HUMAN BEHAVIOR AND ENVIRONMENT: A TANGLE

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ABSTRACT

Behaviourism is the theory of knowledge based on the idea that all behaviours are acquired through governance, and this governance occurs through communion with the environment. In simple words, behaviorism is referred to the way humans behave under a certain condition. Human behavior is directly related to the condition they are in. Human behavior can create or rupture, guard, or wipe out his environment. The present environmental challenges like climate change, pollution, loss of biodiversity, water scarcity, etc are due to the human behavior of over-exploitation of natural resources. Human destroys the environment either due to a lack of knowledge and awareness or due to ignorance. Environmentalism promotes the restoration, preservation, and improvement of the natural environment and the critical earth systems. It focuses on the protection of climate, controlling pollution, and protecting plant and animal diversity. Environmentalism also focuses on maintaining the balance between the relationship between humans and the natural environment in a manner so that all the components are under a proper degree of sustainability. Although the measure and outcome of the balance are controversial and there are many other ways to express environmental concern. Environmental concerns are dependent on environmental awareness and the practice of environmental concerns is related to human behavior. The way humans behave reflects the degree of their consciousness about the environmental concern.

***Keywords*:** Behaviour, environment, sustainability, environmentalism, behaviorism

1. Introduction

Environment and human behavior are correlated and have immense influences on each other. While some schools of thought claim that the surrounding environment shapes human psychology and behavior to some extent. On the other hand, the environment is highly being altered, polluted, degraded, or even conserved by a human. Here we've attempted to re-evaluate the connections between these. There are handful numbers of research on environmental psychology and vice-versa, and here we will be discussing a few.

As a few psychologists opined, the environment has ever been regarded as a platform that could be used for free. In any psychological investigation, the environment has been spotted as a disturbance or interference that people receive from outside. In certain cases, these noises have been reduced to the highest to perceive a good result. Though in real-time studies, it is indeed accepted that environment is not to be ignored; rather it should be considered an indispensable and critical factor that has an impact on human psychology and behavior. Hence, the ecosystem or environment isn't a valueless stage on which humans can perform as per their wish; rather the stage may shape the performance as required. Although psychology, as a discipline asserts that only the human being should be in focus. Environmental values are being carried by humans as the investigations portray.

Besides, there's a huge difference between human attitude and behavior, whatever people claim regarding their consciousness towards the environment, is not always the same as they act in reality. Sometimes, we regard the environment simply as an illusion, but numerous records are there to prove that environment has got an enormous ability to come up with feedback on human activities directly. Environment shapes psychology, hence human psychology is highly dependent upon the surrounding environment of an individual, be it social, cultural, economic, or educational.

In a few earlier studies, dissimilarities have been identified between the behavior of the city dwellers and that of the rural people. The keenness for helping others, i.e., interpersonal relations have been studied to drop as urbanization took place (Krupat, 1985). Aggressiveness is found to be common with the so-called improvement of civilization. Individualism, self-centeredness, social withdrawal, detachment, and egoistic behavior are common among the men in the cities (Korte and Grand, 1980; Moser and Uzzell, 2003; Steg, Norlund, 2018).

2. Environment shapes human behavior

2.1. Environmental Determinism, Possibilism, and Neo- determinism

Environmental Determinism

In the late 19th century, German geographer Friedrich Ratzel proposed the theory of Environmental Determinism that was influenced by the "Origin of Species"- by Charles Darwin. This was followed by the introduction of the determinism theory in the early 20th century by Ellen Churchill Semple, a student of Retzel. As per the philosophy, human psychology is entirely influenced by their environment and climate. This eventually influences the societal culture, work culture, and habits. The attainments of civilization in a particular continent depend upon its geographical location, and climatic conditions (Ratzel, F., 1896).

Environmental Possibilism

A French geographer, V. De La Blanche opined that the environment doesn't control the entire societal and cultural behavior of humans, rather it offers possibilities or options that man could opt for. By 1950, environmental determinism had almost been replaced by the concept of environmental possibilism. The crux of the theory is, that the environment is there with several possibilities, it is the human who has to select the proper one for living, human is not only the product of nature, they're the administrator to decide from the options given by the nature, nature is only the adviser for human, man can sometimes manipulate the possibilities by his intellectual supremacy and grow crops or fruits in the adverse climatic conditions. The thought has been greatly criticized in several ways, most importantly, that humans can never control the physical power of nature despite having presumed possibilities.

Neo- determinism

In 1920, the Australian geographer Griffith Taylor proposed a new concept stating that environmental condition determines a country's economic foundation. Humans can speed up, slow down, start or stop the developments but be off from the geophysical (elevation, soil, slopes, landforms, and so on) and climatic (temperature, precipitation, humidity, and so on) conditions (if wise) that nature has provided. Man can control the "stop and go" mechanism with the options. Neo-determinism says, every choice made by a human, be it for the environment or against it, is sure to get paid off by the ecosystem.

2.2. Human behavior and built environment

Now, coming to the modern scenario of living and mindset of humans and its relation to the surrounding environment. People's frame of mind is dependent upon the surrounding built environment *viz*., indoor air quality, availability of light and air, ambient temperature, weather conditions, access to greeneries, noise, and so on. Several studies show detrimental impacts of continuous exposure to darkness on the mental health of man whereas, daylight offers positivity amongst them. Even few health-care institutions reveal that the speed of recovery is correlated to the cabins allowing daylights. Besides, a prolonged sight of the greeneries impacts better analytical ability, control of emotions, and self disciplines in social and personal life. On the other hand, a person having lesser access to nature might be suffering from dejection, fretfulness, mindlessness, and so on.

Apart from the surrounding natural environment, the immediate built environment in which humans live is greatly responsible for human psychology-led behaviors. For instance, the gathering of humans, living in a congested locality; or even a household having a bigger number of family members might direct the behavior of the inhabitant in either way; being annoyed or being happy for the gathering. Thus, privacy is vital for the mental health of a good number of individuals. A few other factors that might influence the health of the human mind are the color of the walls, images, and vibes of the home, or the workspace as the researchers suggest. In the case of the workspace, another driving force is the ambient noise; it even can hamper the professional abilities of the employees. A healthy ambiance (or environment) is essential for healthy minds and bodies, and only a healthy and sensible human can perceive the significance of a healthy environment.

3. Human behavior and environment

The studies on the confluence of the human psyche and environmental health are the newest thoroughfare of recent day research.

Several dynamic models are being designed based on the variability of one against the other factor. This particular school of study is the need of the hour to approximate how far we are from sustainable earth. Researchers are aiming to anticipate the target behaviors which are outright pernicious for the ecosystem. This would bring out the possible way-outs which might be effective to drive the behaviors to be in favor of environmental protection.

The global thinkers are almost sanguine that it is human activity that contributes the most to the global climatic changes. The variations in weather, landforms, etc. make the inhabitants relocate which has substantial aftermath, especially on the psychological health of the man. We might not claim that only ecological security is at risk where the psyche of humans is in insecurity too. Civilization has shaped the physical environment in different ways. The concern was raised during the mid-twentieth century and since then people are busy in the study regarding this particular interface. Apart from climate change, loss of biodiversity, air, water, soil, and noise pollution are also crucial (Swim, Clayton, and Howard, 2011; Miles-Novelo and Anderson, 2022).

3.1. Pro-Environmental Behaviour (PEB)

Pro-environmental behavior is such behaviors that drive the human being to act environment friendly. Several facets effectively block the pro-environmental behaviors of the individuals. Psychological disengage might be the vital one all. Social, economic, and cultural hindrances are external whereas, behavioral is an entirely internal aspect that can be believed to be the function of emotions, thoughts, reliance, knowledge, confidence, and so on (Krajhanzl, 2010).

3.1.1. PEB and Human Psychology

Let's have look at the "Dragon of Inaction.." as proposed by Robert Gifford in 2011 (Gifford, 2011); here, he categorizes all these barriers into seven major categories, *viz.*, Limited Cognition (less or no awareness), Ideologies (the worldwide belief that clashes with environmental management strategies), Social Comparison (routine comparison with the activities of the surrounding people), Sunk Costs (investments nullifying alternative prospects), Discredence (incredulity in environmental problems and the policymakers as well), Perceived Risks (worried about whether the investments for the environmental benefits would pay off or not), and Limited Behaviour (tendency to opt for the easier alternatives than that of the eco-friendly ones) which are liable for eco-friendly inaction of man (Kollmuss and Agyeman, 2002; Gifford, 2011).

4. Conclusions

Environmental problems are burning issues of this era and several environmental policies and environmental protection acts are being taken for the improvement of the health of the environment. But how does environmental condition have reached such a sensitive state? The relationship between humans and the environment is a complex yet interesting concept to discuss. From the beginning of time human has developed a complex relationship with the environment around them. The interaction between the primitive human society and strong forces of nature has developed and established certain human practices and behaviors according to the physical environmental conditions. Human behavior depends upon numerous factors, and the relation between the psyche and ecosystem is complex indeed. Environmental awareness, education, and training amongst the population might influence the brains of all age groups and frequent and effective sessions along with monitoring of the day-to-day behavior could make a big difference by escorting society to a sustainable one.

References

1. Gifford, R., (2011), The Dragons of Inaction Psychological Barriers That Limit Climate Change Mitigation and Adaptation, American Psychological Association Vol. 66, No. 4, 290–302 DOI: 10.1037/a0023566.
2. Kollmuss, A., Agyeman, J., (2002) Mind the Gap: Why do people act

environmentally and what are the barriers to pro-environmental behavior?, Environmental Education Research, 8:3, 239-260, DOI: 10.1080/ 13504620220145401.

3. Korte, C., Grant, R., (1980), Traffic Noise, "Environmental Awareness, and Pedestrian Behavior", Environment and Behavior Volume: 12 issue: 3, page(s): 408-420.
4. Krajhanzl, J., (2010), Environmental And Proenvironmental Behavior, School and Health 21, 2010, Health Education: International Experiences, 251 -274.
5. Krupat, E. (1985). People in cities: The urban environment and its effects. Cambridge University Press.
6. Miles-Novelo, A., & Anderson, C. (2022). Climate Change and Human Behavior: Impacts of a Rapidly Changing Climate on Human Aggression and Violence (Elements in Applied Social Psychology). Cambridge: Cambridge University Press. doi:10.1017/9781108953078.
7. Moser, G. and Uzzell, D. (2003). Environmental Psychology. In Handbook of Psychology, I.B. Weiner (Ed.). https://doi.org/10.1002/0471264385.wei0517
8. Ratzel, F. 1896. History of mankind. Trans. A. J. But- ler. London: Macmillan.
9. Steg, L. and Nordlund, A. (2018). Theories to Explain Environmental Behaviour. In Environmental Psychology (eds L. Steg and J.I.M. Groot). https://doi.org /10.1002/9781119241072.ch22
10. Swim, J, K., Clayton, S., Howard, G. S., (2011), Human Behavioral Contributions to Climate Change, Psychological and Contextual Drivers, American Psychologist, Vol. 66, No. 4, 251–264.

ENVIRONMENT CHALLENGES IN INDIAN BANKING SYSTEM: BAD BANK

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Abstract

A bad bank is created for the purpose of transferring the toxic assets of a regular bank to it so that the balance sheet of the regular bank can be cleaned up. The bad bank then services the transferred assets and liquidates them. During this process the bad bank incurs costs. While creating a bad bank several essential factors have to be kept in mind. Bad banks evolved out of several historical examples and have numerous advantages and disadvantages.

Keywords: Good-bank or bad-bank, Stressed assets, Toxic assets, Asset Reconstruction of banking Company, Fire Sale Externality, Contagion risks.

1. INTRODUCTION

The banks in India have in the recent past accumulated a large number of stressed assets arising from the default in repayment of loans by both corporate and individual borrowers. As per Reserve Bank of India's Annual Report of 2017-18 the stressed assets account for 12.1% of gross advances by banks at the end of March, 2018. The definition of stressed assets in this report includes both gross non-performing assets as well as restructured standard advances. If the gross non-performing assets are taken separately then it will account for about 11.2% of advances at the end of March, 2018. This will amount to about 10.3 lakh crore in monetary terms (CRISIL, 2018). This increased burden of stressed assets gets reflected in the balance sheet of the banks resulting in lower investor confidence and other associated problems. A large number of solutions have been suggested by economists to tide over this crisis and recapitalize the banks. The most prominent among the said suggestions is that of the good bank-bad bank scheme. The Economic Survey of the Government of India for the year 2016-17 suggested the creation of bad banks. This article attempts to critically analyse the concept of bad banks in the background of different historical examples. It also analyses the essential factors to be considered while establishing a bad bank. The pros and cons of bad banks are also discussed.

2. OBJECTIVE OF THE STUDY

The objective of this study is to review different opinion about a bad bank in India.

3. RESEARCH METHODOLOGY

Secondary data collected from various reference books and web resources.

4. WHAT IS A BAD BANK?

A bad bank is an entity established for the purpose of separating the stressed assets held by a regular bank from its performing assets (Öncü, 2017). The said separation is achieved by transferring the stressed assets from the regular bank to the bad bank. When that is done, the stressed assets go out of the balance sheet of the regular bank and it gets recapitalised. Thereafter the regular bank can focus on its normal business activity without worrying about the stressed assets. The task of managing and/or liquidating the stressed assets is left to the bad bank. Since the toxic/stressed assets get removed from the balance sheet of the regular bank, it is often called as the good bank.

5. HISTORICAL EXAMPLES OF BAD BANKS

More than in theory, bad banks evolved in the late 1980's out of the crisis in the banking sector of the United States of America. At that time due to the steep fall in real estate and oil prices, a number of banks were on the verge of collapse and bankruptcy (Bleier, 2008). The most badly hit was Mellon Bank based at Pittsburg, Pennysilvania. That bank was steadily making loss and had to be recapitalized. For this purpose, Mellon Bank

created another bank called the Grant Street National Bank (GSNB). GSNB was not a normal bank which would collect deposits and lend the same. The purpose of creating GSNB was to transfer Mellon Bank's toxic assets to it (McKinsey& Company, 2003). The GSNB would then liquidate those toxic assets and thereafter liquidate itself. The toxic assets of Mellon Bank having an original worth of $ 1.4 billion was transferred to GSNB at a discounted book value of $ 640 million. This purchase was primarily funded by a public issue of extendable pay-through notes and Mellon Bank's shareholder's dividends. (The shareholders of Mellon Bank received GSNB's shares for their dividend value). GSNB which was created in 1988, liquidated all the toxic assets transferred to it and went out of existence in July, 1995 (Bleier, 2008). Mellon Bank on its part began to make profits within about one year of the creation of GSNB (McKinsey& Company, 2003).

The success of the Mellon Bank's case has resulted in the good bank-bad bank approach being adopted both in the USA as well as other countries. The success of GSNB promoted the US government to establish an asset management company called the Resolution Trust Corporation. This corporation took over the task of liquidating those stressed assets of banks declared as insolvent by the Office of Thrift Supervision. The early 1990's saw this corporation liquidating stressed assets worth $394 billion which arose as a result of the saving and loan crisis of the 1980's (Schäfer & Zimmermann, 2009). However this bad bank resolution process cost the US tax payer a total of $ 124 billion (Curry & Shibut, 2000).

Japanese banks have employed the good bank-bad bank technique to restructure their bad debts. In 1992, the Banker's Association of Japan created a bad bank by the name Credit Co-operative Purchasing Company (CCPC). This company purchased the stressed assets of Japanese banks and serviced them (Bleier, 2008). The banks which sold the stressed assets at a discounted valued to CCPC itself financed the said sale by extending a loan for the sale value. The CCPC then sold the real estate property and other assets given as security for the stressed assets and used that money to repay the loan extended to it by the bank which had sold the stressed assets to it (Taniuchi, 1997).

Many countries in Europe have successfully used varying shades of the good bank – bad bank solution to deal with the bad loan crisis in their respective banking sectors. The earliest bad banks in Europe were set up in Sweden. The Swedish government set up two bad banks by the name Securum and Retriva (Schäfer & Zimmermann, 2009). Securum was established in 1992 to take over the stressed assets of Nordbanken, a commercial bank. Securum financed this purchase partly with a loan from Nordbanken and partly with a government equity infusion (Repousis, 2017). At about the same time, Retriva was established for taking over the stressed assets of Gota Bank (Ingves & Lind, 1996). The remaining good assets of Gota Bank were auctioned off and purchased by Nordbanken (Repousis, 2017). Even though that bailout package cost the tax payer a considerable amount, the same was offset by the end of 2007 due to revenues from dividends, selling of stock etc. (Schäfer & Zimmermann, 2009). The two bad banks on their part successfully liquidated the stressed assets taken over by them (Repousis, 2017).

In Germany a bad bank called Berliner Immobilien Holding (BIH) was created in 2006 to separate the stressed assets of a bank called Berliner Bankgesellschaft (Schäfer & Zimmermann, 2009). However, when a bigger financial crisis hit Germany in 2008-09, the German Federal Legislature enacted a law in July 2009 for providing a good bank-bad bank solution which put very little burden on the tax payer. The said law created two separate bad bank models for the private and public banks. For the private banks the German law created a special purpose entity model. Under the said model, private banks transferred their stressed assets at the book value to these special purpose entities. As consideration for such transfer, these special purpose entities issued bonds at 90% of the book value of the stressed assets to the transferring bank. These bonds were guaranteed by a government funded institution called Special Fund Financial Market Stabilisation (SoFFin). The said guarantee is only for redemption at par value.

For such guarantee SoFFin charged the bank a one-time fee as well as a fixed annual sum. For the public banks, the German law created a 'Consolidation Model'. Under the said model the public banks could transfer not just stressed assets but also other type of assets including business divisions which had lost their profit making ability. The fundamental feature of the consolidation model was that certain types of liabilities that were incurred prior to the coming into force of the legislation would be borne by the German Federal and State Governments (Ulrich & Ilgmann, 2013).

In Ireland, a bad bank by the name National Asset Management Agency (NAMA) was established through legislation in 2009 to deal with the crisis in its banking sector arising from the global meltdown in the real estate sector (Honohan, 2009). Under this scheme all toxic assets of a participating bank were transferred to NAMA at a discounted value. Payment to the transferring bank was in the form of Irish government bonds. Once this transfer took place, NAMA was statutorily mandated to liquidate those assets within a time frame of seven to ten years in such a manner as to obtain the optimum financial return. Banks transferred a total of € 74 billion at a discounted value of 57% to NAMA. By mid-2015, NAMA had liquidated more than 70% of its major obligations and is eventually expected to bring profit to the Irish Government by the time it would be wound up (Schoenmaker, 2015).

Spain in the year 2012 created a bad bank by the name SAREB (an acronym short form for a Spanish name which when translated to English reads as 'Company for the Management of Assets proceeding from Restructuring of the Banking System'). The toxic assets of many Spanish banks were transferred to SAREB. As of mid-2016, SAREB held assets worth more than € 50 billion and is expected to profitably liquidate those assets within 15 years of its creation (Blazsek, 2016).

The above brief analysis of important historical examples of bad banks very clearly shows that there is no standard or uniform structure of bad banks. Different countries have created different bad bank schemes to suit their national requirements. However, the basic purpose of the bad banks is same, i.e. to separate (and eventually liquidate) the toxic assets from the balance sheets of the regular banks so as to save the latter from collapse.

6. TYPES OF BAD BANK SCHEMES

As discussed above, the fundamental principle of good bank-bad bank technique is in the separation of the stressed assets of a regular bank from its performing assets (Mínguez, 2016). The purpose of this separation is for enabling a specialized management team to liquidate the stressed assets. For achieving the said separation of assets it is not always necessary that the bad bank and the good bank be separate legal entities. Bad banks can also be created as a separate business entity within the regular bank. Keeping this in mind, it is possible to identify four basic types of bad bank schemes (Martini, et al., 2009). The first type of bad bank scheme is called the on-balance sheet guarantee. Under this scheme certain stressed assets of a bank are protected from further loss under a guarantee agreement whereby the government or some public institution guarantees that the book value of those stressed assets will not go below a certain value. Those stressed assets however, remain in the balance sheet of the regular bank. The second type of scheme is the internal restructuring unit scheme. Here, instead of creating a bad bank as a separate legal entity, an internal bad bank or restructuring unit is created. All the stressed assets of the bank are transferred to the internal restructuring unit which manages the same. In this case also the stressed assets remain in the balance sheet of the regular bank. The third type of bad bank scheme is referred to as the off-balance sheet special purpose entity. In this type of scheme the regular bank transfers the stressed assets to a special purpose entity which is usually public funded. It results in the stressed assets being taken off the balance sheet of the regular bank. The fourth type of bad bank scheme is called as the bad bank spin off. In this type of scheme a separate legal entity called the bad bank is established and the stressed assets of the regular bank are off loaded to the bad bank. The bad bank is a separate legal entity and it usually has a banking license. This results in the stressed assets being taken out of the balance sheet of

the regular bank. It is this fourth type of scheme that is normally referred to as the good bank-bad bank scheme.

It may be noted that when a separate bad bank is established, it could be used to service the toxic assets of one bank or several banks. Also the bad bank may be established by a single bank or a consortium of banks.

CONCLUSION

The above analysis will clearly show that the basic task of the bad bank is to mop up the mess created by the regular banks in relation to the management of their toxic assets. The toxic assets of a regular bank are transferred to the bad bank not just for the purpose of better management of the transferred assets but also for the purpose of cleaning up the balance sheet of the regular bank. This process however involves some costs. As long as these costs are borne by the concerned banks or private players, the impact on the economy will be limited and the government need to have only a regulatory control over the entire process. However, if these costs are financed with tax payer's money, a mere regulatory control by the government agencies will not be sufficient and a more strict and watchful control of the bad banks by the government will be necessary.

In India, as of now a large number of bad banks (called as asset reconstruction companies) registered under the Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002 are functioning. These banks are primarily financed by those regular banks whose toxic assets they service and liquidate. The said legislation provides the Reserve Bank of India with sufficient powers to exercise regulatory control over those bad banks. However, it is highly doubtful, whether the said regulatory powers conferred on the Reserve Bank would be sufficient to ensure the efficient functioning of any public funded bad bank that may be established in pursuance of the suggestions made in the Economic Survey of the Government of India for the year 2016-17. More stringent legislation will be necessary.

BIBLIOGRAPHY

1. Aggarwal, S., Aritomo, K., Brena, G., Clark, J., Guse, F., & Harle, P. (2012, April). Good Riddance - Excellence in managing wind-down portfolios. *McKinsey Working Papers on Risk, Number 31*. McKinsey & Company.
2. Blazsek, V. (2016). A comparative analysis of the bad asset management companies of Spain and Hungary:the devil is in the details. In A. M. Deligkari, & K. T. Mabe (Ed.), *Queen Mary Law Journal Special Conference Issue. 7*, pp. 69-78. London: Queen Mary Law Journal.
3. Bleier, M. E. (2008). *From 'Bad' Bank to 'Good'.* Pittsburg: reedSmith.com.
4. Bolzico, J. , Mascaro, Y., & Granata, P. (2007, November). Practical Guidelines for Effective Bank Resoultion. *Policy Research Working Paper. No. 4389*. Washington D.C., USA: The World Bank Latin America and the Caribbean Region Poverty Reduction and Economic Management Department.
5. CRISIL. (2018, June 5). *Rs.5 lakh crore slippages to NPAs in fiscal 2018 mars banks' profitability*. Retrieved December 20, 2018, from https://www.crisil.com: https://www.crisil.com/en/home/newsroom/press-releases/2018/06/rs5-lakh-crore-slippages-to-npas-in-fiscal-2018-mars-banks-profitability.html
6. Curry, T., & Shibut, L. (2000). The Cost of the Savings and Loan Crisis: Truth and Consequences. *FDIC Banking Review, 13*, 26-35.
7. Elliott, D. J. (2009). *"Bad Bank", "Nationalization", "Guaranteeing Toxic Assets": Choosing among the options.* Massachusetts Ave., NW, Washington, DC: The Brookings Institution.
8. Gandrud, C., & Mark, H. (2013, October 28). Bad Banks as a Response to Crises: When Do Governments Use Them, and Why Does Their Governance Differ? San Francisco, CA, USA.
9. Honohan, P. (2009). Resolving Ireland's Banking Crisis. *The Economic and Social Review, Economic and Social Studies, 40*(2), 207-231.

10. Ingves, S., & Lind, G. (1996). The Management of the Bank Crisis - In Retrospect. *Sveriges Riksbank Quarterly Review, I*, 5-18.
11. Ingves, S., Seelig, S. A., , & Dong, H. (2004, May). Issues in the Establishment of Asset Management Companies. *IMF Policy Discussion Paper*. Washington D.C., United States of America: Monetary and Financial Systems Department, IMF.
12. Klingebiel, D. (2000, February). The Use of Asset Management Companies in the Resolution of Banking Crises: Cross-Country Experiences. *Policy Research Working Paper No. 2284*. Washington D.C., USA: The World Bank Financial Sector Strategy and Policy Group.
13. Martini, L., Stegemann, U., Windhagen, E., Hueser, M., Schneider, S., Poppensieker, T., et al. (2009, August). Bad banks: Finding the right exit from the financial crisis. *McKinsey Working Paper on Risk No: 12*.

a. McKinsey& Company. (2003). *Managing Successful Bank Restructuring: The Mellon Bank Story*. Emerging Markets Financial Institutions Group.

14. Schäfer, D., & Zimmermann, K. (2009, June). Bad Bank(s) and Recapitalization of the Banking Banks. *IZA Policy Paper No. 10*. Bonn, Germany: Institute for the study of Labor.
15. Schoenmaker, D. (2015). Stabilising and Healing the Irish Banking System: Policy Lessons. *Ireland Lessons from its Recovery from the Bank-Sovereign Loop* (pp. 39-70). Dublin: International Monetary Fund Publication Services.
16. Taniuchi, M. (1997, May). Recent Developments in Japan's Financial Sector -- Bad Loans and Financial Deregulation --. *Discussion Paper No. 76*. Tokyo, Japan: http://www.esri.go.jp.
17. Ulrich , S., & Ilgmann, C. (2013, June). Bad banks: a proposal based on German financial history. *European Journal of Law and Economics, 35*(3), 367-384.

a. Woo, D. (2000, March). Two Approaches to Resolving Nonperforming Assets During Financial Crises. *IMF Working Paper (WP//00//33)*. Monetary and Exchange Affairs Department, IMF.

MONITORING AND ASSESSMENT OF WATER QUALITY AT CONFLUENCE OF GODAVARI AND KADVA, AT DIFFERENT POINTS, NASHIK

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ABSTRACT

The present investigation was done on physicochemical assessment of some water samples at three different locations at confluence of Godavari and Kadva river. Looking at the importance of understanding physicochemical properties of water in a water body for supporting various biotas, a study was planned to find out physicochemical status of water at confluence of Godavari River and Kadwa River at different locations. the study shows that, the river is less polluted at Manjargaon& moderate at Dam . It is believed that continuous pollution of the water sources by various human activities may lead to some health problems to human. The TDS of NandurMadhmeshwar Bird sanctuary was well above the desirable limit the average of Alkalinity has exceeded the desirable limits which are due to improper drainage system of the different units. From the recent study we can conclude that the River water of NandurMadhmeshwar Dam is not fit for domestic & drinking purpose need treatments to minimize the contamination especially the hardness. The values of correlation coefficients & their significance levels will help in selecting the proper treatments to minimize their contaminations of River water Godavari at NandurMadhmeshwar dam .

KEYWORDS Physicochemical Assessment, Godavari, Kadwa, NandurMadhmeshwar.

INTRODUCTION

Nashik is an ancient holy city in Maharashtra, a state in western India & Northwest region of Maharashtra. Situated on the banks of Godavari river. Nashik is best known for being one of Hindu pilgrimage sites, that of KumbhMela which is held every 12 year's. Nashik is the fourth largest city of Maharashtra after Mumbai, Pune & Nagpur. The city located about 190 km north of state capital Mumbai, is called the "wine capital of India" as half of India's vineyard & wineries are located in Nashik. It is situated in the northern part of Maharashtra state at 584 m (1,916 ft) from the mean sea level, which gives it Ideal Temperature variation. particularly in winters. Nashik city is governed by Municipal Corporation which comes under Nashik metropolitan region. As per provisional reports of census India, population of Nashik in 2011 was 1,486,053 of which male & female were 782,517 & 703,536 respectively. Nashik lies on the western edge of the Deccan plateau, Which is likewise a volcanic plateau. The city had transformation from a little town to a present city in the latest two decades & it is the third most Industrialization city in the state after Mumbai & Pune.

According to surveys carried out on selected stretches of important rivers, it luas been found that most of the rivers are highly polluted. The domestic sewage discharged from a population of about 2 million gives rise to numerous water - borne diseases like typhoid, cholera, dysentery, poliomyelitis &Cysticercosis, their by affecting the human health & decline of the water quality. Water is a basic resource on the earth, which maintains its prominence among all natural resources. As a companion of nature, water provides the basis for all living organisms on the carth. Its distribution on the earth is found in many forms at various places. Its form keeps changing according to location & climate.

It remains in gaseous form in atmosphere as water vapour, in solid form as micro snow granules and in liquid form as drops of water. All these forms keep changing because of temperature & they affect weather patterns. Aquatic organisms need a healthy environment for survival.

The Kadva rises in the Sahyadris to the north-west of DindoriTaluka in the angle between the former and the Satmala Range, and crosses Dindori from north-west to south-east.

It is rocky both in bed and bank, but the bed is wide, and the average volume of water is small compared with the area through which it flows. Irrigation works of considerable importance have been established on it. At its confluence with Godavari, a pick-up weir has

been constructed, raising the upstream water levels resulting in formation of the NandurMadhyameshwar reservoir. The back waters of this reservoir harbors rich flora & flora and has been deemed as the NandurMadhyameshwar Bird Sanctuary. It witnesses migratory birds belonging to different species arriving here in huge numbers during the winter season. Total length of this river is 74 km up to NandurMadhyameshwar Dam with a total drainage area of near about 1664 km. The chief project on Kadwa River is the Karanjwan Project. The construction work of Karanjwan Dam started in 1968 and was completed in 1974. This dam supplies water to Palkhed Dam from where canal networks begin. This project has its canal network of around 12 km. Another significant project is the Ozarkhed Project on Unanda River. Its construction work started in 1974 and was completed in 1984. Another major project on Kadwa River is Palkhed Dam. Its construction work started in 1971 and was completed in 1976. Construction work of Waghad Dam, another vital project on Kolwan River started in 1976 and was completed in 1984. The term water pollution is referred to any type of aquatic contamination. A highly enriched, over productive biotic community such river or lake with nutrients from sewage or fertilizer called eutrophication. The physical & chemical properties of water immensely influence uses of a water body for the distribution & richness of biota. Each factor plays its own role but at the same time the final effect is the actual result of the interactions of all the factors. These factors serve as a basis for the richness or otherwise biological productivity of any aquatic environment. Looking at the importance of understanding physicochemical properties of water in a water body for supporting various biotas, a study was planned to find out physicochemical status of water at confluence of Godavari River and Kadwa River at different locations.

The objectives of present study was

1)To determine the toxicity of Water.

2) To analysis the Water quality.

3) To determine water contents & minerals.

STUDY AREA

NandurMadhmeshwar Bird Sanctuary is located in Niphad Tehsil of Nashik district in Western Maharashtra. A stone pick up weir was constructed in 1907-13 across the river Godavari just below the confluence of Kodwa and Goadavari rivers at NandurMadhameshwar. The water level is always fluctuating in NandurMadhameshwar Lake. Located near Niphad in Nashik district, NandurMadhmeshwar is a large water storage reservoir, created by the construction of a dam at **the confluence of the Godavari and the Kadva**rivers. The lake is a pick-up weir constructed in 1907-1913 on the Godavari river to supply water for irrigation.

Over the years, the water released from Gangapur and Darana water reservoirs is stored at NandurMadhmeshwar and subsequently released from here through canals for irrigation. Huge quantities of silt and organic matter carried in the past 90 years have accumulated in the lake, due to which islands, shallow water ponds and marshlands have been created. This has resulted in a good wetland habitat for birds. It has been aptly described as the Bharatpur of Maharashtra (Rane 1983). The Nandur-Madhmeshwar irrigation dam and the catchment areas are surrounded by sugarcane, onion, jowar and wheat fields, and grape orchards. There is no forest around this wetland (Rane 1983). The reservoir fills with monsoon runoff between July and September, and attracts several species of migratory birds between September and March. The water level fluctuates, depending upon the usage. This is quite suitable for waterfowl and waders, as most of them prefer shallow water, mudflats and marshes. Three large islands are also present within the waterbody. About 23 small satellite lakes are present within a radius of 25 km around the reservoir, adding to the overall importance of the region. About 463 species of plants have been identified (Kumar et al. 2002), of which nearly 80 are aquatic.

Manjargaon is a Village in NiphadTaluka in Nashik District of Maharashtra State, India. It belongs to Khandesh and Northern Maharashtra region . It belongs to Nashik Division . It is located 39 KM towards East from District head quarters Nashik. 205 KM from State capital Mumbai.

MATERIALS AND METHODS

Sampling sites selection depends on population. Selected areas having high population as compare to others. Most of the peoples live into these areas. Schools, College, hostels are also situated in these areas, so water used by peoples are suitable or not for drinking and other purposes. Because of anthropogenic activities ground water becomes polluted Six visits were made during the study period to collect water samples for analysis, Plastic containers of two liters capacity have been used. Surface water samples collected from three different station of Godavari River namely A, B & C between 8 am to 10 am. The sample was collected in three separate clean containers and labeled station wise to indicate date, location & Brought to the laboratory to the analysis.

water temperature (WT), pH & turbidity was analyzed at the field station itself while dissolved oxygen was fix in separate B & C bottles. Analysis of other parameters such as total Hardness (TH), chlorides (CI), BOD, TDS, & Alkalinity vere carried out in the laboratory. Two stages systematic sampling design were followed. Water was collect in such manner so that no air bubble could form and will be taken into the laboratory for further procedure. Samples were collected by using a sterile polythene bottles or by water sampler or a using glass. Where the shallow and deep water sampling is must be done. Sample can be collected by covering a close bottle to the bottom. The bottles were filled leaving no air space and the bottle was sealed to prevent any leakage. The sampling time is morning they should be 8 to10am in a time. A accurate sampling should be collect by water handling immediately after collection of water sample label it. Each container was clearly marked with the name and date of sampling.It should be protect from direct sunlight during transportation. The temperature of water should be recorded immediately. - The sample for chemical, biological and physical analysis should perfectly be collected separately.

Water sample were brought to the Laboratory and analysis was carried out by following the standard physicochemical methods (APHA) American Public Health Associate (1987). After the samples will be brought in lab, the sample analysis for following physicochemical parameters are the Total solid, Biological Oxygen Demand, Total Hardness, Chloride, Alkalinity. The Physico-chemical parameters of water:

1. pH
2. Temperature
3. Colour 4. Turbidity
5. Dissolved Oxygen
6. Biological Oxygen Demand (BOD) 7. Total Dissolve Solid (TDS)
8. Chloride
9. Alkalinity
10. Total Hardness

OBSERVATIONS

The analyzed physicochemica! parameters were arranged into the table to understand water quality. A comparative study of these parameters has done to understand the Monthly variation. The details of three sampling locations are tabulated as (Table 1 to Table 4). The result of physicochemical parameters observed from different sites were tabulated in Table 2 to Table 4

Table no.1 Water Colour:

Month	**N.M.Bird Sanctuary**	**N. M. Dam**	**Manjargaon**
Dec2021	Colourless	Colourless	Colourless
Jan2022	Muddy colour	Muddy colour	Muddy colour
Feb2022	Colourless	Colourless	Colourless
Mar2022	Colourless	Colourless	Blackish
Apr2022	Colourless	Colourless	Blackish
May2022	Colourless	Colourless	Colourless

Table no.2 Water quality parameters of NandurMadhyameshawar Bird Sanctuary (2021-22):

Month	pH	Temp.	BOD	TDS	Turbidity	DO	Chloride	Total Hardness	Alkalinity
Dec	6.6	20	4	14.6	16.4	7.7	63.5	96	60
Jan	7	22	8	10.1	17.6	6.1	59.5	104	80
Feb	7.8	19.1	10	17.7	19.1	7.1	43.6	136	100
Mar	1.4	17.7	6	6.2	18.1	5.3	41.6	108	80
Apr	7.6	18	3.2	7.8	16	7.5	25.1	140	120
May	7.7	21	4.2	1.2	17.4	5.1	39.7	154	160

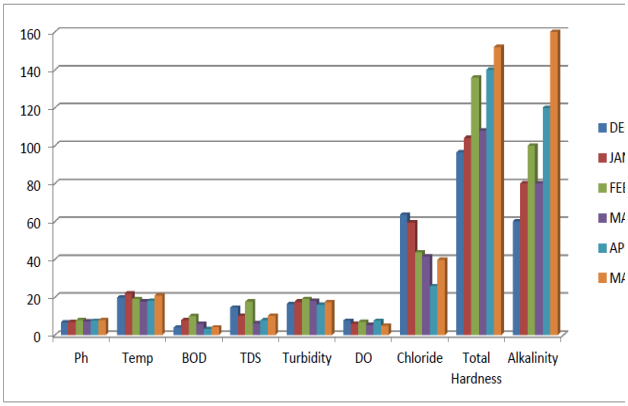
Table no.3 Water quality parameters at NandurMadhyameshwar Dam (2021-22):

Month	pH	Temp.	BOD	TDS	Turbidity	DO	Chloride	Total Hardness	Alkalinity
Dec	7.1	21	25	25.9	14	4.3	95.2	108	120
Jan	7	22	19	13.5	24.9	5.6	61.5	132	140
Feb	7.9	20.4	18	27.9	16.5	6.8	79.4	140	160
Mar	7.5	19.1	18.5	11.4	26.4	5.1	71.4	156	166
Apr	7.6	20	6.93	10.14	24.3	3.8	51.6	176	212
May	7.5	21.7	29	22	28.7	5.1	43.6	156	226

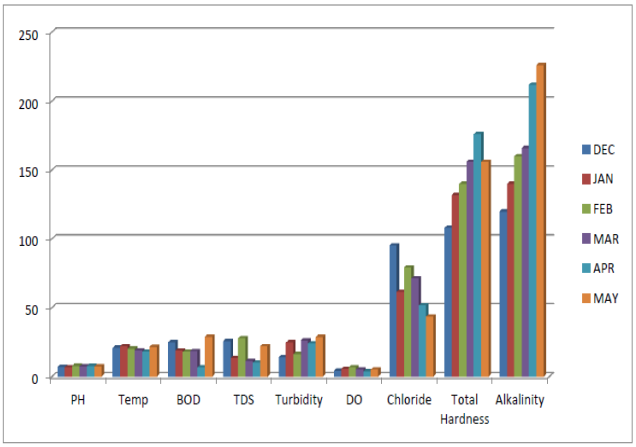
Table no.4 Water quality parameters of Manjargaon (2021-22):

Month	pH	Temp.	BOD	TDS	Turbidity	DO	Chloride	Total Hardness	Alkalinity
Dec	7.2	20	26	26.6	40	4.6	97.2	120	140
Jan	6.9	23	20	17	26.6	6.8	87.3	160	160
Feb	7.5	21	24	30.2	40.5	7.2	107.2	184	180
Mar	7.7	19	18	14.5	30.5	6.3	99.2	200.1	200.5
Apr	7.8	18	6.25	12.4	26.4	4.1	111.1	244	220
May	8	22	4.2	11.5	28.8	3.9	115.1	164	240

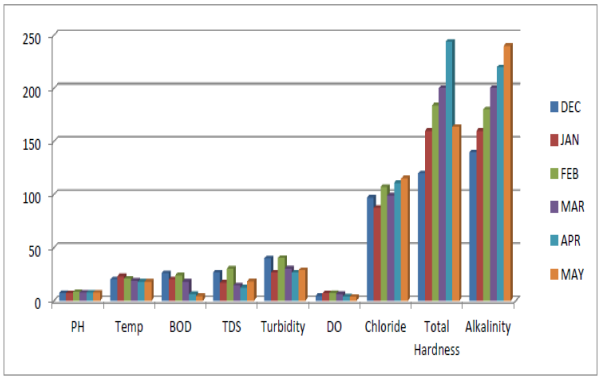
Water quality parameters of NandurMadhmeshwar Bird Sanctuary (2021-2022)



Water quality parameters of NandurMadhmeshwar Dam (2021-2022)



Water quality parameters of Manjargao Village(2021-2022)



RESULTS AND DISCUSSION

The physicochemical variation details are mentioned in the table 1 to 4 and the same is represented in the graphical form. The data shows that the temperature on the different locations of Godavari River ranged between 17.7 to 23°C which was decreased in the month of February 2022 at NandurMadhmeshwar Bird sanctuary and increased in the month of April . In the present study the pH values are ranged from 6.6 to 8 at three different locations of Godavari River. The highest pH at same stations could be due to bicarbonates and carbonates of calcium and magnesium in water. Colour variation at the different stations of Godavari River indicates that, In the month of January the colour of water three locations were similar but at Manjargaon the water colour was black in the month of December and January. The concentration of dissolve oxygen in the Godavari River at different locations ranges from 3.8 to 7.7 mg/1. The

depletion of dissolve oxygen values indicates that the Godavari River was polluted. Similar result were reported by BawaKalapna .V. et.al., (2013). The concentration of hardness in the Godavari River water at three different locations ranges from 96 to 244 mg/1. Hence it may be due to mixing a urban run off.

The concentration of hardness in the Godavari River water at three different stations ranges from 96 to 244 mg/1. Hence it may be due to mixing a urban runoff. The concentration of Chloride in the Godavari River water ranged 60 to 240 mg/ 1 at three different sampling locations. Similar concentration of Chloride Observed by BawaKalpanaV.et.al.,(2013). The turbidity of the water ranged 14 to 40.8 NTU. The concentration of Biological Oxygen Demand (BOD) in the Godavari River water ranged from 4 to 29 mg/ 1. The low BOD content indicates the good quality of water, while a high BOD indicates polluted water. When BOD level is high, DO level decrease because of oxygen available in the water is consumed by the microorganism present in the water. The concentration of TDS in the Godavari River water ranged 6.2 to 30.2 mg/l at three different sampling locations . The effects of water pollution are not only devastating to people, but also to animals. Due to it aquatic life may destroy and reduces reproductive ability. The present study shows that, the quality of water at different sampling locations may not be suitable for aquatic life as well as for using domestic purposes. The water quality parameters pH, Temperature, alkalinity, Hardness, chloride, BOD, DO. TDS, Turbidity, etc. The highest pH (7.9) and Temperature (22) were recorded in the month of February at NandurMadhmeshwar Dam &Manjargaon . The highest hardness was reported at Manjargaon in the month of January. The highest Alkalinity was recorded in the month of February at NandurMadhmeshwar bird sanctuary .

Hence, the study shows that, the river is less polluted at Manjargaon& moderate at Dam . It is believed that continuous pollution of the water sources by various human activities may lead to some health problems to human. The TDS of NandurMadhmeshwar Bird sanctuary was well above the desirable limit the average of Alkalinity has exceeded the desirable limits which are due to improper drainage system of the different units. From the recent study we can conclude that the River water of NandurMadhmeshwar Dam is not fit for domestic & drinking purpose need treatments to minimize the contamination especially the hardness. The values of correlation coefficients & their significance levels will help in selecting the proper treatments to minimize their contaminations of River water Godavari at NandurMadhmeshwar dam .

REFERENCES

1. H.C.Kataria and Santosh Ambhore, (2012), A Study on Seasonal Variation in the physicochemical Assessment of MPN and Fluoride Analysis of Dankne Water of Gandhinagar Area of Bhopal. Current World Environment. vol7 (2) 301-303.
2. JyotiprakashG.Nayak and DrL.G.Patil, (2016). Assessment of Water quality of Godavari River at Nashik, Maharashtra, India. International Jour3of Civil Engineering and Technology, Vol 7, Issue 1, pp 83-92.
3. KolheBharati G and Shinde Satish M. (2014), Study of some Physicochemical Parameters of Godavari River Water T Ramkund, Nashik with Reference to Correlation Study.Paripex Indian Journal of Research. vol 3,1ssue5, ISSN 2250 1991
4. ManjushaBhor, Prakash Kadave, AbhijitBhor, SheetalBhor, Manisha Bhosale.
5. Bholay A.D. (2013), Water Quality Assessment of the River Godavari, At
6. Ramkund, Nashik, (Maharashtra), India. International Journal of Engineering and Science. vol 2, Pp 64-68.
7. Minu Kumar, L.K Mudgal&A.K.Singh (2013), comparative studies of physicochemical parameters of two reservoir of Narmada river, MP, India.

Current World Environment, vol 8 (3), 473-478.

8. Mukesh Kumar Jogi, Naresh Kumar, Sukhvinder Singh Purewal, Pradeep Ganguly and Nidhi Bansal, (2014). Comparative Analysis of Physicochemical properties of water from different locations of Distt. Alwar, Rajasthan, India.
9. International journal of Current Research, vol 6, Issue 03, pp 5865-5868. . Nitin AnandraoKamble&A.B.Sarwade (2015), evaluation of physicochemical parameters of river krishna, Sangli Maharashtra. Octa Jou6 of Environmental Research. ISSN: 2321-3655.
10. Padghan P.D (2013), comparative study of physio chemical characteristics of river Godavari in district Parbhani (M.S) India. International Journal of Environmental Sciences,vol 4, No 2.
11. R.K.Gujar and B.C. Jat (2007), Textbook of Geography of Water Recourses. .Ravi Kumar Gant Khare, Jaspal Singh and A.P. Singh, (2012), Assessment of Physicochemical properties of water: River Ramganga at Bareilly, U.P. Journal of Chemical and Pharmaceutical Research, vol4 (9):4231-4234.
12. ReetaBajpai, M.Sc., Ph.D. (2012). Comparative Ana6of Physicochemical Parameters of Haddeo River Barrage and Arpa River Water Samples of Bilaspur Region. International Journal of Scientific and Research Publications, vol2, Issue 9, ISSN 2250-3153.

ENVIRONMENTAL ISSUES AND SUSTAINABLE ECONOMIC DEVELOPEMTN OF INDIA

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"***Sustainable development is the development that meets the needs of the Present Generation without compromising with the need of Future Generations."***
(Define by Brundtland Commission Report "Our Common Future" in 1987)

ABSTRACT

A study of environment refers the study of interrelationship between biotic (living elements) and abiotic (physical and non-living resources) components of the environment. Environment provides renewable and non-renewable resources; it sustains life by providing genetic and bio diversity etc. Sustainable development of an economy is crucial for any country. With the rapid growth of population, urbanization, constructions, industries and other economic sectors in recent years has affected and continuously degrading the environment globally. The development community and 193 member-states of the United Nations as the development agenda from 2015 to 2030 have set Sustainable Development Goals (SDGs) to be achieved by 2030. India follows a holistic approach for achieving the SDGs. Current flagship policies and programmes of Government of India such as Swachh Bharat Mission (SBM), Beti Bachao Beti Padhao (BBBP), Pradhan Mantri Awas Yojana (PMAY), Pradhan Mantri Jan-Dhan Yojana (PMJDY), Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY) and Pradhan Mantri Ujjwala Yojana (PMUY) have been contributing towards achieving the SDGs. To achieve SDG – 6 (Clean Water and Sanitation) the ***Namami Gange Mission*** *was launched as a priority programme with a budget outlay of Rs.20,000 crores. Major components include sewerage project management, urban and rural sanitation, tackling industrial pollution, water use efficiency and quality improvement, ecosystem conservation and Clean Ganga Fund, among others. It is time for the global community to exhibit the requisite momentum to act upon their responsibilities on establishing the enabling environment for sustainable development and climate actions. India's NDC (Nationally Determined Contribution) has set clear targets for achieving its climate goals. However, a substantial scaling up of financial resources and technology are needed to implement this target by 2030. It is found after reviewing the available literature relating to this burning issue of climate change and the initiatives taking place for overcome the situation globally that the continuous contribution is needed by all the countries with a long term vision of environment protection and sustainable development. Collective efforts right from individuals, NGOs, corporate and government needed to move together in the same direction of safe and secure environment to live in this beautiful earth.*

Keywords: *Climate Change, Environment Degradation, Ecosystem, Sustainable Development.*

Introduction

Sustainable development of an economy is crucial for any country. With the rapid growth of population, urbanization, constructions, industries and other economic sectors in recent years has affected and continuously degrading the environment globally. Can we are ready for such economic development at the cost of our health? Is this kind of development will be rational for our future generation? What are the current issues have to be considered with economic development? What are the responsibilities of stakeholders of economy and remedies which may results sustainable development of economy in true sense are the issues have to be discussed and find out solutions over it.

This research paper will specifically focus the present environmental issues, challenges and remedies/alternatives through which protecting environment in which we live and the sustainable economic development. It will also highlight the initiatives of the Government of India in this regard.

Current Environmental Issues in India

According to the latest report of IPCC (Intergovernmental Panel on Climate Change) published in April, 2022, specifically warns as "now or never" to take seriously the global warming to 1.5 degrees as the climate change and crisis is accelerating at a vulnerable pace.[1] Globally the deforestation, droughts, air and plastic pollution and other such factors are affecting climate change. Some of the major

environmental issues in India are highlighted below.

1. Degrading Air Quality Index.
2. Rampant Environmental Degradation.
3. Loss of Biodiversity.
4. Urbanization in the Himalayas.
5. Loss of Resilience in Ecosystems.
6. Lack of Waste Management.
7. Depletion of Resources (land, air, water).
8. Growing Water Scarcity.
9. Pollution from industries (air and water).
10. Lack of Sanitation etc.

These are some critical environmental issues facing not only by our country but are the concerns at globally. The climate changing factors like air and water pollution having global concern and therefore each and every nation has to contribute to control it. In India, the major challenges are extremely high growth in population especially the growing urban centers, air and water pollution and lack of sanitation.

Environment and Sustainable Development

A study of environment refers the study of interrelationship between biotic (living elements) and abiotic (physical and non-living resources) components of the environment. Environment provides renewable and non-renewable resources; it sustains life by providing genetic and bio diversity etc. The environment is providing all these necessities for the smooth functioning of life cycle on the earth. But the developments taking place in the world affecting the environmental capabilities of providing resources and ultimately results in environmental degradation. The pollution and wastes generation is going beyond the absorption capacity of the environment and this is the actual environmental crisis which affecting the sustainable development of economy.

The United Nations Conference on Environment and Development (UNCED) emphasized the concept of sustainable development by defining it as : 'Development that meets the need of the present generation without compromising the ability of the future generation to meet their own needs'.[2] Sustainable development means a development that meets the basic needs of all, particularly the poor majority provided with employment, food, energy, water, shelter, and ensures growth of agriculture, manufacturing and allied services to fulfill these needs. Providing these needs to the targeted segment it has to be ensure that the there should be a minimum depletion of resources, growth of agriculture, development of all economical sectors including manufacturing and service sectors, all should grow but not at the cost of environmental degradation.

Sustainable Development Goals (SDGs)

The development community and 193 member-states of the United Nations as the development agenda from 2015 to 2030 have set Sustainable Development Goals (SDGs) to be achieved by 2030. It is an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests. The Government of India has designated NITI Aayog as the institution responsible for overall coordination and monitoring of the SDGs in the country, in close collaboration with the Ministry of Statistics and Programme Implementation (MoSPI).

Following are the Sustainable Development Goals (SDGs) to transform our world:

1. No Poverty
2. Zero Hunger
3. Good Health and Well-being
4. Quality Education
5. Gender Equality
6. Clean Water and Sanitation
7. Affordable and Clean Energy
8. Decent Work and Economic Growth
10. Reduced Inequality
11. Sustainable Cities and Communities
12. Responsible Consumption and Production
13. Climate Action
14. Life Below Water
15. Life on Land
16. Peace and Justice Strong Institutions
17. Partnerships to achieve the Goal

9. Industry, Innovation and Infrastructure

To achieve these goals and actual implementation of strategies right from the grass root level in India, NITI Aayog has been encouraging the States/UTs to develop their own Indicator Framework and monitoring mechanisms at the State and district levels.[3] NITI Aayog has come up with a single measurable index to track the progress of all the States and UTs across 13 out of 17 SDGs (excluding Goal 12, 13, 14 and 17 on account of unavailability of comparable data across States/UTs).[4]

Government Initiatives For Environment Protection in India

Following the global agenda of Sustainable Development Goals (SDGs) 2030, the countries are moving forward by contributing their efforts in minimizing ill effects of poverty, inequalities (gender, economic, utilization of resources, etc.) with the ultimate aim of sustainable development. India with implementation of its different policy measures, schemes and programs stepping forward for tackling current environmental crisis and contributing for the best possible outcomes for environment protection.

India follows a holistic approach for achieving the SDGs. Current flagship policies and programmes of Government of India such as Swachh Bharat Mission (SBM), Beti Bachao Beti Padhao (BBBP), Pradhan Mantri Awas Yojana (PMAY), Pradhan Mantri Jan-Dhan Yojana (PMJDY), Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY) and Pradhan Mantri Ujjwala Yojana (PMUY) have been contributing towards achieving the SDGs.

To achieve SDG – 6 (Clean Water and Sanitation) the **Namami Gange Mission** was launched as a priority programme with a budget outlay of Rs.20,000 crores. Major components include sewerage project management, urban and rural sanitation, tackling industrial pollution, water use efficiency and quality improvement, ecosystem conservation and Clean Ganga Fund, among others.

Further, in order to deal with the increasing air pollution across the country in a comprehensive manner, Government of India has launched a **National Clean Air Programme** in 2019 as a pan. India has introduced time bound national level strategy for prevention, control and abatement of air pollution besides augmenting the air quality monitoring network across the country.

The Survey states that a harmonized overarching **National Policy on Resource Efficiency (RE),** building upon the existing policies to address multiple sectors should be devised for mainstreaming Resource Efficiency approach in the development pathway for achieving SDGs. Resource Efficiency can be a major tool to meet the resource needs of the country, at the least possible cost to the environment.

The Union Cabinet approved India's updated climate pledge August 3, 2022 to communicate to United Nations Framework Convention on Climate Change (UNFCCC). The notification elaborated India's enhanced climate targets toward achieving net-zero by 2070. However, reducing carbon emissions from thermal power plants is still a big blind-spot.

The latest Nationally Determined Contribution (NDC) has committed to reducing emissions intensity of its GDP by 45 per cent by 2030 from its 2005 levels. India will also target about 50 per cent of cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030.

Conclusion

It is time for the global community to exhibit the requisite momentum to act upon their responsibilities on establishing the enabling environment for sustainable development and climate actions. India has abundant natural resources in terms of rich quality of soil, hundreds of rivers and tributaries, lush green forests, plenty of mineral deposits beneath the land surface, vast stretch of the Indian Ocean, ranges of mountains, etc. It needs to contribute its best possible efforts within their own available domestic resources, keeping in mind the sustainable development goals.

Efficient utilization of resources also plays an important role. With increasing demand for resources to cater to the different developmental needs, policies towards achieving the maximum output from the available resources. India's policies have

already taken the correct initiatives in this direction. For the gaining maximum output it is needed to implement at grass root level.

India's NDC (Nationally Determined Contribution) has set clear targets for achieving its climate goals. However, a substantial scaling up of financial resources and technology are needed to implement this target by 2030. The fulfillment of pledges by developed countries through provision of 'new and additional' financial resources is an important contingent factor.

Appropriate measures are being taken under various schemes and programs across many sectors, including water, agriculture, forest, energy and enterprise, sustainable mobility and housing, waste management, circular economy and resource efficiency, etc.

It is found after reviewing the available literature relating to this burning issue of climate change and the initiatives taking place for overcome the situation globally that the continuous contribution is needed by all the countries with a long term vision of environment protection and sustainable development. Collective efforts right from individuals, NGOs, corporate and government needed to move together in the same direction of safe and secure environment to live in this beautiful earth.

References

1. https://www.ipcc.ch/2022/04/04/ipcc-ar6-wgiii-pressrelease/
2. https://ncert.nic.in/ncerts/l/keec109.pdf
3. https://sdgs.un.org/goals
4. https://www.indiabudget.gov.in/budget2019-
20/economicsurvey/doc/vol2chapter/echap05_vol2.pdf
5. https://www.downtoearth.org.in/blog/climate-change/india-s-ndc-why-sector-specific-targets-are-needed-for-reducing-emissions
6. https://www.google.co.in/books/edition/Population_and_Sustainable_Development

A STUDY OF SOME CHEMICAL PARAMETER OF SONALA DAM IN WASHIM DISTRICT OF MAHARASHTRA

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Abstract:

The present study shows analytical report of water quality characteristics of four different sites of Sonala dam, Washim Dist. Maharashtra. During the present study the chemical parameters like Dissolved Oxygen, Carbon dioxide, Carbonate, Bicarbonate, Chloride, Salinity, Total hardness, Calcium hardness and Magnesium hardness were analyzed for a period of four months (November 2020- February 2021). The monsoon and winter season shows diverse regular change in different chemical parameters. The observed chemical status of this water body is reported to be appropriate for the sending on planktonic living beings and fishes. The water of present dam is useful for irrigation domestic use and fish culture.

Key words: chemical parameters, Dissolved Oxygen, Carbon dioxide, Carbonate, Bicarbonate, Chloride, Salinity, Total hardness, Calcium hardness, Magnesium hardness.

Introduction:

Water plays a very vital role in human life. It is one of the important components on earth. Water maintains and links all ecosystems on the planet. As nature's most important nutrient, people need water to survive. The role and function of water in ecosystem is to provide the lifeblood of the community. Nearly 71% of earth's surface is covered with water, for most part in oceans and sea. It is a fundamental supplement and plays a key part within human body. Near about 93% of total water present on earth is sea water and only 3% is fresh water. Fresh water is mostly characterized by having low concentration of broken up salts and other total dissolved solids. It includes water in rivers, ponds, low lands, ice sheets, ice caps, streams and indeed underground water i.e., groundwater. In spite of the fact that freshwater particularly avoids sea water and brackish water, it does incorporate mineral rich water such as chalybeate springs.

The cause of water contamination includes a wide extend of chemicals, pathogens as well as physical parameters. The contamination may incorporate natural and organic substances. Lifted a temperature can also leads to contamination. The water contamination is measured by examining water tests such as physical, chemical, organic and inorganic tests. A suitable framework and administration plans are recurred to control water contamination. It involves wastewater treatment plants, sewage treatment plants and mechanical wastewater treatment plants to secure water bodies from untreated wastewater. The contaminated water supply can cause many health issues. The presence of more concentration of chemicals or its inadequate supply in water leads to congenital diseases like goiter and cancer. Dominic, Chacko, Tom (Oct 2016).Limnology is the study of physical, chemical and biological features of lakes and other freshwater bodies. It covers all inland waters which may be lakes, waterways, streams, ground-waters and wetlands and their numerous diverse perspective. It also incorporates inland salt and brackish waters. One of the most important objectives of limnology is giving rules for water administration and water contamination control.The quality of water affects human health. Water quality is tested using physical and chemical parameters. The physical parameters are pH, alkalinity, salinity, colour, temperature, turbidity, total dissolved solids and electrical conductivity. Whereas chemical parameters are dissolved oxygen, carbonate, bicarbonate, biological oxygen demand, chemical oxygen demand, chloride and total hardness.

Review of literature:

Dr. Ujwala P. Mankar (2018) studied on limnological and correlation studies of Sonala dam, Sonala district Washim. It revealed the water can be safely used for domestic use, irrigation and pesciculture. Mahajan and Pokale (2017) reported the physicochemical analysis of Mohabalalake near Bhadrawati, district chandrapur, Maharashtra. It observed the physicochemical parameters of three sites of mohobala lake water varied appreciably and indicated change in relative to seasonal change. Solanke and Dabhade (2016) studied the physicochemical analysis of upper morna reservoir, medshi, district Washim, Maharashtra. It concluded the water can be used for domestic use, irrigation and for culturing of fishes. Dominic, Chacko, Tom (2016) analysed the water quality of samples collected from Thevara region, Kerla, India. A.M. Bali (2016) studied chemical parameters of different freshwater bodies in Washim town of Maharashtra. The study revealed that mansoon and winter season shows different fluctuation and water is suitable for of planktonic organism and fishing growth and irrigation. Mankar and Bobdey (2015) studied the assessment of water quality of Sonala dam, district Washim, Maharashtra. Pawaiya, Sharma and Khushwah (2014) analysed the physicochemical parameters in Harsi Reservoir Dabra, Gwalior district, Madhyapradesh indicating that all the physical and chemical parameters in Harsi reservoir were within desirable range. Shukla, Bhadresha, Dr. Jain and Dr. Modi (2013) studied physicochemical analysis of water from various sources. It concluded that potable water is safe to be consumed or used with low risk of immediate or to enough long term harm. Dubey, Tiwari and Ujjainia (2013) studied physicochemical properties of Sahapura Lake, Bhopal and they concluded that all the physicochemical parameters of Sahapura lake are beyond the prescribed limits of Who and BIS indicating for increasing in pollution of the lake which need control of industrial waste and human activity in the water body. Dhonde and Kulkarni (2012) monitored the hydro-chemical parameters of drinking water in kadi river at Nimgaonchoba project in Beed, Maharashtra and they found that all the parameters were within the permissible limits as per WHO and ISI.

Materials and Methods:

Description of study area - Sonala is a village near Malegaon taluka in Washim district of Maharashtra, India. It is located 30 km towards North from district headquarters Washim. The main purpose of Sonala dam is irrigation and it is constructed by government of Maharashtra in year 1981. Sonala dam is an earthfill dam on Aranriver. The height of the dam above lowest foundation is 19.6 m (64ft) while length is 1,114 m (3,655ft). The volume content is 698 km^3 and gross storage capacity is 20, 270, 00$km^{3.}$

Four different sampling stations were selected along the periphery of Sonala dam namely Site A, Site B, Site C and Site D. samples collected in early morning hours for Four Months from November 2020 to February 2021. To analyze physicochemical parameters the samples were collected at the same time from all selected sites following instructions of APHA (1998).

Result and Discussion:

In the present study the chemical parameters like Dissolved Oxygen, Carbon dioxide, Carbonate, Bicarbonate, Chloride, Salinity, Total hardness, Calcium hardness and Magnesium hardness were analyzed in four different sites of Sonala Dam of Washim Dist. Maharashtra for a four months (November 2020- February 2021).

Analytical report of water quality characteristics with four month observation of physicochemical parameters of four sampling sites, their mean and standard deviation is given in table no. 1. Whereas monthly variation of physicochemical parameter are shown in table no. 2.

Chemical parameters And sampling site	**Site A**	**Site B**	**Site C**	**Site D**
DO (mg/L)	3.65± 0.129099445	4.9± 0.141421356	4.65± 0.129099445	4.975± 0.170782513
Carbon dioxide (mg/L)	Absent	Absent	Absent	Absent
Carbonate (mg/L)	18 ± 2.828427125	12 ± 1.632993162	17 ± 154700538	13.5± 2.516611478
Bicarbonate (mg/L)	96 ± 1.632993162	95.5± 1.91485421	93± 2.581988897	88.5± 2.516611478
Chloride (mg/L)	79.7625± 6.788158194	85.08± 10.02677416	95.8525± 9.061086671	104.5575± 12.09288048
Salinity (mg/L)	145.95± 12.20286852	153.55± 18.05482392	125.4925± 82.33629875	141.4925± 94.87316861
Total Hardness (mg/L)	350.5± 7.724420151	348.5± 3.415650255	272± 3.415650255	290± 7.118052168
Calcium Hardness (mg/L)	18.2175± 0.358643277	18.165± 0.271108834	14.125± 0.203715488	17.64± 0.618223261
Magnesium Hardness (mg/L)	80.0225± 3.872323807	80.055± 2.48242489	61.1675± 4.758854029	50.6825± 33.03291729

Table No. 1: Analytical report of water quality characteristics

Chemical parameters		DO	Carbonate	Bicarbonate	Chloride	Salinity	Total Hardness	Calcium Hardness	Magnesium Hardness	CO_2
November	SA	3.5	16	94	70.9	128	340	17.85	74.32	Absent
	SB	4.8	10	94	77.99	140.8	350	17.85	76.43	Absent
	SC	4.5	16	90	85.08	153.59	270	13.86	54.08	Absent
	SD	4.8	10	86	92.17	166.39	280	16.8	61.14	Absent
December	SA	3.6	16	96	77.99	140.8	350	18.06	80.99	Absent
	SB	4.8	12	94	77.99	140.8	348	18.06	80.5	Absent
	SC	4.6	16	92	92.77	166.3	272	14.07	62.93	Absent
	SD	4.9	14	88	99.26	179.1	290	17.64	66.45	Absent
January	SA	3.7	18	96	85.08	153.5	354	18.27	81.99	Absent
	SB	4.9	12	96	85.08	153.5	352	18.27	81.43	Absent
	SC	4.7	18	94	99.26	179.1	274	14.28	63.37	Absent
	SD	5	14	88	106.3	210.04	294	17.85	67.38	Absent
February	SA	3.8	22	98	85.08	153.5	358	18.69	82.79	Absent
	SB	5.1	14	98	99.26	179.1	344	18.48	81.86	Absent
	SC	4.8	18	96	106.3	210.04	278	14.29	64.29	Absent
	SD	5.2	16	92	120.5	217.5	296	18.27	67.76	Absent

Table No. 2: Monthly variation of physicochemical parameter

Summary and Conclusion

In the present study, the chemical parameters namely Dissolved Oxygen, Carbon dioxide, Carbonate, Bicarbonate, Chloride, Salinity, Total hardness, Calcium hardness and Magnesium hardness of Sonala Dam were analyzed.

The reveals that maximum value of dissolve oxygen was found on the site D (4.975 ± 0.170782513 mg/L) while minimum value was found on the site A (3.65 ± 0.1290994 mg/L) and carbon dioxide was found to be absent on all Sonala dam.

The maximum value of alkalinity in carbonate was found on the site A (18 ± 2.828427128mg/L) while minimum value was noted on the site B (12 ± 1.632993162mg/L). Similarly the maximum value of Bicarbonate was found on the site A (96 ± 1.632993162mg/L) while minimum value was reported in site D (88.5 ± 2.516612478mg/L).

The maximum chloride value was recorded on the site D (104.557 ± 12.09288048mg/L) while minimum value was found on the site A (79.7625 ± 6.788158194mg/L). Similarly the maximum value of salinity was recorded on the site B (153.55 ± 18.05482392mg/L) while minimum value was found on the site C (125.4925 ± 82.33629875mg/L).

The maximum total hardness value was recorded on the site A (350 ± 7.724420151 mg/L) while minimum value was recorded on site C (272± 3.415650255 mg/L). Similarly calcium and magnesium hardness, the maximum calcium hardness of value was recorded on the site A (18.217 ± 0.35864327 mg/L) while minimum value was found on the site C (14.125± 0.20371488 mg/L) and the maximum magnesium hardness value was found on the site A (80.0225 ± 3.872323807 mg/L) while minimum value was recorded on site D (50.6825 ± 33.032917 mg/L).

The monsoon and winter season shows diverse regular change in different chemical parameters. The observed chemical status of these water bodies are reported to be appropriate for the sending on planktonic living beings and fishes.

The water of present dam is useful for irrigation and fish culture. Dissolve oxygen point out photosynthetic exercise happening into the water whereas supplement like sulfate and nutrients and chloride gives appropriate environment for the biota within the dam in any case advance ponder is needed to affirm the precise status of water quality of dam. After observation, it was concluded that the water sources may be used safely for both domestic and irrigation purpose. The life in aquatic ecosystem is directly or indirectly dependent on water quality. To improve water quality there should be continuous monitoring of pollution level and maintain the favorable conditions essential for fish survival, growth and reproduction. The absence of free CO_2 attributes to the presence of larger populations of phytoplankton in these area.

Suggestions and recommendations

Sonala dam should be commercially abused for fishes. Fish seeds of financially vital species should be refined in this dam. Don't leave waste material in dam because they pollute the water. Idol immersion in this dam should be banned as the colours used to paint the idols are proven toxic to the biota. Activities like washing animals, clothes, vehicles etc. should be prohibited.

Bibliography

1. A.P.H.A., (1998): Standard methods for examination of water and waste water. 20 edition, edited by Lenore S. Clescerei, Arnold E. Greenber and Andrew D. Eaton. Multidisciplinary research journal vol.5 (12):1-12

2. ShuklaDevangee, kinjalbhadresha, Dr. N. K. jain and Dr.H. A. modi (2013): physiochemical analysis of water from various source and their comparative studies IOSR Journal of Environmental Science, Toxicology and food (10SR JESTET) vol. 5(3):89-92

3. Patil. P.N., D.V.sawant and R.N. Deshmukh (2012): physiochemical parameter for testing of water-A review International Journal of Environmental science vol. 3(3): 1197-1207.

4. Mahajan V.S and S.S pokale (2017):physico- chemical analysis of mohabalaLake near Bhadrawati, District –

chandrapur (MS), India International Journal ofLife science vol.5(3): 438-446.
5. Midhun Dominic C.D, shinochacko and Thara tom (2016): Analysis of water quality of samples collected from Thevara Region, Kerala, India. International Journal for research of applied science and Engineering technology (IJRASET) vol. 4 Issue x, pg. 382-388.
6. Gorde S.P and M.V Jadhav (2013): Assessment of water quality parameters: AReview International Journal of engineering Research and application vol. 3 (6):2029-2035
7. Solanke M.R. and D.S. dabhade (2016):physico-chemical analysis of upparmorna reservoir, medshi district- washim, Maharashtra. International recognized
8. Dr. Ujwala P. Mankar (2018):limnological and correlation studies of sonala dam, sonala, district- washim,(MS) International conference on frontiers in life and earth science, vol.5 (1): 62-69
9. A. M. Bali (2016): Analysis of chemical parameters of different freshwater bodies in WashimTown of Maharashtra Indian streams journal vol 6 (5): 1-54
10. Mankar U.P and A.D bobdey (2015): studied the assessment of water quality of sonala dam, district washim, Maharashtra. International journal of researchesIn biosciences, agriculture and technology vol (11), issue (7) nov 2015 pg:363
11. Dabhade,D.S.(2006): limnological studies on lonar crater lake, Maharashtra. PH.D.Thesis submitted to S.G.B. AmaravatiUniversity, Amaravati
12. Dhonde M.S. and Kulkarni G.B. (2012): hydro- chemical monitoring of drinking water in kadi river at nimgaonchoba project in beeddist, India. Bioscience discovery, vol3(1):133-137.
13. Dubey M., Tiwari A.K. and Ujjania N.C.(2013): The study of physico-chemical properties of sahapura Lake, Bhopal (India) International journal of Advanced Research, voll (8) 158-164.
14. Pawar S. and vaidya R. (2012): studies on physico-chemical characteristics and level Of sewage pollution in krishna river at wai, dist-satara. Proceeding of InternationalConference SWRDM: 129-131
15. Vasanthkumar G., Khatoon B.A. and Manjappa S. (2012): physico-chemical characteristics of Queen lake in Arasikere Karnataka, India. International journal of pharmacy and life sciences, vol 3 (11) 2135-2137
16. Mahananda M.TV, Mohanty B.P. and Beers N.R. (2010): physico-chemical analysis of surface and ground water of bargarh district, Orissa, India. LIRRAS, vol2 (3):284-295
17. Pawaiya N., Sharma D.K. and Khushwah M.KS (2014): Analysis of physic chemical parameters in Harsi reservoir Dabra,Gwalior district, Madhya Pradesh. International journal of innovation and research, vol 11 (2): 248-258.
18. Shrivastava C.B.L. (1988): A text book of fishery science and indian fisheries. KitabMahal Agencies Allahabad, Pp. 17-18.

EVALUATION OF CLEAN AGENT FOR REPLACEMENT OF OZONE DEPLETING SUBSTANCE HALONS USED IN COMBAT VEHICLES.

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ABSTRACT

The present work is an effort to control the depletion of ozone layer by replacement of halons fire extinguishing agent used in combat vehicles with suitable environment friendly near equivalent clean alternatives. In this context other fire extinguishing agents like fluorocarbons having less ozone depletion potential have been experimented by using actual hazard volume of combat Tanks and observed that the effectiveness of fluorocarbon fire extinguishing agent 1,1,1,3,3,3 hexafluoropropane is having near equivaient fire extinguishing capability.

Key words: Halons, fire extinguishing systems, Hexa fluorocarbon, Aqueous Film Farming Foam, Chlorofluorocarbons, Combat vehicles, Ozone depletion potential, Global warming potential, Montreal protocol, Fire detection and suppression system.

INTRODUCTION

Halon 1301 has been used for decades as the primary fire extinguishing material for a multitude of military applications. However, Halons have very high ozone depleting potentials which results in higher levels of ultraviolet radiation at Earth's surface and gives rise to serious health effects therefore its production was stopped in 1994 in most of the world. As per Montreal protocol use of Halons have been banned however developing nations are allowed to use Halons up to 2010which has been further extended temporarily for its mission critical applications. Accordinglyresearch initiated to identify and develop replacement agents and technologies to satisfy the performance requirements of fire protection systems in combat vehicles.

Halons are used in crew compartment, hand held extinguishers and engine compartment offighting Tanks accordingly this research has been based on Halon elimination efforts in three separate grounds of combat vehicle applications .The research program is to identify alternatives to Halons used in fire extinguishing systems (FES) of Army ground based Combat tanks and trucks .

Based on the requirements, individual chemical agents having near equivalent fire extinguishing capability with low ozone depleting potentials have been experimented.
Initial investigations indicated that a universal solution would not be available for drop in replacement of Halons Accordingly it is decided to develop near equivalent clean agent having similar fire extinguishing property.

SYNOPSIS

The research has been divided in three stages which are given as under-

STAGE - I Comprehensive study of near equivalent fire extinguishing agents.

The study was based a on review of the extensive research and engineering literature covering the physical and chemical processes active in flames and involved in flame extinguishment. Published lists of prospective Halon replacements have been evaluated. Ozone depletion potential (ODP), a useful metric found in regulatory legislation, has been examined in the light of recent work for alternative agents. Also Global warming potential (GWP), a measure of agent effect on climate, has been examined

STAGE -II Testing for fire extinguishing capability of agents for effectiveness.

The extinguishing concentrations of gaseous agents are determined by small-scale tests. Developmental testing of the most promising concepts, by simulating hazard area of of existing combat vehicles. Crew Survivability Criteria has been taken in to consideration for the minimum acceptable requirements of automatic fire extinguishing systems for occupied vehicle compartments.

STAGE –III Technical feasibility of agents wrt existing technology in Combat vehicles-

Technical feasibility of agents wrt existing fire extinguishing systems and technology in combat vehicles, test methodology, including agent toxicology, storage stability, and extinguishment effectiveness, have been studied. Thefull-scale test simulating actual hazard area of of existing combat vehicles, thermal decomposition products and potential for retro fitment wrt most promising alternatives on existing platforms has been examined.

METHODOLOGY OF EXPERIMENTS-

This research for halon replacements has been based on innovative application of promising agents to eliminate the chlorine and bromine atoms which are responsible for ozone depletion. In this connection halon-like halocarbons includes hydrofluorocarbons (HFCs), hydrochlorofluorocarbons (HCFCs),Viz- FE-13 ,FE-25, FM-200, FE-36 have been studied and most promising agentFE-36 has been tested for fire suppression performance . The extinguishing concentrations of gaseous agent and fire extingushing timehas been determined by small-scale tests which are given as under-.

Agents Trade Name	**Chemical Formula**	**Chemical Name**	**Vapor Pressure**	**Boiling Point (F)**	**Ozone Depletion Potential (ODP**	**Performance factor(Hept) CB Ext Conc** %	**Fire Extinguishing Time** (inmili sec)
FE-36	C3F6H2	1,1,1,3,3,3 hexafluoro propane	39.9	33.2	0	5.6	96
Halon 1301	CF3Br	Bromo Trifluoro methane	234.8	-72.0	12 – 16	2.9	72

CONCLUSION

We are aggressively pursuing alternatives to Halon 1301being usedin ground combat vehicles. As of now, we are reliant on Halons for fire suppression in our combat vehicles ie.Tanks , but the use of Halon has been banned as per Montreal protocol. Developing nations like India are allowed to use Halons in mission critical application up to 2010. Accordingly Halocarbon agent FE 36 (1,1,1,3,3,3 hexafluoropropane) having similar molecular structures to halon are innovated to eliminate the chlorine and bromine atoms which are mainly responsible for depletion of ozone layer have been experimented for its fire extinguishing performance. It is concluded that the agents FE 36 (1,1,1,3,3,3 hexafluoropropane) is able to extinguish fire at its design concentration.however is having higher extinguishing time than Halon 1301 and, therefore, are comparatively less effective.

REFERENCES

1. Development of Fire and Suppression Models for DOD Vehicle Compartments: Background, Objectives, and Methodology .Gritzo, L. A. ; Tucker, J. R. ; Ash, L. ; 1999
2. Evaluation and Testing of Clean Agents for U.S. Army Combat Vehicle Portable Fire Extinguishers. . Moore, T. A. ;Lifke, J. L. ; 1997
3. Evaluation of Alternative Agents for Suppression of Fuel Spray Explosions in Military Vehicle Crew Compartments. . Chattaway, A. ; Dunster, R. G. ; Spring, D. J. ; 1999
4. Fire Suppression Testing of HFC-125, CF3I, and IG-541 for Fire Protection in Engine Compartments of Armoured Vehicles. .Su, J. Z. ; Kim, A. K. ; Liu, Z. G. ; Crampton, G. P. ; Kanabus-Kaminska, M. ; 1998
5. Crew Compartment Alternate Agent Test Program. .Polyanski, S. ; Bolt, W. ; Herud, C. ; 1997

6. Advanced Environmentally Friendly Fire Protection Technology. . Wierenga, P. ; 2001

7. Assessment of the Fire Suppression Mechanics for HFC-227ea Combined With NaHCO3. . Skaggs, R. R. ; 2002

IMPACT OF E-WASTE ON ENVIRONMENT

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Abstract:

Solid waste management, which is already a mammoth task in India, is becoming more complicated by the invasion of e-waste, particularly computer waste. The hazardous content of these e-waste materials pose a threat to human health and environment. This article highlights the hazards of e-wastes, the need for its appropriate management and options that can be implemented. Improper disposal of these e-wastes and other substances reach the soil and groundwater. Most of the e-waste materials can be reused, or recycled in an environmentally sound manner so that they are less harmful to the ecosystem.

Key words: Environment effect, E-Waste, Management process.

Introduction:

Growth in the IT and communication sectors has enhanced the operation of the electronic outfit exponentially. Faster up gradation of electronic product is forcing to consumers to discard old electronic products veritably snappily, which, in turn, adds toe-waste to the solid waste sluice. The growing problem of e-waste calls for lesser emphasis on recovering e-waste and better e-waste operation.

The World Bank study revealed that India was the world's highest waste-generating nation. According to a 2016 estimate given by the study, India's annual waste generated is likely to touch 387.8 million tonnes in 2030 and 543.3 million tonnes by 2050. Since2018, India generates further than two million tonnes of e-waste annually, and also significances huge quantities of e-waste from other countries around the world.

Nearly all e-wastes contain some form of recyclable material, including plastic, glass, and essence; still, due to indecorous disposal styles and ways these accoutrements cannot be recaptured for other purposes. However, its poisonous ingredients can inflict annihilation on the mortal body; Ife-waste is disassembled and reused in a crude manner. The health hazards range from order and liver damage to neurological diseases. Recycling of e-waste scrap is contaminating the water, soil, and the air. Burning to recoup essence from cables and lines has led to the emigration of brominates and chlorinated dioxins as well as carcinogens which contaminate the air and, thereby, cause cancer in humans and creatures.

Meaning of e-waste:

There is no specific definition of e-waste, but it can be explained as electronic waste or e-waste is generated when electronic and electrical outfit come unfit for their firstly intended use or have crossed the expiry date. Computers, waiters, mainframes, observers, compact discs(CDs), printers, scanners, copiers, calculators, fax machines, battery cells, cellular phones, transceivers, TVs, iPods, medical outfit, washing machines, refrigerators, and air conditioners are exemplifications of e-waste(when unfit for use).

Meaning of Environment:

The circumstances, objects, or conditions are by which one is surrounded. The complex of physical, chemical and biotic factors (such as climate, soil, and living things)_ that act upon an organism or an ecological community and ultimately determine its form and survival.

Literature Review:

According to Peeranart Kiddee et al. (2013) e-waste can be managed by developing eco-design devices, properly collecting e-waste, recover and recycle material by safe methods, dispose of e-waste by suitable techniques, forbid the transfer of used electronic devices to developing countries, and raise awareness of the impact of e-waste. No single tool is adequate but together they can complement each other to solve this issue. A national scheme such as EPR is a good policy in solving the growing e-waste problems.

Yamini Gupt & Samraj Sahay (2015) suggested that financial responsibility of the producers and separate collecting and recycling agencies contribute significantly to the success of the extended producer responsibility-based environmental policies. Regulatory provisions, take-back responsibility and financial flow come out to be the three most important aspects of the extended producer responsibility. Presence of informal sector had a negative impact on the regulatory provisions.

In **Sukeshini Jadhav (2013)** observed that proper e waste management will help efficient sourcing and collection right up to extraction and disposal of material, ensuring that e-waste will turn into lucrative products and business opportunity. The manufacturers have to take responsibility for adopting the guideline for manufacturing sound environment product and sustainability management should be started from the product manufacturing stage i.e. raw material selection, product and process design can be the important factors for the designed for environment practices, which can facilitate the recycling and reuse. Manufacturer should also try and initiate a take back program to handle the waste so that proper management and disposal of e-waste can be done. This way as 60% e-waste is coming from industry, can contribute to a very large part of Electronic waste management collection and establishing clean e-waste channels.

UNEP (2010) report predicts that by 2020, E-waste from old computers in India will increase to 500%; from discarded mobile phones will be about 18 times high; from televisions will be 1.5 to 2 times higher; from discarded refrigerators will double or triple; than its respective 2007 levels. Considering the growth rate, studies show that the volume of E-waste will reach nearly 2 million MT by 2025.

Samarkoon M.B. (2014) in his study states that improper handling of e-waste can cause harm to the environment and human health because of its toxic components. Although the current emphasis is on end-of-life management of e-waste activities, such as reuse, servicing, remanufacturing, recycling and disposal, upstream reduction of e-waste generation through green design and cleaner production must be introduced to enhance a sustainable e-waste management system for Sri Lanka.

Objectives of the study

i) To study the concept of E-Waste and environment.
ii) To study the impact of E-Waste on environment.
iii) To study the management process of E-Waste.

Methodology of the study:

The study is descriptive and analytic in nature. For the study, secondary data is used. Secondary data is collected from various journals from government website.

The existing EPR targets for E-Waste Management:

Table No-1

SL.NO.	YEAR	E- Waste Collection Target (weight)
1.	2017-18	10% of the quantity of waste generation as indicated in extended producer responsibility plan.
2.	2018-19	20% of the quantity of waste generation as indicated in extended producer responsibility plan.
3.	2019-20	30% of the quantity of waste generation as indicated in extended producer responsibility plan.
4.	2020-21	40% of the quantity of waste generation as indicated in extended producer responsibility plan.
5.	2021-22	50% of the quantity of waste generation as indicated in extended producer responsibility plan.
6.	2022-23	60% of the quantity of waste generation as indicated in extended producer responsibility plan.
7.	2023-Onwards	70% of the quantity of waste generation as indicated in extended producer responsibility plan.

(Source: https://www.pib.gov.in/pressReleasePage.aspx?PRID=1807655, 21st March ,2022)

The EPR target was revised in financial year 2021-22 from 50% to 40% based on the representations received from the industry and in view of the pandemic.

Table No-2

The percentage of E-Waste collected dismantled and recycled out of the total E-Waste generated in the country.

Financial Year	Generation (Tonnes)	Quantity of E-Waste collected dismantled and recycled (Tonnes)
2017-18	7,08445.00	69,414.0
2018-19	7,71,215.00	1,64,663.0
2019-20	10,14,961.21	2,24,041.0

(Source: https://www.pib.gov.in/pressReleasePage.aspx?PRID=1807655, 21st March ,2022)

Ministry has notified E-Waste management rules, 2016 which were farther amended in 2018 for management of electronic waste generated due to discarding of electronic equipment by the consumers. Above table shows that the amount of generation and collected dismantled and recycle of E-Waste gradually increases with the financial year

State wise cases of illegal shipment and dumping of E-Waste

Table No-3

Year	**2019-20**		**2020-21**		**2021-22**	
States	**No of Cases**	**Quantity (in MTS/Pieces**	**No of Cases**	**Quantity (in MTS/Pieces**	**No of Cases**	**Quantity (in MTS/Pieces**
Gujarat	2	895 Pieces*	0	0	1	2355 Pieces*
Karnataka	0	0	0	0	0	0
Mahastra	3	15771 Pieces* +5.43 MTS	1	3974 Pieces*	7	21861 Pieces* +50.61 MTS
Tamilnadu	0	0	9	17624Pieces * +143.06 MTS	2	15317 Pieces* +81.43 MTS
Uttar Pradesh	1	5158 Pieces*	0	0	1	0.0067 MTS
West Bengal	0	0	2	3873 Pieces*	0	0

(Source: https://www.pib.gov.in/pressReleasePage.aspx?PRID=1807655, 21st March ,2022)

*Old and used photocopiers and parts and accessories of computers.

Impact on Environment:

Negative Impact

1. On Air

Contamination in the air occurs when e-waste is informally disposed by dismantling, shredding or melting the materials, releasing dust particles or toxins, such as dioxins, into the environment that cause air pollution and damage respiratory health. E-waste of little value is often burned, but burning also serves a way to get valuable metal from electronics, like copper. Chronic diseases and cancers are at a higher risk to occur when burning e-waste because it also releases fine particles, which can travel thousands of miles, creating numerous negative health risks to humans and animals.

2. On Soil

When improper disposal of e-waste in regular landfills or in places where it is dumped illegally, both heavy metals and flame retardants can seep directly from the e-waste into the soil, causing contamination of underlying groundwater or contamination of crops that may be planted nearby or in the area in the future. When the soil is contaminated by heavy metals, the crops become vulnerable to absorbing these toxins, which can cause many illnesses and doesn't allow the farmland to be as productive as possible.

3. On Water

After soil contamination, heavy metals from e-waste, such as mercury, lithium, lead and barium, then leak through the earth even further to reach groundwater. When these heavy metals reach groundwater, they eventually make their way into ponds, streams, rivers and lakes. Through these pathways, acidification and toxic are created in the water, which is unsafe for animals, plants and communities even if they are miles away from

a recycling site. Clean drinking water becomes problematic to find.

Acidification can kill marine and freshwater organisms, disturb biodiversity and harm ecosystems. If acidification is present in water supplies, it can damage ecosystems to the point where recovery is questionable, if not impossible.

4. **On Human**

"Tsunami of e-waste, putting lives and health at risk" Said, **Dr Tedros Adhanom Ghebreyesus,** WHO Director-General. "In the same way the world has rallied to protect the seas and their ecosystems from plastic and micro plastic pollution, we need to rally to protect our most valuable resource –the health of our children – from the growing threat of e-waste." As many as 12.9 million women are working in the informal waste sector, which potentially exposes them to toxic e-waste and puts them and their unborn children at risk.

Meanwhile more than 18 million children and adolescents, some as young as 5 years of age, are actively engaged in the informal industrial sector, of which waste processing is a sub-sector. Other children live, go to school and play near e-waste recycling centres where high levels of toxic chemicals, mostly lead and mercury, can damage their intellectual abilities. (Source : https://www.who.int ›Soaring e-waste affects the health of millions of children, WHO warns, 15th Jun, 2021)

Positive aspects of e-waste for the Environment

1. **It protects the environment**
   When a lead-acid battery is recycled, the plastic parts and toxic lead are recycled, while the sulphuric acid is neutralised and then converted into sodium sulphate to make fertiliser and detergent.

2. **It reduces business costs**
   E-waste recycling is not only good for Mother Nature; it can also be good for a business' bottom line. Most state and territory governments have now incentivised e-waste recycling by hiking the cost of dumping or outright banning it. There are also some non-tangible dividends of recycling to consider, such as lowering the future costs of non-renewable materials and boosting staff morale and retention.

3. **It supports non-renewable recycling**
   The growing demand for electronic devices and appliances means a range of metals and other non-renewable resources need to be mined and processed. However, many of the materials used to make smart phones, appliances and other e-waste can be re-used again.

4. **It shows your eco-friendly credential**
   Employees increasingly want to work for businesses that do their part for the environment and the community. Recycling is a simple and tangible way to demonstrate your organisation's commitment to social and environmental values, and reinforces those principles to your employees. Eco cycle provides recycling certificates that illustrate your achievements, and also outline how your business is performing against your own green goals.

5. **It's super easy to recycle e-waste**
   Recycling e-waste has never been easier. There are a range of places and businesses where you can drop off an old phone, TV or other household appliances. For household quantities of e-waste, you can find a drop-off point near you at the Recycling near You website.
   (Source: https://ecocycle.com.au ›5 benefits of recycling e-waste – Eco cycle)

Waste concerns and challenges:

a) Accurate figures not available for rapidly increasing e-waste volumes— generated domestically and by imports.

b) Low level of awareness among manufacturers and consumers of the hazards of incorrect e-waste disposal.

c) No accurate estimates of the quantity of e-waste generated and recycled available in India.

d) Major portion of e-waste is processed by the informal (unorganized) sector using rudiment techniques such as acid leaching and open-air burning, which results in severe environmental damage.

e) E-waste workers have little or no knowledge of toxins in e-waste and are exposed to health hazards.
f) Cherry-picking by recyclers who recover precious metals (gold, platinum, silver, copper, etc) and
Improperly dispose of the rest, posing environmental hazards.
g) No specific legislation for dealing.
h) High-risk backyard recycling operations impact vulnerable social groups like women, children and immigrant labourers.
i) Due to unscientific and inefficient recycling processes produce in substantial losses of material Value and resources.

E-waste Management in Informal Sector:

The following steps have been taken to curb informal collection and unscientific dismantling and recycling of e-waste:

- Under Extended Producer Responsibility Authorisation (EPRA), a producer is required to get its e-waste managed only through an authorized dismantler or recycler of e-waste.
- CPCB grants EPRA only to those producers who have set up a system of collection of e-waste through authorised entity as per the above said rules.
- An Action Plan for enforcement of E-Waste (Management) Rules, 2016, across the country is in place since May, 2019. The action plan is to be implemented by all the States/UTs and SPCBs/PCCs are required to submit their quarterly progress reports to CPCB to review progress. In the said action plan, checking informal traders, dismantlers, recyclers of e-waste have been taken-up as one of the action points. Drives for identification of informal activities are to be done by all the SPCBs along with district administration of the State. An e-waste Management review portal has also been developed for uploading status & progress of e-waste action plan.
- Actions, such as, constitution of teams for carrying out drives, issuing of notices, closure of operation, seizing the E-Waste against the informal processing are being taken up by the State
- Pollution Control Boards (SPCBs)/Pollution Control Committees (PCCs).Seventeen SPCBs/ PCCs started the drive against informal recycling as per the aforesaid Action Plan during FY 2020-2021.
- Under the aforesaid rules, provisions have been made for recognition and registering of workers involved in dismantling and recycling of E-Waste. Under Rule 12(1) of the said rules, State Government has been entrusted with the responsibility to ensure earmarking or allocation of industrial space or shed for E-Waste dismantling and recycling in the existing and upcoming industrial park, estate and industrial clusters.
- This information was given by the Minister of State for Environment, Forest and Climate Change, **Shri Ashwini Kumar Choubey** in a written reply in Rajya Sabha, today.

(Source: https://www.pib.gov.in/PressReleasePage.aspx ?PRlD= 1312032, 31st March, 2022)

Conclusion:

Waste electrical and electronic equipment (WEEE) is becoming major threat to the whole world. Its toxic emissions mixed with virgin soil and air and causing harmful effects to the entire biota either directly or indirectly. Direct impacts include release of acids, toxic compounds including heavy metals, carcinogenic chemicals and indirect effects such as bio magnification of heavy metals. As a consequence, toxic materials enter the waste stream with no special precautions to avoid the known adverse effects on the environment and human health and the resources are wasted when economically valuable .Basel Action Network is now working at their best to stop or control trans boundary e-waste movements, they also involved in conducting public awareness programs to enlighten the world community and opening research areas to find better methods or alternatives. As e-wastes are the known major source of heavy metals, hazardous chemicals and carcinogens, certainly diseases related to skin, respiratory, intestinal, immune, and endocrine and nervous systems including cancers can be prevented by proper management and disposal of e-waste.

References :

1.Amini N, Crescenzi C. Feasibility of an on-line restricted access material/liquid chromatography/ tandem mass spectrometer methods in the rapid and sensitive determination plasma. Journal of Chromatography B. 2003; 795(2):245-256.

2. CII. "E-waste management", Green Business Opportunities, Confederation of Indian Industry, Delhi, 2006; 12:1.

3. Dahl R. Who pays for e-junk? Environ Health Perspect. 2002; 110: A 196-199.

4. Devi BS, Shobha SV, Kamble RK. E-Waste: The Hidden harm of Technological Revolution, Journal IAEM. 2004; 31:196-205

5. DHHS. 11 th Report on Carcinogens. U.S. Department of Health and Human Services, US Public Health Services, National Toxicology Program, 2005.

6. Jahan K, Begum A. Electronic waste (E-waste) management in India: A Review. IOSR-JHSS, 2013, 46-57.

7. Joseph K. Electronic waste management in India-Issues and Strategies. Proceeding Sardinia, Elevanth International Waste Management and Landfill Symposium S Margherita di Pula, Cagliari, Italy, 2007, 1-5.

8. https://www.pib.gov.in/PressReleasePage.aspx ?PRlD= 1312032,31st March, 2022

9. https://www.who.int ›Soaring e-waste affects the health of millions of children, WHO warns, 15th Jun, 2021

FEDERALISM: A LOOK AT GOVERNOR AND CHIEF MINISTER'S RELATIONSHIP IN INDIA

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Abstract

Over the years, as the government keeps on changing at the state level, the issue before the central government is the question of changing the governor keeps bothering to newly formed government at the centre as the governor was appointed by the previous central government. The central government has its own pressure to appoint a person as the governor who adheres to the party ideology. The Constitution is formed in such a way that favours central government superiority over the state governments. The question of appointing a person as a governor to a particular state is highly resisted by the state government due to the person's personal beliefs and convictions. This leads to unwanted bickering over the centre-state relationship as the appointed governor would keep on interfering in the day-to-day functioning of the state government. Against this background, my research paper focuses on centre-state relations by discussing the role of the governor and the elected government in a particular state.

Keywords: Centre, State, government, governor, chief minister, Constitution

Introduction

The Governor-Chief Minister relationship has been always an interesting topic of discussion among the academicians, students and the intellectual chunks of People in India. The relationship between a Governor and Chief Minister of a state lies on a stake level where they are supposed to work together on every issue of the state. Governor is the central government's representative in the State, who takes cognizance of the state in order to provide proper law and order in the state, and takes daily reports of the state's happening. He is also responsible for facilitating all legal procedures of the state in a smoother way, and also to safeguard the legal principles in that particular state. With this, he is responsible for reporting all the reports to the central government in a time-bound manner. He is also supposed to be informed by the Chief Minister of every activity of the state, where he has to put his valuable feedback in front of the Chief Minister. Apart from all these aspects, he is equally responsible to take action against the state government in case they are infringing legal mechanisms in the state. On another hand, a state government's members are basically elected by people, and they are supposed to conduct every aspect of the state. From funding to implementation, everything lies in their hands, and thus, the state government plays a very important role in the mechanism part of a particular state. Here, governors also take daily reports from the state government and in all the significant matters; with the approval of governors those decisions are implemented in the ground level.

The conflict lies on the part that, to what extent the governor is eligible enough to get into the decisions of state government. This is the point where most of the state's struggle and come up with the problem of central state relationship. Here the basic confrontation that comes as Governor is the spy of the central government and they are trying to control every aspect of the state in their own way. Here a question of federalism also lies, that whether state government is bound to follow all orders and principles of state government. Then the aspect of federalism also comes into the picture, whether India is a federal country or not. Therefore, the clear assertion that lies here is that India is a quasi-federal country, as some serious aspects of national interest, defence, economy, etc lie totally in the hands of the central government, where their decision is binding upon state governments, but many other aspects are also not binding on state governments. It is a very clear assertion that in case of conflict between state and central, central decision persists, but this principle also lies on exceptional aspects. So, due to this

India is a Quasi-federal country. The central government does not have powers over every aspect of the state, so it is a very clear assertion that governors cannot impose their will on every aspect of the state government. Now, the discretion of the governor is up to an extent where the central government has overriding effect over the states, but apart from that the governor can only suggest measures, but his say cannot be binding upon the state. In a way, a governor is a watchdog to the state, but not a guardian or parent to it. However, it is a widespread debate in India that governors can impose central government's rule over the state, but nobody discusses the fact that up to what extent a governor's powers can be imposed.

In the recent past, we have seen various stories of conflict between governors and the state machinery; on the topic, the central government is trying to impose its absolute rule over the state. Most of the recent example was the appointment of the governor's rule in Pondicherry, the conflict between West Bengal's Chief Minister and governor during the legislative assembly's election and the Maharashtra government's conflict with the Governor. We all know that corruption is a huge part in a country like India, so using money power, a Governor possesses the chance to impose president rule in a particular state. So, all are these the probable factors, through which conflict of state and central government arises. Analyzing every state's stance on this issue becomes highly important as well.

West Bengal: Tussle between the Governor and the Chief Minister

One of the most recent examples of rising conflict between state and governor is the state of West Bengal. The recent elections in West Bengal have seen every possible conflict between the state and governor. The then Governor of West Bengal, Mr. Jagdeep Dhankhar always criticized Chief Minister Mamata Banerjee on this aspect of maintaining law and order during the time of election. He also insisted upon the fact that she should not use unconstitutional and harsh language in her campaigns. As the BJP is the main ruling party at the Central Government and it was the main opposing party in West Bengal this time, the Governor was highly criticized for putting false allegations on Mamata Banerjee and her party members. The Chief Minister termed Jagdeep Dhankhar as the "puppet governor" in West Bengal. Quoting the aspect of central intervention, and the campaign of Prime Minister Narendra Modi and central home minister Amit Shah in West Bengal, Chief Minister Mamata Banerjee stated it was complete intervention of centre into the state affairs. Highlighting the aspects of 'Bengali Ashmita', Mamata Banerjee tried to turn the situation in her favour, where she too dragged the Governor of West Bengal. Even after the elections, the political massacres in West Bengal by TMC goons were highly criticized by the governor, and the clashes were highly prevalent.

Currently, the clashes seem not to be prevalent, the governor was elected as the Vice President of India. The state and the governor are executing their operations separately. Still, with the clash between centre and state, the aspect of the governor is always been criticized.

Maharashtra: Centre was to take revenge using the office of the Governor against Shiv Sena?

After West Bengal, Maharashtra is the most debatable area to discuss on the governor-state relation in India. Since 2019, when Shiv Sena- Congress alliance came into power in Maharashtra, this had become an unending conflict for both the parties. The main reason as contended was that the Governor is an ex-BJP Chief Minister of Uttarakhand state, who tried to inflict central government's interference in the state. It was a type of manipulating and disturbing the state government in their daily affairs and state government's machinery. At the time of the election in 2019, the Governor went against the CM candidature of Uddhav Thackeray, as he had some electoral issues in his constituency. Even after approving his CM Candidature, he opposed the approval of cabinet ministers in the state, where a huge conflict arose between both the bodies. After the proper establishment of the state government, the issue did not come to an end. The Governor highly criticised and opposed state government's action in various

issues, whether it was the opening of temples, Palghar lynching case, Kangana Ranaut's office demolition case, vaccination drive, covid protocols, and with many other aspects. Recently, the Governor had also obstructed the nomination of 12 Shiv Sena candidates to the upper house of the legislature, without showing any appropriate and constitutional reasons to subdue. All these aspects clearly show a huge gap of interest between the state and the governor. On the contrary, to all these hassles, the state government too countered the BJP appointed Governor in various ways and circumstances, claiming that he was the puppet of the central government, which is majorly ruled by BJP, and they are trying to create a strong stance of BJP in the state through all these hassled-out ways. Thus, the conflict between Governor and State had a highly ranged infliction upon the state of Maharashtra. However, since the majority of Shiv Sena members coming out from Uddhav Thackeray's faction and forming the government along with BJP, it shows for the time being there would not be any issues with the present Maharashtra government and the Governor.

Rajasthan: Unnecessary controversy between the Governor and the Chief Minister

The state of Rajasthan is not in less conflict in this aspect of constitutional machinery. Now, almost every congress-ruling state is facing these issues on cards. Rajasthan is currently functioning with the state government where Indian National Congress holds the reign, which is being now headed by Ashok Gehlot as Chief Minister. The Governor of the state is also appointed by BJP ruled central government, where chances increase of centre's invention into state. The recent issue in Rajasthan clearly shows the conflict between the two bodies. The issue is regarding Governor's delay in approving state government's mandate to summon the legislative house. The issue got highly debatable in this aspect, as the power of summoning the legislative house lies with the authority of governor, with taking the suggestions from state government. Here the propositions were done, but the final authority whose call is final on this stature, that is the governor, kept silent by making further delay on the issue. This is not the first issue that was highlighted. The state of Rajasthan too saw other issues prior to this. The Governor highly criticized and interfered with the state machinery to regulate the vaccination drive in the state. In addition, during the oxygen crisis in covid times, the Governor took supreme cognizance to handle the issue and criticized the Chief Minister Ashok Gehlot. The other issue with covid was that the state machinery were been minutely taken care of by the Governor, where the state opposed, stating that it is amounting interference in State Government's functioning. The state has also been criticised on other issues as well, which is now becoming a headache for the state government to function there. Thus, the situation in Rajasthan is no different from the state of Maharashtra.

Punjab: shrewd diplomacy of Captain Amrinder Singh

Punjab being a state, basically associated with Congress ruling, was coming on a sharper ground of relationship between state and the Governor. Captain Amrinder Singh, the then Congress Chief Minister of the state, due to his diplomatic and political courtesy was handling the situation very well. Captain Amrinder Singh was not only seen as a mere Congress worker but sought special importance in the framework functioning for the welfare of our country. Apart from being a congress worker, he was also considered as a visionary to India. Being a Congress-ruled state then, the government was facing issues and contraventions, but the political respect and courtesy of the 'Captain' were proving to be an aid to come out of those conflicts in a more efficient and appreciative way. The state too faced problems from the governor's side, in cases of handling covid situation, education, border conflicts, etc, but the talk tables between both the state and the Governor, always came out with a fruitful solution, unlike other states. Therefore, basically, Punjab could be termed as a state, which was out of these conflicting issues while compared with other Non-BJP ruled states.

A glance at South Indian states

South is that part of the country, which always relies upon regional parties, as they have the belief of North Indian annexation into their states, mostly cultural aspects. Like North Indian states, the regional parties in the South are highly devoted to the public welfare, instead of being corrupt. No regional party in the South desires to come into conflict with the central government, as they need assistance and funds from Delhi to run their state. Whether it is TDP, TRS, YSR Congress in Telangana & Andhra Pradesh, JD (s) in Karnataka, DMK and AIADMK in Tamil Nadu, or Communist Party in Kerala, they all lie on the same grounds of relationship. In addition, most of the regional ruling parties are part of the NDA, so they already have an ally there. However, currently, BJP is trying to gain prominence in the South, but it seems quite difficult as the Southern states have the fear of invading the culture of the South from the North. BJP too seems to have allies with these regional parties now, but in the aspect of the Governor and his relation with the state chief ministers, some issues are found. It depends on centre-state relation always, and now the South Indian States never go into conflict with the Central Government where BJP is currently in power in cases of the governor-state conflict no issues are prevalent as such. But, Karnataka, being a Congress-ruled state then came into these conflicts on a daily basis, with various state issues as such. At present, the states of Telangana, Tamil Nadu, and Kerala are facing few hurdles from the governor and Karnataka is ruled by the BJP as of today, thereby poses no problems.

Favourable conditions in BJP ruled states

Currently, India as a democratic country, having BJP rule in maximum states no doubt, Modi magic is still persistent in many parts of India till date, which is a big political era to look upon. Now BJP is in Central Government, has its own ideology of Hindu Rashtra, UCC and other string reforming steps. That is why in implementing those aspects in the states by the state government is an easy task, as they are getting centre's support and other forms of aid. Now of course, there will be no political problems between the governor and state as such, as governor is also appointed by central govt., and they all work together for the same ideology.

Now North East is also not a separate part to discuss on, as the whole north east lies under the BJP rule, and the same trend is continuing in that place. J and K is also not different now, as the article 370 has been abrogated, and the president's rule is imposed there. So, all the BJP ruled states are going with a peaceful and ideological functioning.

Conclusion

Some states in India are facing issues with governor and state relationships in many ways. The states having non-BJP and Congress ruled are managing their statecraft with many issues as such. South Indian states are an exception to it, as few of the regional ruling parties there are the part of NDA. BJP does not want to unnecessarily trouble the South Indian States as it is eyeing winning seats in all the states in which its presence is negligible, such as Tamil Nadu and Kerala. The other BJP ruling states are not facing any issues, because they all represent the same ideology, both in their respective states and the country as a whole. Therefore, the overall assertion lies with the fact that all of these are leading this country to make a Hindu Rashtra, which is a BJP ideology. It is clearly asserted as, Congress and other non-BJP-ruled states are facing many issues in their day-to-day functioning, but the same trend is not there with BJP-associated states. Additionally, in BJP-associated states, the aspects are pro-Hindu and the central laws are being framed in that way. This is a clear ground where governor and state relation is also being altered, and this is becoming a common trend in India. Now the whole governor and state relationship is being managed in such a way that the BJP's intention of making a Hindu Rashtra is achieved, and the whole state-governor relationship is geared towards this agenda.

References

1. For an insightful analysis on the issue, see Govind Rao, "Dynamics of Centre-State Relations: Emerging Trends," in N. K. Singh and Nicholas Stern edited The New Bihar: Rekindling Governance and Development, Delhi: Harper Collins, 2012.
2. Govind M. Rao, A Review of Indian Fiscal Federalism, Research Study submitted to the Commission on Centre-State Relations; Inter-State Council, Ministry of Home, Government of India, 2009.
3. Harihar Bhattacharya, "Globalization and Indian Federalism: Current Trends", An in-house seminar presentation at the Institute of Federalism, Fribourg Switzerland, 16 May 2007.
4. P.K. Chaubey Fiscal Federalism in India | -New Delhi: Deep & Deep Publications Pvt. Ltd., 2004.
5. S.H. Patil, Changing Bases of Federal Units in India Vol. I & II | New Delhi: Mohit Publications, 2006.
6. Subrata Mitra and Malte Pehl, "Federalism", Niraja G. Jayal and Pratap Mehta (ed.) Oxford Companion to Politics in India, New Delhi: Oxford University Press, page: 45, 2010.

STUDY OF MOLECULAR INTERACTION AND STATISTICAL ANALYSIS OF BINARY LIQUID MIXTURES

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Abstract*:*

The nature of molecular interaction can be evaluated from the thermodynamic properties of the liquid mixture. In present work experimental parameters such as ultrasonic velocity (U), density (ρ) of binary mixtures of Tolune+Piperidine and 1-Butanol+Piperidine has been measured over the entire range of composition at different temperatures 303,313,323 K. The observed experimental data have been utilized to evaluate excess thermo-acoustical parameter ie. excesses free length (L_f^E). Thermo-acoustic parameters are also calculated theoretically by applying Jacobson's free length theory and Kalidoss revised free length theory, statistical Chi-square (χ^2) test applied to both the theories, applicability of liquid theories promptly discussed.

Keywords*:* Thermo acoustic parameters, Chi-square (χ^2) test.

1. Introduction:

The ultrasonic velocity data plays very important role to understand the nature of molecular interactions in binary liquid mixtures. The ultrasonic velocity is varies with concentration of solvent and is highly sensitive to temperature, can be used to provide qualitative information about the physical nature and strength of molecular interaction in the liquid mixtures [1-3] The variation of ultrasonic velocity and related parameters with temperature provide information related to structural changes associated with the liquid mixtures having weakly interacting components [4] as well as strongly interacting components. Jacobson's free length theory (flt) has been applied by many workers [5] to evaluate ultrasonic velocities in liquids. Kalidoss incorporated thermodynamic state and shape factor revised Jacobson free length theory can help to predict ultrasonic velocities in liquid mixtures better, and the approach can very well be use to incorporate thermostatic state, associative and shape factors [6] The present study reports the results of the variation of ultrasonic velocity and thermo-acoustic parameters with mole fraction at different temperature in binary systems of Tolune+Piperidine an 1-Butanol+Piperidine and conformers the applicability of liquid state theory by applying statistical analysis ie. Chi-square (χ^2) test.

2. Experimental Method:

In the present work, fixed frequency ultrasonic interferometer (2MHz) has been used to measure the ultrasonic velocity with an accuracy of ± 0.01ms^{-1} at different temperature. By adjusting the temperature of water bath, temperature of the binary mixtures maintain by circulating constant temperature water from double interferometer wall cell. The accuracy in the temperature measurement is ± 0.1K. For this work analytical reagent (AR) grade obtained from E-Merk, purity of chemicals were checked by the density measurements at different temperature and were compared with available literature values. The density and ultrasonic velocity measured at different temperature ie 303K, 313K, 323K. The densities of liquid mixtures are measured at different temperature by employing monopan balance. Temperature of the liquid mixture maintain by circulating constant temperature water through double wall glass cell.

3. Thermodynamic Parameters:

Experimental velocity and density data of binary liquid mixtures of Tolune+Piperidine and 1-Butanol+Piperidine used to calculate thermodynamic parameters such as adiabatic compressibility and free length of binary liquid mixtures which is given by relation,

$$\beta_a = (\rho u^2)^{-1}$$

$$L_f = (\beta_a)^{-1/2}$$

$$L_{Mix} = 2(V_m - X_1V_0^1 + X_2V_0^2 / X_1Y_1 + X_2Y_2)$$

Molar volume of the binary mixtures is calculated by,

$$V_m = (X_1M_1 + X_2M_2) / \rho$$

Where X_1, X_2 represents the molar concentration of 1 and 2 liquid.

Excess parameters of binary liquid mixtures have been calculated by using formula,

$$A^E = A_{Exp} - A_{Ideal} .$$

According to Kalidoss revised free length theory (rflt) intermolecular free length is given by relation,

$$Lf_{(rflt)=} 2 (\sum XiAiMi / \rho_{mix} - \sum XiAiV_{oi}) / X_iA_iF_iY_i$$

Where A_i and F_i are association and shape factors of i^{th} component in the mixtures, A_i = 1,2,3… refers to the monomeric, dimetic, trimeric.. of molecules X_i is mole fraction and M_i represents molecular weight of the i^{th} components in liquid mixtures.

Ultrasonic velocity using flt and rflt have been obtained by,

$$u= (K / \rho) ½ L_f$$

Statistical Chi-square (χ^2) test is given by relation,

$$\chi^2=\sum \{\frac{(O-E)^2}{E}\}$$

Table: 1.Experimental and theoretical velocity (u) m/s at temp 303K-323K

System: 1-Butanol + Piperidine

	303K			313K			323K		
x	u(expt)	u(flt)	u(rflt)	u(expt)	u(flt)	u(rflt)	u(expt)	u(flt)	u(rflt)
0.1	1304.05	1315.97	1315.98	1263.4	1275.87	1275.87	1223.45	1235.29	1235.29
0.2	1308.1	1315.13	1315.15	1266.8	1275.37	1275.37	1227.4	1235.15	1235.15
0.3	1312.15	1315.59	1315.36	1270.2	1276.07	1276.07	1231.35	1236.09	1236.09
0.4	1316.2	1317.29	1317.32	1273.6	1277.91	1277.91	1235.3	1238.08	1238.08
0.5	1320.25	1320.18	1320.21	1277	1280.85	1280.85	1239.25	1241.07	1241.07
0.6	1324.3	1324.21	1324.24	1280.4	1284.85	1284.85	1243.2	1247.04	1245.04
0.7	1328.35	1329.36	1329.39	1283.8	1289.88	1289.88	1247.15	1249.96	1249.96
0.8	1332.4	1335.6	1335.62	1287.2	1295.93	1295.93	1251.1	1255.8	1255.8
0.9	1336.45	1342.9	1342.91	1290.6	1302.96	1302.96	1255.05	1262.56	1262.56
		χ^2=0.19	χ^2=0.195		χ^2=0.45	χ^2=0.452		χ^2=0.26	χ^2=0.26

System: Tolune + Piperidine

	303K			313K			323K		
X	u(expt)	u(flt)	u(rflt)	u(expt)	u(flt)	u(rflt)	u(expt)	u(flt)	u(rflt)
0.1	1291.9	1327.82	1339.81	1249.9	1288.5	1271.2	1211.3	1248.73	1232.1
0.2	1297.3	1335.6	1304.65	1254.8	1296.05	1266.3	1216.6	1256.07	1227.43
0.3	1302.7	1342.31	1302.82	1259.7	1302.56	1264.58	1221.9	1262.38	1225.8
0.4	1308	1347.86	1303.8	1264.6	1303.93	1265.53	1227.2	1267.58	1226.72
0.5	1313.5	1352.14	1307.16	1269.5	1312.07	1268.77	1232.5	1271.58	1229.83
0.6	1318.9	1355.07	1312.61	1274.4	1314.88	1274	1237.8	1274.28	1234.83
0.7	1324.3	1356.53	1319.91	1279.3	1316.27	1280.99	1243.1	1275.59	1241.52
0.8	1329.7	1356.45	1328.87	1284.2	1316.15	1289.57	1248.4	1275.41	1249.74
0.9	1335.1	1354.72	1339.36	1289.1	1314.41	1299.6	1253.7	1273.65	1259.34
		χ^2=8.059	χ^2=0.389		χ^2=10.25	χ^2=0.591		χ^2=8.904	χ^2=0.501

Table: 2.Experimental and theoretical free length (L_f) 10^{-10}m at temp 303K-323K

System: 1-Butanol + Piperidine

	303K			313K			323K		
X	L_f(expt)	L_f(flt)	L_f(rflt)	L_f(expt)	L_f(flt)	L_f(rflt)	L_f(expt)	L_f(flt)	L_f(rflt)
0.1	0.5389	0.534	0.534	0.5711	0.5656	0.5656	0.6046	0.5988	0.5988
0.2	0.5353	0.5324	0.5324	0.5674	0.5636	0.5636	0.6002	0.5964	0.5964
0.3	0.5317	0.5303	0.5303	0.5637	0.5611	0.5611	0.5957	0.5934	0.5934
0.4	0.5282	0.5277	0.5277	0.56	0.5581	0.5581	0.5954	0.59	0.59

0.5	0.5247	0.5247	0.5247	0.5564	0.5547	0.5547	0.5871	0.5862	0.5862
0.6	0.5212	0.5213	0.5213	0.5528	0.5509	0.5509	0.5828	0.582	0.582
0.7	0.5178	0.5175	0.5174	0.5493	0.5467	0.5467	0.5786	0.5773	0.5773
0.8	0.5145	0.5133	0.5133	0.5458	0.5421	0.5421	0.5745	0.5723	0.5723
0.9	0.5112	0.587	0.5087	0.5423	0.5372	0.5372	0.5704	0.567	0.567

System: Tolune + Piperidine

	303K			313K			323K		
X	L_f(expt)	L_f(flt)	L_f(rflt)	L_f(expt)	L_f(flt)	L_f(rflt)	L_f(expt)	L_f(flt)	L_f(rflt)
0.1	0.5384	0.5238	0.531	0.5705	0.5534	0.5609	0.6025	0.5844	0.5923
0.2	0.5349	0.5195	0.5318	0.5668	0.5488	0.5617	0.5983	0.5795	0.593
0.3	0.5314	0.5157	0.5313	0.5632	0.5447	0.561	0.5941	0.5751	0.5922
0.4	0.5279	0.5123	0.5296	0.5596	0.5411	0.5592	0.59	0.5712	0.5902
0.5	0.5245	0.5095	0.527	0.5561	0.5381	0.5564	0.5806	0.568	0.5872
0.6	0.5211	0.5072	0.5236	0.5526	0.5356	0.5528	0.582	0.5653	0.5833
0.7	0.5177	0.5054	0.5194	0.5491	0.5337	0.5484	0.578	0.5633	0.5787
0.8	0.5144	0.5043	0.5147	0.5457	0.5324	0.5434	0.5741	0.5619	0.5735
0.9	0.5111	0.5037	0.5095	0.5423	0.5318	0.5379	0.5702	0.5613	0.5676

Result and Discussion

The tables 1 and 2 provide the experimentally and theoretically determined ultrasonic velocity (u) and intermolecular fee length for the binary systems of 1-Butanol+ Piperidine and Toluene+ Piperidine at 303, 313 and 323K. According to Eyring and Kincaid [7] ultrasonic velocity should decrease, if the intermolecular free length increase and vice-versa. In present investigation, for both the liquid systems, the thermodynamic excess properties are found to be more sensitive towards intermolecular interaction between the component molecules of liquid mixtures which varies with temperature. Ultrasonic velocity in both the systems is increased and almost linear with mole concentration of Piperidine, In case of 1-Butanol+ Piperidine and Toluene+ Piperidine liquid system ultrasonic velocity is increases with mole concentration which shows hetromolecular interaction exiting in the mixture. liquid state theories, Jacobson's free length theory (flt) and Kalidoss revised free length theory (rflt) has been applied to both the systems at three different temperatures 303K,313K,323K .Table-1 shows the variation of $u_{(expt)}$ $u_{(flt)}$ $u_{(rflt)}$ with mole fraction .While applying revised free length theory, different shape combination and thermostatic state such as monomer, dimer, trimer of liquid has been considered. In case of both the system, minimum chi-square (χ^2) value has been obtained by considering spherical + spherical shape combination. By considering minimum χ^2 value of thermostatic state theoretical ultrasonic velocity (rflt) have been calculated. In both the systems it reveals that there is close agreement between theoretical ultrasonic velocity calculated according to revised free length theory (rft) and experimental velocity. Theoretical and experimental free length has the same trend of variation with mole concentration and good agreement between the theoretical and experimental values.In case of 1-Butanol+ Piperidine mixture there is quite a good agreement between experimental and theoretical (rflt) sound velocities, giving minimum value of χ^2 is 0.195 at 303K,0.452 at 313K ,0.26 at323K. Minimum χ^2 is obtained when 1-Butanol and Piperidine molecules are assumed to have spherical shape and both are in monomer thermostatic state. In Toluene+ Piperidine system produced good result of new free length theory giving minimum χ^2value 0.389at303K, 0.591 at 313 K , 0.501 at 323K ,by considering spherical shapes combination and Toluene as monomer while Piperidine as dimer thermostatic state. The magnitude of deviation of excess properties depend on strength of interaction between unlike molecules. That is in order to understand the nature of molecular interactions between the

components of the liquid mixtures. Excess free length L_f^E indicate that sound waves cover long distances due to decrease in intermolecular free length in both the system describing the dominant nature of hydrogen bond interaction between unlike molecules which support the attractive interaction in the mixture.

Conclusion:

Ultrasonic interferometer is found very helpful technique to characterize the thermoacoustic properties of the liquid, which gives the information about the molecular interaction in the liquid mixtures. By considering different shape combination of molecules and by applying statistical chi-square test (χ^2) it has been observed that, revised free length theory (rflt) is applicable to Tolune+Piperidine and 1-Butanol+Piperidine systems.

References:

1. V D Bhandakkar, V A Tabhane, Sharda Ghosh (2003) Ultrasonic study of molecular interactions in binary liquid mixtures: acrolien & cinnanlaldehyde in methanol, cyclohexane & p-dioxane , Indian Journal of Pure & Applied Physic,.41: . 849-854
2. Krishna H. Fattepur , Jagadish G. Baragi , Narendra B.V. (2015) ultrasonic study of molecular interactions in binary liquid mixtures of acetylacetone with nhexane and n-heptane using excess acoustic parameters, World Journal of Pharmaceutical Journal 4: , 572-581.
3. N. Santhi , P. L. Sabarathinam , G. Alamelumangai , J. Madhumitha1 , M. Emayavaramban (2013). Ultrasonic study of molecular interaction in binary liquid mixtures of n-hexane with alcohols .5: 59-71
4. M. Kalidoss ,S.Ravi, R.Shrinivasmoorthy (2006),Association and shape of molecule using free length theory ,Physics and Chemistry of Liquids,423-431
5. Jaroslaw Wawer, Anna Płaczek, Dorota Warminska, Waclaw Grzybkowski (2009) Usefulness of the Free Length Theory for assessment of the self-association of pure solvents, Journal of Molecular Liquids,149: 37-44
6. V A Tabhane, Sangita Agrawal , Sharda Ghosh, M. kalidoss (1999) . kalidoss - Jacobson free length theory applied to binary liquid mixtures of benzene +pyridine /piperidine/furon/tretrahydrofuron Indian Journal of Pure & Applied Physic,.37: 583-586
7. John F. Kincaid and Henry Eyring (1938) Free Volumes and Free Angle Ratios of Molecules in Liquids, The Journal of Chemical Physics 6,620-624

IMPACT OF GREEN COMPUTING IN COMPUTER-BASED MODEL IN ENVIRONMENTAL DATA ORGANIZATION AND MANAGEMENT

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ABSTRACT

The world as we know it has changed over a short period of time, with the rise and spread of the deadly novel the protection of the environment is one of the main problems the mankind faces today. Furthermore, it identifies the platforms, technologies which can be used to conduct organization and management data. Recent advances in computer technology have assisted environmental studies towards this direction, in various scientific approaches. It is basically a balanced and sustainable approach towards the achievement of a healthy and clean environment without compromising the needs and necessities of technology for the present generation. Thus taking up a more holistic and careful approach to making our IT-industry greener definitely falls in our list of responsibilities in creating a more healthier, safer and clean environment. This research work "impact of green computing in all filed" will be dealing on how green computing can help all filed to save energy consumption, with the help IT.

KEYWORDS : Green, Computing, cloud, institutions, e-waste, sustainability, Data Management, Energy efficient computing, Integrated computer system, huge environmental data

INTRODUCTION

A number of products have been developed and applied in environmental education and research in general Riley [1]. However, there are still a lot of environmental issues that need to be tackled further in order to provide solutions, particularly in the organization and assessment of the various scientific findings. In this direction, an interactive application environment, called AgroModel Tzortzios [2], was constructed and used as an integrated computing platform for efficient organization and management mainly of agricultural data. The basic idea was to use an integrated environment, where various data analysis tools could be applied in order to extract and propose solutions to certain case environmental problems [3]. I always have wondered about the increase of electricity bills that have been sent to me every month end and when I don't use any other electrical gadgets other than my Laptop, TV and Iron box and of which I use Iron occasionally. The aim of this research is to design and integrate Green Computing in our educational institutes as well as all filed and to explore green computing in particular cloud computing in the institutions. The Objectives is to critically evaluate Green Computing and its effectiveness to our schools and to the society. To critically evaluate the Green computing via Cloud Computing technology and assessing the benefits, challenges caused due to uptake of Green Computing in our schools and using IT to help in solving environmental issues such as minimizing the negative impact of IT on the all filed. Cloud computing can also help in virtualization. Virtualization is defined as a foundational technology for deploying cloud based transportation which allows a single physical server to run multiple application or operating system concurrently. Virtualization reduces the total physical server footprint, which has inherent green computing benefits. From the efficiency perspective, less equipment will be needed to run workload, which proactively reduces data center space and with less physical equipment plugged in the data center in the school will consume less electricity.

II. LITERATURE REVIEW

The use of application environment

The overall application work was carried out using the above mentioned integrated environment Agro Model. The development of this application environment was based mainly upon the use of object-oriented and visual development tools and techniques [4]. The Environmental Protection Agency has used computers for years to monitor and to investigate chemicals used in the earth's soil and waters. In fact, according to an EPA

article, Computational Toxicology is an important component of regulating things like fertilizers and pesticides.

Best Databases for Finding Environmental Science Articles

- Agricultural & Environmental Science Database. ...
- Web of Science. ...
- Ecology Abstracts. ...
- GreenFILE. ...
- CQ Researcher. ...
- CAB Direct. ...
- BIOSIS Citation Index. ...
- Water Resources Abstracts.

The use of open architecture technology drivers and methods -ODBC interface, **SQL**- to interact initially with Microsoft Access and Excel databases and certain statistical packages later on, such as SPSS, on a **Windows operating system plat**form. In particular, software modules were created as **Visual Basic modules scripts and SQL** queries in order to facilitate the communication of system components and execution of internal functions and procedures.

The idea was to develop and use an interactive and friendly environment for **all filed (Business, Educations, Agricultural & Industrial) data management**, where data analysis (e.g. statistical) and experimentation, as well as further research on contemporary data analysis techniques, could easily be contacted. Some of the basic system tools and facilities the environment provides include database management and maintenance, data analysis and advanced data management involving some type of programming.

III. METHODOLOGY

The environment of Data Base model currently provides the following basic tools for all required filed data management:

1. Database basic data manipulation use of retrieval, update, filter, report, queries.
2. Data analysis through build-in functions, spreadsheet functions (MS Excel), etc.
3. Advanced data management (SQL queries, etc.)

The data analysis *tool* provides access to spreadsheet functions (e.g. Excel), where the user can either perform data analysis directly on a spreadsheet worksheet, or work with data analysis tools and functions within the application environment. Some of the basic data analysis facilities include: mathematical analysis and statistical analysis.

Avoid wasting electricity

1. Turn off your computer and monitor when not in use. ...
2. Use power management settings, available on most newer computers. ...
3. Turn off peripherals, such as printers, scanners, speakers, external drives, and gaming systems, when not in use.

Computers are or could be used to reduce resource use and to support environmental protection measures **by doing things more by hand and less by computers** most people are used it being done electronically because it is more convenient but it causes more harm in the future because of updates those computers need and the ...

The advanced data management tool currently provides a small number of logical functions, based mainly on quantitative techniques, for the generation of any required new information derived from the existing database; nevertheless, this functionality is under continuous development. A general schematic view of this environment is presented in **Diagram 1**

The application's user interface design is user-friendly, based upon system objects use as tables through which the user could easily communicate and interact with the functions and procedures provided within the environment to obtain the required information from the database [2].

The given application use to some layers are as following:-

1. Advanced Data Management :- Predictions, Reasoning
2. Database Management :- Maintenance, Development
3. System Analysis :- Metrics, Functions
4. Applications Management :- SPSS, STATISTICA
5. Advanced Data Management :- Predictions, Reasoning

IV. Database organization

Data management is the process by which businesses gather, store, access and secure data from various business software solutions. Employing data management enables more efficient access to data analytics that offer insights that are needed to improve business operations and identify opportunities for improvement. By establishing a better framework to access the wide swaths of data that every business generates, companies can make more informed decisions and improve their ability to deliver valuable products and services to their customers.

"Data management involves multiple disparate functions and systems working together to move, organize, and secure data such that it is accurate, precise, accessible and protected," said Christopher Risher, senior program manager of application management services at Onepath.

"Managing data typically begins with a project that'll get started in one of the knowledge areas and iterate through the other knowledge areas," Risher said. "Utilizing cloud-enabled tools can assist in the rapid development of a data management platform. These cloud tools can empower an organization regardless of the location of their data."

In addition, data management should serve to standardized data in a way that makes it effective for business purposes. Not every software platform will collect data in the same way, or even collect the same types of data. Data management serves to unify these data silos so they become useful when combined.

Data management systems make the process of data management more manageable, automating some of the most arduous aspects of unifying and reviewing key data. These systems incorporate databases and analytics tools that allow businesses to not only store and organize important data but also query the system as needed. The best systems consolidate data into useful reports that include visualizations that provide the ability to contextualize data at a glance. Some even incorporate automated decision-making recommendations empowered by machine learning, helping key stakeholders make more informed, effective choices about how to govern the business's operations.

- **Data governance:** Tools like Informatica, Azure Data Catalog, and Talend improve a business's ability to track data and associate it with metadata for later retrieval. Metadata helps improve data structure, organizing it in such a way that makes it more useful. Data tracking tools help businesses understand each data asset they have at their disposal. Together, these elements are critical for making vast databases truly useful. Data governance is all about how data is organized, stored and secured, Risher said. Through data governance, businesses can guarantee data quality.
- **Business intelligence:** BI tools like Microsoft Power BI, Azure Synapse Analytics, Tableau and Snowflake serve to improve data storage and security while also availing it to decision-makers in a structured, contextualized way. BI tools are essential for making use of vast databases, which no human could ever hope to manually sort through to derive meaningful insights.
- **Data integration:** Tools like Azure Data Factory, Logic Apps and Functions offer user-friendly interfaces for centralizing disparate sources of data, which can yield new insights. For example, data from accounting software

and a CRM might seem separate and unrelated until organized together. Taken together, though, the data from these disparate systems might help paint a more complete picture of business cash flow and revenue. This is true for all sources of seemingly separate, but in actuality, related data.

V. Database structure:-

Small businesses run on databases. These repositories of organized information can store virtually every kind of data imaginable, and they can sort that information and deliver it to you with a click of a mouse. Business databases **help small-business owners organize and track their customers, inventory and employees**.

A database scheme structure representation is given as it can be seen, the overall organization of the all field database is based on a relational database model, where each specific entity of business and educations data is structured logically as a table data structure and related to other data subsets through the appropriate key data fields. For representing these table relations, a shorthand notation is used, where each data attribute (table field) is contained in a list separated by commas, with the primary key underlined and the name of the table to the left of the brackets.

As we can see from the above, each table has a unique property field, as a primary key, acts as a unique identifier for a particular record of information within table. In other words, all these attributes within the entity table are functionally dependent (have a unique association) with the primary key. This approach simplifies the management of the relational tables, by reducing their relations to the simplest forms, and therefore making them easier to handle, and ensure that data could be processed more efficiently (e.g. queries could be carried out more quickly).

Oracle is now the most frequently used commercially supported database and one of the most widely used RDBMS in general. The 2nd one on our list is Microsoft's SQL Server – a relational database management system used by organizations across the globe.

Three types of database management systems

1. Hierarchical database systems.
2. Network database systems.
3. Object-oriented database systems.

Some of the most common ones include:

- Hierarchical database model.
- Relational model.
- Network model.
- Object-oriented database model.
- Entity-relationship model.
- Document model.
- Entity-attribute-value model.
- Star schema.

A general schematic view of this environment Data Structure processing in data base model is presented in **Diagram 2 & 3**

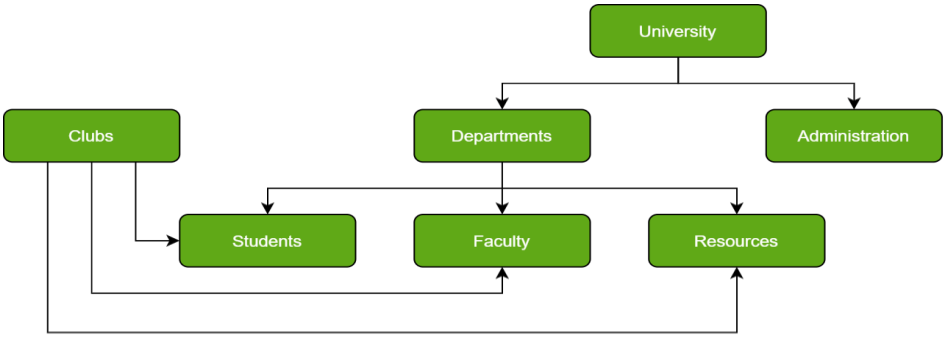

Diagram 2 is present on data processing in data model for education purpose

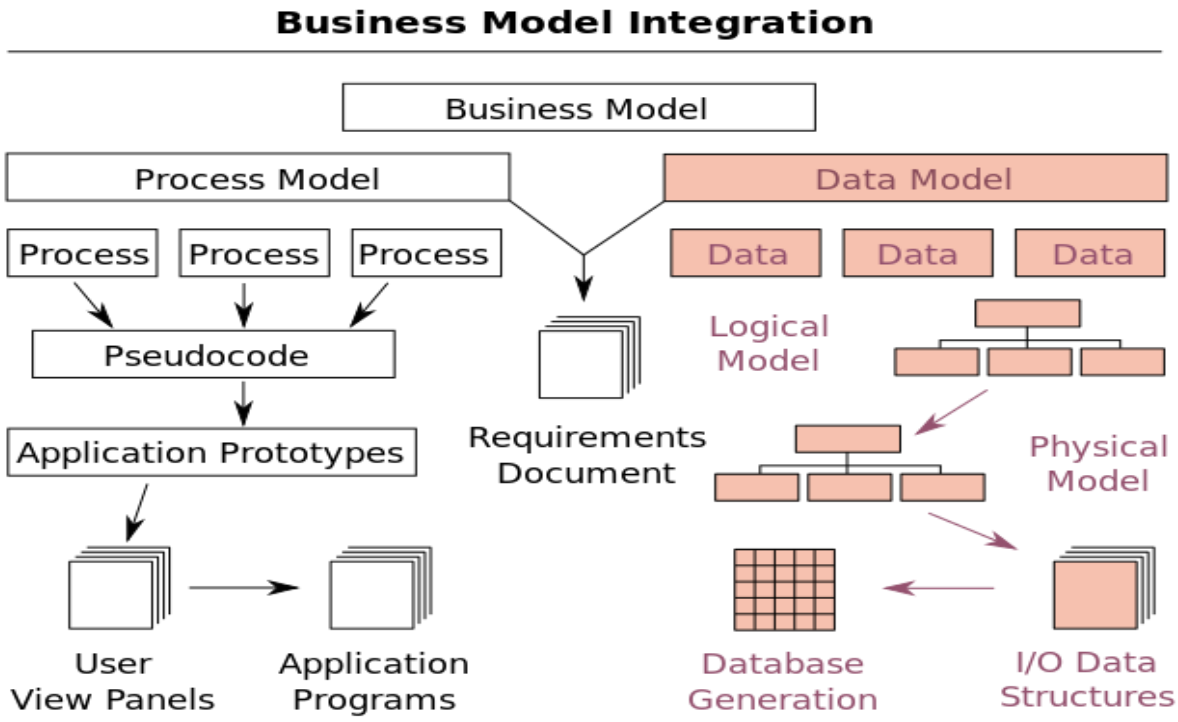

Diagram 3 is present on Business Model Integration

VI. Data manipulation

The management of the above database structure could be easily performed using data structure basic database management facilities, or in a more advanced and constructive way, by using specific SQL queries provided for this purpose.

Finally, this database structure also allows applications (e.g. Excel spreadsheets) and high-level languages (e.g. Visual Basic scripts, SQL queries) to link to the data in such a way that the whole structure of the database is transparent to such or any other applications according to the user's requests. At the top level, the application system of Data Base Model controls and co-ordinates the entire user interaction and requirements (educational or research), towards the all filed database, through a number of facilities and tools provided for this purpose [2].

VII. Discussion

The world of data is constantly changing and evolving every second. This, in turn, has created an entirely new dimension of growth and challenges for companies around the globe. By accurately recording data and updating and tracking them on an efficient and regular basis, companies can address their challenges on the one hand and make use of the immense potential offered by this sector on the other hand.

By collecting minute and updated data, companies are using the said information to achieve their goals systematically on the one hand and strategically empower their business on the other hand. Some activities conducted after collecting data include creating accounting reports, calculating sales estimates, and creating customer invoices. This data and its insights are then made available to the management and employees of the organization through a computerized database. One of the proven ways brands can manage the relationships between the various database elements is through the use of database management systems, which is today an integral part of the functioning of companies and organizations worldwide.

1. **The data management system is needed for data access within the company**

Modern database management systems are dependent on a programming language that is called a structured query language. This language is then used to access, update and delete data in its tables. The database systems also contain programs that include Microsoft's

SQL server and the open source MySQL queries that enable outside programs to access its data through SQL queries. For example, a web page can display information or data that includes product data and descriptions, photographs, and prices. This information is readily available to the user when the web server software is connected to the relational database management system.

2. **It is needed to maintain strong relationships between data.**

One of the most critical functions of relational database management systems programs is allowing different data tables to relate. When a database contains information about employee data on its product sales in one table, and another contains information with sales employee data, then a relational database will be perfect for managing their relationships in a systematic and straightforward style. This system can help brand managers understand vital statistics like which salesperson can sell the most or which product a particular salesperson sells.

3. **This system allows newer and better updates.**

A valuable and productive database management system allows brand managers not just to enter newer information but also to update the current information and delete information they do not require. For example, when a salesperson can,000 units, then the son can enter that transaction information into the relational management system, which can include specific details like the person's name, customer information,andt and the number of products sold by the user. The relational database management system will enter the new records and update all the required information, allowing brands to track and sell their products effectively.

VIII. Challenges of Database

1. Growing complexity in landscape

We alluded to this earlier. As the database market evolves, many companies are finding it difficult to evaluate and choose a solution. There are relational databases, columnar databases, object-oriented databases, and NoSQL databases. Not to mention the plethora of vendors offering their own spin on each

2. Limits on scalability

The fact is, all software has scalability and resource usage limitations, including database servers. Forward thinking companies concerned about transaction processing capacity know that cataloguing components, database architecture, and even operating systems and hardware configuration all affect scalability.

3. Increasing data volumes

As the amount of data generated and collected explodes, companies are struggling to keep up. Research shows that we've created more data in the past two years than in the entirety of the human race. Yet, a 10% increase in data accessibility could generate more than $65 million additional net income for a typical Fortune 1000 company.

4. Data security

Databases are the hidden workhorses of many companies' IT systems, storing critical public and private data. Lately there has been an understandable and high-profile focus on data security. A data breach typically costs a company $4 million, not to mention loss of reputation and goodwill.

5. Decentralized data management

Although there are benefits to decentralized data management, it presents challenges as well. How will the data be distributed? What's the best decentralization method? What's the proper degree of decentralization? A major challenge in designing and managing a distributed database results from the inherent lack of centralized knowledge of the entire database.

IX. Possible Solutions to the Challenges of Database in environment

1. **Real-Time Data Streaming :-** One of the most common ways to solve this problem is to institute real-time data streaming. That means instead of data pulling into your business intelligence system at intervals, such as once a day or once a week, the data pulls immediately. For most data

management systems, this is a standard and automated process.

2. **Data Organization & Translation :-** This comparison problem is solved by having a system to organize and translate data into something that can interact more collaboratively for reporting and analytics. Data organization and translation are at the heart of data management. The right tools and expertise can create protocols for organizing and translating data automatically without the need for manual interpretation.
3. **Recognize Potential Variations & Trigger Corrective Action :-** Depending on the structure of your data, there is likely a pattern of variations that can be identified. The right data management platform will be able to recognize these variations and automatically trigger corrective actions. This helps keep your data as clean and accurate as possible.
4. **Data Visualization, Platform Support, & Training :-** There are several solutions to this data management problem. The first is to ensure you have proper, easy-to-use dashboard tools in place. These are tools that provide visual reports to those people who will utilize the information and allow queries and analysis in a user-friendly space. In addition to comprehensive and easy-to-use reporting tools, you should also plan on providing training and support for your data management platform. Individuals who will be participating in the business intelligence process should be trained on the platform and have easy, reliable access to support to ask questions and help troubleshoot as needed.
5. **Better Processes :-** The easiest solution to this issue is to implement better data processes. This means defining roles and expectations, naming conventions or taxonomies, timeframes, etc. With more specific processes in place, it can be easier to prevent data issues as well as to identify and resolve them more quickly.
6. **Better Processes :-** The easiest solution to this issue is to implement better data processes. This means defining roles and expectations, naming conventions or taxonomies, timeframes, etc. With more specific processes in place, it can be easier to prevent data issues as well as to identify and resolve them more quickly.

X. CONCLUSION

Relational database systems underpin the majority of the managed data storage in computer systems. In this course we have considered database development as an instance of the waterfall model of the software development life cycle. We have seen that the same activities are required to develop and maintain databases that meet user requirements.

As a general conclusion of the results presented could be realized that the degree to which a user could exploit the database model depends on his goal and his level of knowledge and experience. In cases of general database use, an business, education, agriculture and industrial his main managerial requirements; for a more educated researcher there are advanced tools, which could be exploited according to specific scientific purposes. We have addressed the problem of organizing and managing some of the important cattle breed characteristics, using a tool that utilizes computer-based methods and statistical tools, in order to deal efficiently with proper animal's selections of the most productive ones.

1. Produce a reliable description of the specific cattle breed scheme based on SQL models.
2. Provide flexibility in the manipulation of various cattle parameters in SQL query forms.

In conclusion, a database is a far more efficient mechanism to store and organize data than spreadsheets; it allows for a centralized facility that can easily be modified and quickly shared among multiple users.

A database environment is a collective system of components that comprise and

regulates the group of data, management, and use of data, which consist of software, hardware, people, techniques of handling database, and the data also.

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XI. REFERENCES:

1. Riley, J. Statistical usage in biological sciences: main problems and solutions. Proc. of the 5th Meeting of the International Biometric Society", Network for Central America and Caribbean, Xalapa, Mexico, 1997.

2. Tzortzios, S., & Adam, G. Proper computer procedures (AgroModel) in plant and animal selection for research and educational purposes. Proc. of the International Workshop On Information Technology in Agricultural Education, Moscow, 1999.

3. Computer-based methods in environmental data organization and management G. K. Adam, S. Tzortzios & N. Dalezios Department of Agriculture, Crop and Animal Production University of Thessaly, Greece.

4. Law AM, Kelton WD. *Simulation Modelling and Analysis, McGraw- Hill International Editions. Industrial Engineering Series*. USA: McGraw-Hill; 1991.

5. *Schwartz, Barry. "Can There Ever Be Too Many Flowers Blooming?". Engaging Art: The Next Great Transformation of America's Cultural Life. (2016): n. pag. Print.*

THE ROLE OF ENVIRONMENT IN ECONOMIC GROWTH

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Abstract: -

One of the key environmental problems facing India is that of particle pollution from the combustion of fossil fuels. This has serious health consequences and with the rapid growth in the economy these impacts are increasing. At the same time, economic growth is an imperative and policy makers are concerned about the possibility that pollution reduction measures could reduce growth significantly. The natural environment plays a key role in our economy, as a direct input into production and through the many services it provides. Environmental resources. Such as minerals and fossil fuels. Directly facilitate the production of goods and services. The environment provides other services. That enable economic activity, such sequestering carbon, filtering air and Water Pollution, Protecting against flood risk, and soil formation. It is also vital for our wellbeing, providing us with recreational opportunities, improving our health, and much more.

Economic growth has negative impacts on environment at the first phases of development. After passing a threshold, it affects the world because countries have different economic backgrounds and economic structure. The most important way to prevent global environmental pollution is to act together if developed countries use technology transfer for the benefits of themselves and developing countries by giving up excessing consumer roles, economic growth create much more positive impacts on environmental quality and natural resources than expected.

Keywords: - Economic Growth, Environmental Kuznets, Environmental pollution Impact.

Introduction:-

The World Bank estimated that, under present productivity trends and given projected population. Increases, the output of developing countries would be about five times higher by the year 2030 than it is today. The output of industrial countries would rise more slowly but it would still triple over the same period. If environmental pollution were to rise at the same pace, severe environmental hardships would occur. Tens of millions of people would become sick or die from environmental causes, and the planet would be significantly and irreparably harmed. The relationship between economic growth and the environment is complex, several different drivers come into play, including the scale and composition of the economy particularly the share of services in GDP as opposed to primary industries and manufacturing

and changes in technology that have the potential to reduce the environmental impacts of reduction and consumption decisions whilst also driving economic growth the conflict between economic growth and environment is sharper today than ever before, particularly in developing countries like India with fast growing population and mass poverty. The developing counties are making strenuous efforts to balance their need for rapid economic growth with the environmental concerns for keeping their natural base intact in India.

Yet economic growth and not incompatible in fact, many now believe that they require each other. Economic growth will be undermined without adequate environment protection. Will fail without economic growth.

The Environment Important for Economic growth

Environmental resources such as minerals and fossil fuels directly facilitate the production of goods and services that enable economic activity, such as sequestering carbon, filtering air and water pollution, protecting against flood risk and soil formation. The issue of economic growth and the environment essentially concerns the kinds of pressures that economic growth, at the national and international level, places on the environment over time. The relationship between ecology and the economy's become increasingly significant as humans gradually understand the impact that economic decisions have on the sustainability and quality of the plant.

Environment Issues in India

In India, factors like rapid growth of pollution, organization, Industrialization, and poverty, among others are responsible for harming the environment. Some of the severe environmental issues prevalent in India.

- · Degrading Air quality Index
- · Loss of Biodiversity
- · Urbanization in India
- · Loss of Resilience in Ecosystems
- · Lock of waste management.
- · Depletion of Resources (land, air, water)
- · There are many more such issues that need to be addressed to maintain a sustainable environment so as to ensure consistent economic development.

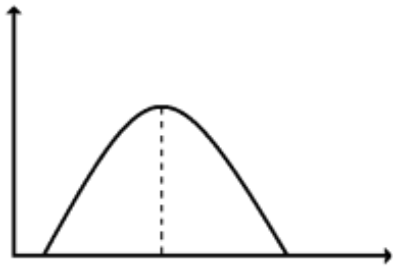
Economic Growth and Environmental Pollution

Beginning of economic growth – environmental pollution debates is expressed with that the general economic circumstances start to remedy Mankind's socioeconomic conditions in fact, developing economic circumstances, first resolved many health problems of humans and sheltering conditions. All of these led to increase of world population. While increasing population is raised the need for total production of goods and services, amount of per capita goods and services were not in the same rate. This is an important factor that makes up essence of environmental issues. Although natural resources use has environmental impacts, their benefits to developing. World are considerable at which one is preferable if economic growth contributes to human development, but decreases environmental quality? It there any limit to the economic growth? Which level economic growth is preferred? To be able to response such questions correctly contributes to robust ecological economic development Strategies. Hence, Economic Growth-environmental relationships are the most controversial issues that environment economists have discussed.

Inferences regarding interactions between income level and demand for environment quality are explained by elasticity concepts in economics. After a certain income level, the rates of willingness to pay for better environmental quality are higher than the rates of increases. Individuals who have higher income levels are tend to willingness to pay more for better environmental standards and regulations that can be enacted. All explanations are discussed comprehensively in the next section.

Environmental Kuznets curve

In 1955 Nobel laureate Simon Kuznets gave a famous hypothesis an inverse 'U' shaped income- inequality relationship named as Kuznets curves. In this hypothesis according to Kuznets, at initial level income inequality increases as income rise and reach to peak where average income level is attained and further declines with increase in income level. Environmental degradation and income per capita.in EKC hypothesis contends that pollution increases inticully as a country develops its industry and there after declines after reaching a certain level of economic progress which is known as threshold level inflation point is that point where the environment degradation is at its peak and after it shows a downfall with further increase in real per capita GDP.



One Theory of economic growth and the environment is they up to a certain point economic growth worsens the environment but after that the move to a post- industrial economy-it leads to a better environment.

Environmental in Impact of economic growth

Economic growth means as increase in real output (real GDP) Therefore, with increased output and consumption we are likely to see costs imposed on the environment. The environment impact of economic growth includes the increased consumption of non renewable resourced consumption of non-renewable resources, higher level of pollution, global warning and the potential loss of environmental habits.

However not all forms of economic growth cause damage to the environment. With rising real incomes, individuals have a greater ability to devote resources to protecting the environment and mitigate the harmful effects of pollution. Also, economic growth caused by improved technology can enable higher output with less pollution.

Governmental initiatives to take Environmental Degradation

While the cooperation of every citizen of the country is essential for safeguarding the Environment, governments have a huge role to play in helping find solutions to the problems. The government of India has taken various steps to safeguard the environment. Some them one listed below.

· Swatch Bharat mission
· Green Skill Development Programmed
· Manama Ganged Programmed
· Compensatory Afforestation fund act
· National Mission for Green India
· National River Conservation Programmed
· Conservation of Natural Resources & Eco-System.

Conclusions:

Economic growth has polluter impacts on environment at the first phase of development. After passing a threshold, it affects the environmental quality positively indeed. Economic development strategies indicate differences in the different regions of the world because countries have different economic backgrounds and economic structure development levels by damaging the environment. Developing countries have not yet pollutes the environment as developing countries. Natural resources have capabilities of regeneration unless excessive uses are experienced. Yet, severe impacts of economic growth have caused irreversible environmental disasters on fragile ecosystem. The Most important discussion is whether economic growth is controlled. If developed countries use technology transfer for the benefits of themselves and developing countries by giving creates much more positive impacts on environment quality and natural resources than expected.

References:

1. World Bank world development Report 1992 Development and the environment. New York Oxford University Press 1992
2. Economic and political weekly a sameeksha trust publication .Vol. Lv II No25 June 18,2022
3. Maharashtra pollution control Board (MPCB)(2006-07)
4. Bhattacharya R.N (Ed) (2006) Environmental Economics: An Indian prospective, oxford University Press, New Delhi.
5. Carleton, T. A and S.M Hsiang (2016) " Social and Economic Impacts of Climate'' Science,353 (6304), and 9837
6. Colom. A (2004) Trade, The pollution haven hypothesis and environmental Kuznets curve: examining the Linkages. Ecological Economics 48:71-81
7. Chopra and Deal, "Handbook of environmental Economies, Oxford University Press, New Delhi.
8. Kuznets's (1955) "Economic growth and income inequality'' American Economic Review 49 1-28.
9. https://en.wilipedia.org/wiki/degrowth
10. Koistad, Charies (2010), Environment Economics, Oxford University press, New Delhi.

ECOCRITICISM AND ECOFEMINISIM

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Abstract

Taking into account the material feministic theories of "Agency", "Matter ", and "Body", thids essay examines to what extent material feminism and trans –corporately can be productive models for conceptualizing feminist ecocriticism, an anti –phallogocentric ecocritical theory that analyzes the complex dynamics of material agencies across human and nonhuman bodies. By contesting gendered dualities and bodily boundaries, it opens up new ecocritical pathways to deconstruct the sexist, speciesist and homophobic discourse of nature which served as a rhetorical strategy to associate female and queer human beings with animals / nature .feminist ecocrticism is also a from literary criticism that examines these issues in literary texts.

Keywords :-Ecocriticism ,Environmental Literary Criticism ,Green Studies ,Eco Poetics,Libreral Feminism ,Radical Feminism ,Radical Feminism ,Marxist And Socialist Feminism ,Cultural Feminism.

Introduction :-

Studying literature is a kind of interdisciplinary and multidisciplinary study. Interdisciplinary study became the hallmark in research also. It provides diversity and variety to exemplify single things with different angles. Interdisciplinary study tries to find the interconnection between different approaches, ideologies, different sciences and different subjects and also tries to apply different theories and approaches. So Literature becomes a mall where every different method is applicable.

So today I am going to present my idea about what is Ecocriticism and ecofeminism and how these both terms are mingled with literature…

When we separate the word- Eco means related to environment or nature or criticism is wide term which is obviously connected with literature. So, Ecocriticism is study of the relationship between literature and Environment. How time and again nature interfere in literature with different perspectives, and how environmental issues and nature reflected in literature is the prime-focus of Ecocriticism. There are also some other terms for Ecocriticism…

- Environmental Literary Criticism
- Green Studies
- Eco-poetics

Ecocriticism as a Literary Theory

Generally in literature we use conventional theories which are from linguistics, Social studies, psychology etc. But ecology as theory is a new approach to explore dimensions. Use of Environment and Nature in literature is a common thing but there is no systematic method make criticism on it.

Ecocritics take nature as a dominant factor. Reasons behind dominant are as following… · Human evaluation as society is largely dependent on natural forces.

- The world in which we live is not only made up of language or social elements. Nature is the driving force behind all these things.
- Human existence and development is also based on nature
- Human life is totally affected by nature.

So these are some of the reasons behind the flourishing of Ecocriticism especially during 1990s. William Rueckert in his book "Literature and Ecology: An experiment in Ecocriticism" first used the ecocriticism which originally published in 1978 and later edited by Cheryll Glotfelty and Harold Fromm in 1996. According to him major concern of ecocritic is to…

"To find the grounds upon which the two communities - the human,the natural - can coexist, cooperate and flourish in the

biosphere."

Ecocriticism is a lens of theory which is an "Earth-centered approach to literary studies. (Glotfelty) So the core idea of Ecocriticism is to study how humans and their culture is affected by nature, how humans affect the nature. Ecocriticism is concerned about how human power and society undermine the nature for their own profit.

Ecofeminism

Before we dragged into Ecofeminism first let's try to understand what Feminism is.Feminism is a worldwide political movement which seeks for an Equality between Men
and Women It emphasizes that men and women should have equal rights and equal positions in society. As Ott and Make said that…

"A movement to end sexism, sexist exploitation and oppression"

The Motto of Feminism is to vanish the Gender stereotypes, which are practiced worldwide in smaller or larger amounts. With the exploration of Feminist movement, there are also growth of some sub-branch of Feminism…

- Liberal Feminism
- Radical Feminism
- Marxist and Socialist Feminism
- Cultural Feminism
- Eco Feminism etc…

One of the important aspects of Feminism is EcoFeminism. There are innumerable perspectives that women are connected with nature. The term was first used by French Feminist and activist Francoise d'Eaubonne in her book Feminisme ou la Mort in 1974. In this book she tries to make comparisons between women and nature..

"The oppression of subordinate groups(such as women and people of colour) to the oppression of nature by man."

Ecofeminism is a philosophical and political theory that tries to connect environmental degradation and exploitation of women and gender inequalities with a dominance of man over woman and capitalism over planet. Both control nature as well as women and show their privileges. Ecofeminism tries to mingle two problems in one…

- Climate change
- Gender biases

By uniting these two problems in one one can get economical development with abolishment of inequality. By dismantling nature, culture became powerful, simultaneously men undermined the existence of women. So this is how we can see a relationship between woman and nature is like a sister. There are two distinct ways in which Ecofeminism works…

Radical Ecofeminism :

It signifies that woman and environment both are controlled by men. Women are exploited by patriarchal society. In the same manner man works on the field.and they used it in their uncaring way and destroy the naturality of nature for their sake and also waste our environmental richness. Thus what connects ecology and women is their degradation.

Cultural Ecofeminism

Second belief is that Climate change affects more women than it does to men. Because women are more near to nature in biological processes like Menstruation period and Pregnancy. So women are the better option to solve the economical crisis along with their
own development. J.R Thorpe, author of "What is exactly Ecofeminism" on which Bustle says that…

"Women in their capacity as natural resource managers might have unique perspectives on how to help stop

environmental damage, but if their voices are silenced, they can't help"

In regards to the above statement we can connect how Great Thunberg a female economist emerges to save the environment and stand against Climate Change. She got world-wide acclaim. But there are so many women whose voices remain unheard like environmental damage is also not seen as a great loss in our economy. Here are some of the important factors which are touched upon by Ecofeminism study….

- Ecofeminism sees parallel between the Earth and Women
- Ecofeminism challenges Power Hierarchy
- Ecofeminism also points out women's unique involvement in Environmental Damage

- Disney movies are generally seen as enchanting magic and a completely fictional world. But when "Read" it deeply these are not simply for entertainment but it also explores deep messages in it. According to Marry Mellor…
- Ecofeminism is a movement that sees a connection between exploitation and degradation of the natural world and subordination or oppression of women. · Ecofeminism is a link between feminism and economy and the common thing is suppression or oppression of something. Using this definition let's have a look at the movie about how ecofeminism is used in Maleficent not only as a connection between both but also used to strengthen female roles.
- During 1950s, the course of time period in which Disney movies are non-feminist and and portraying patriarchal society from anti-feminist way. Steven Watts, the author of The Magic Kingdom:Walt Disney and the American Way of Life states that…
- "Disney Female heroine in the 1950swas quite simply, the ideal American woman of the time."
- But, We can see Maleficent take one step ahead from conventional and stereotypical representation of women. Here, Maleficent is the queen of Moore's and she has a responsibility to save nature from Human world. The protection of the land and ecosystem is on Maleficent and she is defeated by King Stephen and her wings are also stolen by Stephen. If the story of movie ends here then it may be included in the category of Non-feminist Disney movie. But no, In burning desire to take revenge Maleficent cursed the Stephen Daughter and and took her into her Kingdom. Where the bond between two became stronger because of their Love for Nature. So here, Also showing that the bond between two women can be created through Nature and women are very near to nature because of their oppression.
- So, In Maleficent movies, By giving a love for nature in Maleficent and need to save nature from civilization what Disney Movie is trying to show is that…
- "Maleficent an environmentally conscious fairy that protects an enchanted ecosystem on the edge of a destructive kingdom"

So still there are some of the stereotypes regarding women character and non Feminist approache towards women but slowly and steadily Disney movies are changing their shift

from Patriarchy to Feminism and also Showing women as the "Mother Nature" By using Cultural Ecofeminism Maleficent emerges as fight against Male dominant socisty and exploitation of forest by society and Women who is the center for oppression remain as the saver of nature.

Thank You….

REFERENCES

- https://www.bustle.com/articles/155515-what-exactly-is-ecofeminism .
  rebootmag.files.wordpress.com

IMPACT OF ECONOMIC GROWTH ON ENVIRONMENT

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Abstract

Can you imagine the world will be able to sustain economic growth identity without running into resource constraints or despoiling the environment beyond repair? What is the relationship between steadily increasing incomes and environment quality?

The objective of this paper is to critically review, synthesize and interpret the literature on the relationship between economic growth and environment.

Keywords – economic growth environment – recourses, degradation.

Introduction:-

In recent years there has been growing concern about degradation and pollution of environment and climate change as they impact on future development of both the developing and develop countries like India with fast growing population and mass poverty. The developing countries are making strenuous efforts to balance their need for rapid economic growth with the environment concerns for keeping their natural base intact. In India as in other developing countries the adoption of development strategy based primarily on large scale industrialization, energy intensive technologies and bio-chemical based agriculture technology ignoring indigenous development paradigm based on locally self sufficient technologies has led to environmental duration. In this article we shall explain various environment issues and the adverse impact of climate change and explain the need for sustainable development.

The environmental degradation has three damaging effects, if harms human health's reduces economic productivity and leads to the locus of amenities.

The following factors are responsible for the costs of economic growth and environmental degradation.

1) **Industrialization:-**
The strategy of heavy industrialization is the main cause of environmental degradation in different countries. The establishment of such industries as fertilizers iron and steel chemicals refineries is etc. has lead To land, air and water pollution. The use of soil, fuel, mineral and timber as sources of industrial energy is depending these natural resources and degradation the natural ecosystem.

2) **Agricultural Development**
Agricultural development has been a major factor in environment degradation, intensive farming and excessive use of fertilizes and pesticides has lead to over exploitation of land and water resources. These have lead to land degradation in the form of land degradation erosion, water – logging and satiation.

3) **Urbanization**
Rapid and unplanned urbanization has led to degradation of urban environment slums and shanty town's pollute air and water and degradation of solid and hazardous wastes have contributed to environmental degradation on vast scale.

4) **Deforestation**
Deforestation also causes environment problem. Deforestation leads to felling of trees and the natural plants growth for setting up industries and building town's roads highways and dams etc. It destroys flora and fauna. It leads to localized flooding in hilly and adjoining areas.

There is loss of human and animal life. The green landscape changes into factories, residential and building. They produced more heat, noise and pollution which bring

environmental degradation and ultimately result in death of humans and cause of birth defects and genetics mutations.

5) Transport Development :

Environmental degradation is also due to transport development in the different parts of the world Road, Air and Sea transportation lead to air pollution, noise pollution and Sea pollution, The development of port and harbors have lead to oil spills from ships and adversely affected fisheries , Coral reefs, mangroves and landscapes.

6) Solid and Hazardous waste :

Solid wastes also create air and water pollution in urban and semi urban areas. Unregulated urban growth without such facilities collection, transportation, treatment and disposal of solid wastes atmosphere pollutes the atmosphere and water resourced rotating garbage and blocked drains spree communicable diseases and pollutes ground water resources.

7) Market Failure :

An important cause of environment degradation is market failure. It reflects failure of government policy in removing market distortions created by price controls and subsidies. Market failure also called externalities are called by lack of individuals property rights and jointers in either productions or consumption.

For instance, individuals farmers living in hilly areas cause soil degradation through deforestation and overgrazing of land that flood areas of people living in lower areas. Negative expeditions are not considered by the inhabitants of hilly areas. The effects of such environmental degradation are not controlled by market forces.

References

1. https//www.hks.harvald.edu
2. https//www.yourarticlelibrary.com
3. https//www.researchgate.net

A WATER-BORNE DISEASES: A CASE STUDY OF INDIA

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Abstract

The term "water-borne disease" refers to the vast volume of drinking water used to transmit infections which are mainly transmitted through consumption or contact with microbiologically contaminated water. Water-borne diseases are transmitted by polluted water and result in irreversible harm to both animals and plants, including humans. Humans and microorganisms are the groups most affected. It is responsible for epidemics and a number of different of dangerous diseases including cholera, jaundice, dysentery, typhoid, tuberculosis, paratyphoid, diarrhea, as well as others. The present study was carried out the water born disease of India. The result shows the total death due to water bon disease was 10938 from the years 2013 to 2017.Among these years the highest death was in 2017 due to highest diarrhea case was (1296683) in west Bengal, cholera in (78) in Andhra Pradesh, typhoid (429349) in Utter Pradesh .the Despite massive government efforts at all levels, as well as a large number of agencies and scholars interested in water pollution and its safety, water-borne diseases continue to be a significant public health and environmental problem. The massive quantity of quality research, while worthwhile, has not yielded the desired results, as water diseases continue to plague underdeveloped countries, with emerging economies bearing the brunt of the burden

.

Keywords: - Water Borne Diseases, Type, program and management,

Introduction

This paper is deals infections and diseases of human beings are transmitted by contaminated water in India. Distinctively, thispaper willanalysis those infections and diseases that are carried by the ingestion of an aquatic organism. Untreated or contaminated water causes various types of water borne diseases which leads it to be epidemic and dangerous [savindar Singh, 2015].Water borne diseases are mostly broken out over the developing and under developed countries mostly African countries and Asian countries. Overall countries of the world are affected with the untreated drinking water cause water-borne disease, a major cause of morbidity and mortality.

Today, water infrastructure serves 85% of India's population. Each year, between 400 000 and 500 000 children under the age of five die from diarrhoea. A failure to improve personal and household hygiene is one of the causes (India Planning commission 2020) ' There are 12 incidences of viral hepatitis for every 100,000 persons (NITI Aayog 2020). However, at least two studies in metropolitan areas have indicated that the incidence may be close to 100 cases per 100,000 people. According to the research, just a small percentage of diarrheal diseases are detected.through observation. Improvements in sanitation coverage are not expected to lead to changes in hygiene behaviour, according to WHO/UNICEF (2005a). Children who may not have access to enough clean water may not wash their hands frequently enough, leading to eye infections and skin disorders like scabies. Waterborne infections are a result of poor water quality and inadequate home, animal, and human waste management. Only 30% of India's urban waste water is treated before being disposed of [National Health Policy Draft, 2015]. The remainder drains into groundwater, rivers, and lakes.Globally, about 1.8million people die in every year from diarrheal diseases, most of them directly related to diseases by consumption of untreated and contaminated water and sea-foods (WHO. 2015]. 672million people will still use a polluted water source in daily life (UNESCO, 2021)In African and Asian countries, a major number of people living along the course of water bodies still drink and use water of rivers, streams and other water bodies without any form of treatment.

According to the United Nations World Water Development Report: 2021, more than 1 lakh people in India pass away each year from diseases brought on by contaminated water.

There are numerous water borne disease examples, the majority of which are brought on by chemical pollution of water bodies as a result of the effect of elevated levels of nitrates and heavy metals on the industrial areas of India, which frequently have contaminated water bodies because the waste from the factories contains toxic materials that are discharged into the environment. In contrast, some natural water contains a significant amount of microbial species, many of which have not been filtered, much less recognised.The predominant number of organisms present varies significantly between the different types of water, and it is generally acknowledged that sewage-polluted surface water contains significantly more bacteria than unpolluted water. Numerous pathogenic microorganisms, such as bacteria, viruses, and protozoa, can be found in contaminated surface waters. The pathogenic faecal source may come from non-point sources such as domestic and wild animal defection, malfunctioning sewage and septic systems, storm water drainage, and urban runoff, or from point sources such as municipal waste water treatment plants and runoff from areas where livestock are handled.Every year, drinking contaminated water causes health problems for over 37.7 million Indians, ranging from simple diarrhoea to more serious illnesses (Loksobha Reports;- health condition 2018). Living in filthy conditions and not having access to safe drinking water are the main causes of this. In India, more than 500 million people depend on the water that rivers like the Ganga, Damodar, and Hooghly supply. Therefore, even a small amount of water contamination can have a significant impact on a big population. In highly populated areas with irrigated lands, disease transmission may occur rapidly on an individual basis, and irrigation's negative impacts may be attributed to mistakes made during the original planning stages.Either during the system's design and construction, or during its operational phase, when it was poorly managed. By following the right procedures or practises and managing water effectively, diseases associated with water can be prevented or lessened. In numerous regions of the world, waterborne disease causes linked to microorganism contamination of drinking water have been observed. No longer a topic for debate, historical history and writings contain excerpts indicating that water plays a part in the transfer of all types of water-related illnesses.This will discuss only those diseases which'sare spreaded by infectious agent, especially those diseases caused by bacteria, viruses and parasites, by categorizing those diseases. This paper will not allow to understand the physiological or metabolic malfunctions or illness that are caused by untreated water containing abiotic substances, e.g., pesticides, manufactured organic compounds, trace metals or other toxicants. It also contains a composite list of water borne diseases and their infectious agents. Presently, appears to be 36 known diseases of human beings that can be or are strictly suspected of carrying by water; various have others meanings of transmission, such as human to human contact and so on. The following discussion of each water borne diseases is approached from the stand point of infectious agent that is bacteria, viruses, parasites etc.

Table.1 shows the Water-Borne diseases, Causative Agents and Their Route in Human-body, India:

Group	Disease	Causative Agents	Route	Infection organs
Disease which are often water borne	Cholera Typhoid Amoebiasis Giardiasis Infectious hepatatis	Bacteria Bacteria Protozoal Protozoal Viral	Faeces Faeces/oral Faeces Faeces Faeces	Oral Oral Oral Oral Oral
Diseases which are often associated with poor hygiene	Diarrhoea Conjunctivities	Bacteria	Faecel Cutaneous	Oral Cutaneous
Diseases with part	Schistosomiasis	Parasites	Urine/faeces	Percutaneous

of life cycle of paratsites in water				
Diseases which are often related to inadequate sanitaion	Hookworm (Necator/Ancylostoma)	Parasites	Faecel	Oral /percutaneous

Source: Nwabor O.F et al (2016) and NDMC (2017) Prevention and Control of Water Borne

Diseases: Action Plan

Aim and objectives ;

1,To known the occurrence and trend of water born disease in India.

2,Give remedial solution for protect from the water born disease.

TYPES OF WATER BORNE DISEASES IN INDIA

The term "water borne" or "water associated" disorders refers to ailments brought on by both direct and indirect contact with water, whether through ingestion or contact with the skin while bathing or engaging in other water-related activities. Included are illnesses brought on by infections and toxins linked to water. In general, there are four major ways that water-borne diseases can spread: directly via the body, through water that has been rinsed off the body, through water that has been contacted, and through insects that are vectors for water-borne diseases.

1. Water-Borne Diseases: In India, the most common water-borne diseases are cholera, amoebic typhoid, giardiasis, and hepatitis. Children under the age of five who live in impoverished nations frequently suffer from diarrheal illnesses. Estimates place the number of diarrhea-related fatalities among children 0 to 6 years old in India at 158,209, with a 9.1% proportional mortality rate. Between 0 and 6 years old, the estimated incidence of diarrhoea was 1.71 and 1.09 episodes/person/year in rural and urban settings, respectively. According to the National Family Health Survey-4 Report (2015–16), 9% of all children under the age of five were said to have experienced diarrhoea in the previous two weeks. According to studies, the prevalence of acute diarrheal illnesses in some metropolitan settings was as low as one episode per child per year.The National Institute of Cholera and Enteric Diseases (NICED), Kolkata, West Bengal, India, is a WHO Collaborating Center for Diarrheal Diseases Research and Training. Each year, it receives between 1000 and 1500 strains of Vibrio cholera for biotyping, serotyping, and phage typing from between 30 and 40 institutions in India and a few from abroad. A total of 16,624 Vibrio cholera strains were acquired from 24 States between 1990 and 2007, of which 7,225 strains were used for a phage typing research. By using accepted methods, all of these V. cholera strains were recognised and verified. Utilizing polyvalent O1 and monospecific Inaba and Ogawa antisera, as well as monoclonal antibody O139 (Difco& BBL Manual), strains were serotyped (2009).The normal procedure used in our laboratory for phage typing was utilised. To evaluate whether a specific area was cholera endemic in the current investigation, we examined the location from which strains of V. cholera O1 were obtained from different parts of the nation throughout different years.Numerous cases of sporadic viral hepatitis have been linked to HAV in India. In a recent study from Kerala (Rakesh et al. 2015), HAV was found to be the cause of an outbreak of AVH in the Mylopore hamlet of the Kollam district (Indian Scenario, August, 2016) The authors found that participants aged 15–24 years had a higher attack rate (4.6%) than those aged 5–14 years (3.1%). In this village, pipe water contamination from a borewell was found to be a cause of infection (Rakesh P.S. et al. 2015).In a beautiful study by Acharya et al., 1424 schoolchildren between the ages of 4 and 18 were examined for seroprevalence of anti-HAV antibodies, and it was discovered that 93.2% of the children had anti-HAV antibodies in their plasma. 256 individuals with underlying chronic liver disease had their seroprevalence of anti-HAV tested, and 97.6% of them had positive results, demonstrating a high seroprevalence of HAV in India (Acharya S.k, 2003). In a different study from Kottayam, HAV was identified as the cause of an AVH outbreak in the vicinity of

the medical college, and the authors stressed the importance of having a clear strategy for controlling viral hepatitis (Arankalle V.A., 2006).In a research from Lucknow, 267 AVH patients were assessed, and HAV was shown to be the most prevalent cause in 26.96% of patients, followed by HEV in 17.97% of patients. [Jain P.,2013)

2. Water washed Diseases: Diseases that thrive in environments with limited access to clean water and poor sanitation are known as "water scarce" or "washed" diseases. More so than water quality, water quantity is what determines how well illnesses are controlled in water.

a. Through soil Helminthes are intestinal worms that are mainly spread by coming into contact with polluted soil. Ascris and whipworm are the most common helminthes. Over 130 million children worldwide have severe geo-helminth infections, which result in 12,000 annual fatalities from helminthes (WHO 2002).

b. Acute Respiratory Infections (ARI): Pneumonia and ARI together account for about 19% of all child fatalities annually (Nwabor et al. 2016)c.Skin and Eye Diseases: United Nations Children's Fund 2008 posits that trachoma is the world's leading reason of preventable blindness. About 6 million people are blind due to trachoma and more than 10% of the world's population is at risk.

3**.WATER-BASED DISEASES**: Water-based illnesses are infections brought on by parasites and pathogens that live in aquatic hosts. Fish, snails, and other aquatic creatures are examples of these hosts (Nwabor et al. 2016). Humans can become infected by eating the infectious forms or by having them penetrate their skin.

4.VETOR-BASED WATER RELATED DISEASES: There is no direct link between these illnesses and the quality of the water consumed. They are those diseases that are spread by certain vectors that live near or in water bodies where they breed. These insect vectors bite humans, which then transmit the disease. The most prevalent vector insects are flies and mosquitoes.

Mosquito-fly-Borne Diseases

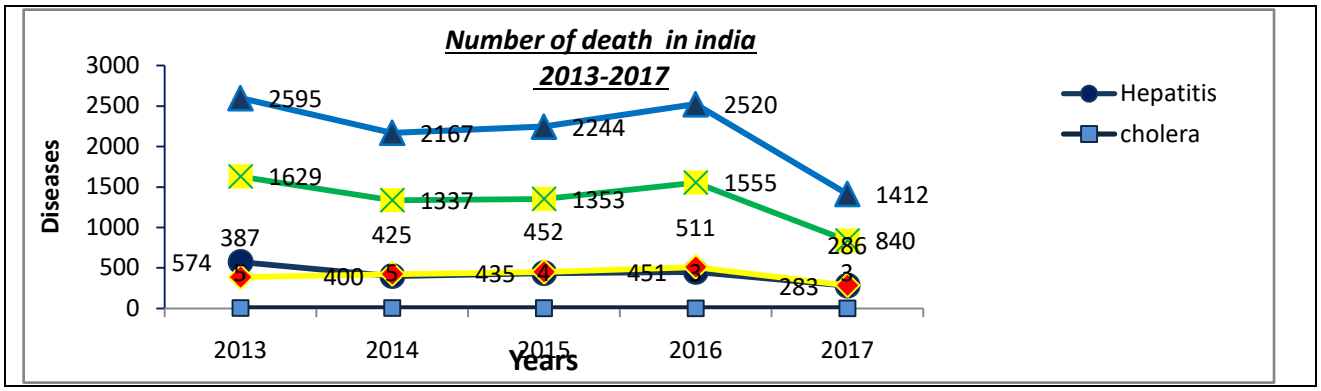
- Malaria
- Yellow fever
- Dengue fever
- Filariasis

Over 150 countries throughout the world have a high prevalence of diseases transmitted by mosquitoes. Over 500 million people worldwide are infected with mosquito-borne diseases, which cause roughly 1 million fatalities each year (WHO/UNICEF, World Malaria Report, 2005). Every year, almost 40 million Indians contract diseases transmitted by mosquitoes. Mosquitoes are the main source of a number of diseases, including dengue, malaria, brain fever, yellow fever, chikungunya, and others (Med India Report; 2015). If the symptoms are not recognized, these illnesses can be fatal.

TABLE ;- 2REPORTED DEATH CASES BY WATER-BORNE DISEASES 2013-2017, INDIA

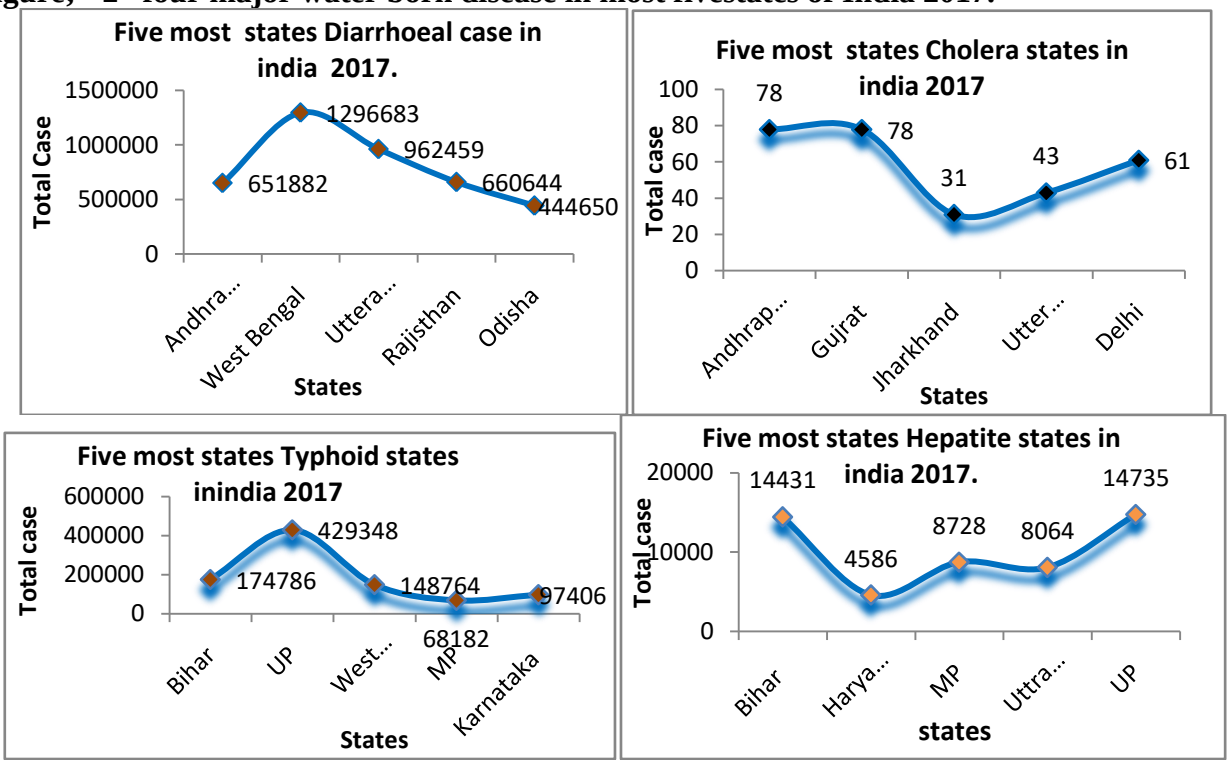
DISEASES	**NO.OFDEATH PERYEAR**				
	2013	**2014**	**2015**	**2016**	**2017**
DIARRHOE	1629	1337	1353	1555	840
HEPATITIS	574	400	435	451	283
TYPHOID	387	425	452	511	286
CHOLERA	5	5	4	3	3
TOTAL	**2595**	**2167**	**2244**	**2520**	**1412**

Source: Loksabha, 2018 Monthly Health Condition Reports from Directorate of Health services of States/UTs,



The total highest death case due to water diseases was 2595 in the year of 2013, and in 2014 was(2167),2015(2244), 2016 (2520),2017 (1412).
The highest number of death case due to diarrhea wasfounded in 2013(1629) and in 2014 (1337),2015, (1353) 2017 was 1337, therefore the lowest diarrhea case founded in the year of 2017 (840). The highest number of death case due to Typhoid was 452 in 2015 and lowest was founded in 2013 (387). The number of death case due to hepatitis was founded in 2013 (574), 2014 (400),2015(435),2016 (451), 2017(283).

Figure; - 2 four major water born disease in most fivestates of India 2017.



Source: - Loksobha, 2018. Monthly Health Condition Reports from Directorate ofHealth services of States/UTs,

Figure 2, shows the dominance of Diarrhea, Cholera, Typhoid, and Hematite among the five major states in India. Respectively the above diagram shows thatthe India recorded totaldiarrheal case is 9630572 in 2017,(Loksobha report 2018) in whichWest Bengal state(14 %) is recorded highest Diarrheal case among the 5 top most states of India, followed by Utter Pradesh (10.42 %), Rajasthan (7.15%), and Odisha (4.8%). The total case of cholera 383 casesin India.(Loksobha report (2018). WhereAndhra Pradesh carried78 cases (20.25 %) recorded highest cholera in India, followed by Gujarat

78 cases (20.25%) Jharkhand 31 cases (8.05%), Utter Pradesh 43 (11.10%), and Delhi 61 case (15 %). the total case of typhoid is 1493050 in India (loksobha 2018).Respectively among the 5 highest states of typhoid, Utter Pradesh carried 429348 (28.79%) number of case in 2017, it is recorded highest number of case in India as followed by Bihar (11.70%), west Bengal (9.96%), Karnataka (6.5%) Madhya Pradesh (4.5%), India has a total case of hepatitis is 98086 (loksobha 2018) in which Utter Pradesh states is carried highest recorded in 14735 (15.02%), mong the top most states ,followed by Bihar 14431(14.71%), Madhya Pradesh 8728 (8.89%), Utterakhand 8064 (8.22%).

Remedies

A number of waterborne diseases can be prevented by:

- ensuring that water is coming from a clean source and carrying water treatment steps when in hesitation; and regularly treating open water sources and testing water from open sources.
- Learn about water testing facilities in various Indian states.
- Avoid drinking water from untreated sources.
- Always heat all food before eating it.
- Washing hands thoroughly with soap and water before eating and after defecating
- Always keeping food and water covered.
- Keeping the environment clean
- Increasing toilet use by designing toilets that are appropriate, user-friendly, and sanitary.

Health policies and Programs, directed at waterborne diseases in India

The National Health Policy 2017 reaffirms the government's commitment to reforming the health sector and achieving universal health coverage. It focuses on disease elimination, reduction in mortality and improvement of health services.

The main strategy to control diseases caused by drinking of contaminated water is providing of safe drinking water. The Government of India supplements the efforts of the states by providing technical and financial assistance under the centrally-sponsored National Rural Drinking Water Programme (NRDWP) for providing safe and adequate drinking water supply facilities in rural areas of the country.

The National Centre for Disease Control (NCDC) provides assistance to state and Union Territory governments to prevent and control waterborne diseases and in investigating outbreaks of such diseases under the Integrated Disease Surveillance Programme (IDSP). While waterborne diseases continue to dominate the scene, the condition could worsen with climate change. Adequate preparedness both at the policy level and among citizens is the need of the hour.

References

1. Bekal S, Brousseau R, Masson L, Prefontaine G, Fairbrother J, Harel J. Rapid identification ofEscherichia coli pathotypes by virulence gene detection with DNA micro arrays. J Clin Microbiol. 2003 May;41(5): 2113-25.doi: 10.1128/JCM.41.5.2113-2125.2003. PMID: 12734257; PMCID: PMC154688.
3. Niti Aayog. (2019, August). COMPOSITE WATER MANAGEMENT INDEX. Niti Aayog in association with Ministry of Jal Shakti and Ministry of Rural Development.
4. Dale, J. W& Park, S. F. (2013). Molecular Genetics of Bacteria (5th ed.).
5. Wiley.Jo Zimbro, M. (2009). Difco& BBL manual : Manual of microbiological culture media (2nd ed.). Sparks, Md : Becton, Dickinson and Company.
6. Hunter P and, Syed Q.(2001), Community surveys of self-reported diarrhea can dramatically overestimate the size outbreaks of water-borne cryptosporidiosis. Water Science and Technology. 43(12):27

7. Imani FA, Iman ID, Hosseini DR, Karami A, Marashi SM. Design of a multiplex PCR method for detection of toxigenic-pathogenic in Vibrio cholerae. Asian Pac J Trop Med. 2013 Feb;6(2):115-8. doi: 10.1016/S1995-7645(13)60005-X. PMID: 23339912.
8. Jenkins C, Chart H, Willshaw GA, Cheasty T, Smith HR. Genotyping of enteroaggregative Escherichia coli and identification of target genes for the detection of both typical and atypical strains. Diagn Microbiol Infect Dis. 2006 May;55(1):13-9. doi: 10.1016/j.diagmicrobio.2005.10.019. Epub 2006 Feb 23. PMID: 16500068.
9. Lata, P., Ram, S., Agrawal, M. et al. Enterococci in river Ganga surface waters: Propensity of species distribution, dissemination of antimicrobial-resistance and virulence-markers among species along landscape. BMC Microbiol 9, 140 (2009). https://doi.org/10.1186/1471-2180-9-140.
10. Manja, K. S., Maurya, M. S., & Rao, K. M. (1982). A simple field test for the detection of faecal pollution in drinking water. Bulletin of the World Health Organization, 60(5), 797–801.
11. Forstinus, N., Ikechukwu, N., Emenike, M., & Christiana, A. (2015). Water and Waterborne Diseases: A Review. International Journal of TROPICAL DISEASE & Health, 12(4), 1-14. https://doi.org/10.9734/IJTDH/2016/21895
12. Rüttler, M. E., Yanzón, C. S., Cuitino, M. J., Renna, N. F., Pizarro, M. A., & Ortiz, A. M. (2006). Evaluation of a multiplex PCR method to detect enteroaggregative Escherichia coli. Biocell, 30(2), 301-308.
13. Sharma VK, Dean-Nystrom EA. Detection of enterohemorrhagic Escherichia coli O157:H7 by using a multiplex real-time PCR assay for genes encoding intimin and Shiga toxins. Vet Microbiol. 2003 May 29;93(3):247-60. doi: 10.1016/s0378-1135(03)00039-7. PMID: 12695048.
14. Singh, S. (1991). Environmental geography (1st ed.). Allahabad, India :PrayagPustak Bhawan.; Revised Edition 2008; ISBN no. 81-86539-53-0; Pg no. 485-494.
15. UNESCO World Water AssesmentProgramme(2021) The United Nations world water development report: valuing water; ISBN no. 978-92-3-100434-6; Arc. Ref. no. NS/258/12.
16. United Nations Children's Fund(2008) (UNICEF) Progress on Sanitation and Drinking Water. New York.Waite WM. A critical appraisalof the coliform test. JIWSDI. 1985; 39:341-357.
17. WHO. (2005.) Guidelines for Laboratory and Field Testing of Mosquito Larvacides. WHO communicable disease control, prevention and eradication. WHO pesticide evaluation Scheme
18. WHO/UNICEF. (2005), Joint Monitoring Programme for Water Suply and Sanition. Water for Life: Making it Happen. Geneva
19. WHO/UNICEF. (2000) Global Water supply and sanitation assessment report. Geneva and New York: WHO and UNICEF
20. World Health Organisation (WHO). (2003), Heterotrophic Plate Counts and Drinking-water safety. Edited by J. Bartram
21. Loksobha report (2018), Monthly Health Condition Reports from Directorate of Health services of States/UTs,
22. Rakesh P, Sherin D, Sankar H, Shaji M, Subhagan S, Salila S. Investigating a community-wide outbreak of hepatitis a in India. J Glob Infect Dis. 2014 Apr;6(2):59-64. doi: 10.4103/0974-777X.132040. PMID: 24926165; PMCID: PMC4049041.
23. Minister of Health & Family Welfare Government of India. (2018). National Health Profile. Central Bureau of Health Intelligence.
24. Jain P, Prakash S, Gupta S, Singh KP, Shrivastava S, Singh DD, Singh J, Jain A. Prevalence of hepatitis A virus,

hepatitis B virus, hepatitis C virus, hepatitis D virus and hepatitis E virus as causes of acute viral hepatitis in North India: a hospital based study. Indian J Med Microbiol. 2013 Jul-Sep;31(3):261-5. doi: 10.4103/0255-0857.115631. PMID: 23883712.

25. Acharya SK, Batra Y, Bhatkal B, Ojha B, Kaur K, Hazari S, Saraya A, Panda SK. Seroepidemiology of hepatitis A virus infection among school children in Delhi and north Indian patients with chronic liver disease: implications for HAV vaccination. J Gastroenterol Hepatol. 2003 Jul;18(7):822-7. doi: 10.1046/j.1440-1746.2003.03051.x. PMID: 12795755.
26. Satsangi, S., & Chawla, Y. K. (2016). Viral hepatitis: Indian scenario. Medical journal, Armed Forces India, 72(3), 204–210. https://doi.org/10.1016/j.mjafi.2016.06.011
27. Kelkar Khambete, A.(2019,January 9). When water kills | India Water Portal. India Water Portal. Retrieved March 2,2022, fromhttps://www.indiawaterportal.org/faqs/waterborne
28. Metropolis Healthcare. (2020, October 20). Water borne diseases and diagnosis. Metropolis Blogs. https://www.metropolisindia.com/blog/disease/water-borne-diseases-and-diagnosis/
29. Tripathi, B. (2018, May 1). Diarrhoea Took More Lives Than Any Other Water-Borne Disease In India. India Spend. Retrieved March 5, 2022, fromhttps://www.indiaspend.com/diarrhoea-took-more-lives-than-any-other-water-borne-disease-in-india-58143/
30. Water-borne Disease. Ministry of Health And Family Welfare.(2017)GoI; Press Information Bureau.https://www.pib.gov.in/newsite/printrelease.aspx?relid=106612
31. World Malaria Day: Med India Report on Mosquito Borne Disease[2015]
32. https://www.medindia.net/news/healthwatch/world-malaria-day-2015-148543-1.htm
33. IIPS. (2016). National Family Health.Survey,India.IIPS,MUMBAI.http://rchiips.org/nfhs/nfhs3.shtmlNational Health Policy
34. Draft.2015).https://www.nhp.gov.in/sites/default/files/pdf/draft_national_health_policy_2015.pdf

EFFECTS OF PESTICIDES AND OVER FERTILIZERS ON THE DIVERSITY AND ASSEMBLAGE OF BUTTERFLIES IN AGROECOSYSTEMS OF LADKHED VILLAGE OF YAVATMAL DISTRICT

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Abstract:-

Since life appeared on Universe, it has been studied numerous collective extinctions in which several species were exhausted because of disastrous climate change, pollutant activity, the impact and increased human approach and few other reasons we have not yet discovered. This paper helps people to look at the significance of butterflies as pollinators in various Indian agroecosystems. In present study the effect of Pesticides and over fertilizers in various cotton and adjacent agroecosystems for diversity of butterflies. In total 12 Cotton and Soyabean fields were surveyed for accommodation and diversity with adverse effect of Pesticides like Profenofos , Cypermetrin and Proclaim. The higher quantity of Profenofos and Cypermetrin applied will affect resulting very low number of butterflies and Moths. Butterfly species by means of smaller bodies and which reproduces smaller number generations for every year seem to suffer most badly.

Keywords:- Assemblage, Butterflies, Diversity, Fertilizers Pesticides.

I. Introduction:-

The manufacturing of pesticides ongoing in India from 1952 and India is now the second largest producer of pesticides in Asia followed by China and ranks twelfth globally (Mathur, 1999). The effects of purposeful use of pesticides have not yet been described for non-target fauna for which effects of other stressors, such as altering environment and alteration of soil.

Artropods comprises over half of Universe diversity of species (May, P.G. 1992**).** Butterflies are regarded as one of the preeminent taxonomically considered group of insect (Aiswarya V. Nair *etal* 2014). India is described as a "Butterfly paradise" by Vankatramani (Venkataramani, G., 1986) Butterflies have been studied scientifically from the time of early 18th century, up to now 19,238 species recognized globally of which, 1,504 species found in India with 100 (15%) prevalent and 26 (1.08%) globally endangered species in India, 334 butterflies species were reported from the Western Ghats and 150 species from the Eastern Ghats region (Ashish D. Tiple, 2012).

Previously biologists haven't thoroughly examined pollination in agriculture by butterflies. Butterflies aren't as copious as bees, and they don't leave of their way to accumulate pollen. As compare to bees, whose furry bodies are simply covered in the pollen grains, butterflies have long, fragile legs that hardly ever encounter up against a flower's pollen-producing anthers. The major use of pesticides in India is for cotton crops (45%), followed by paddy and wheat.

II. Material & Methodology

A. Study Area:-

Soybean and Cotton producing farms of Ladkhed village in Yavatmal district were selected for the above study, the village Ladkhed is about 20.32°N 77.77° E. Village Ladkhed is situated in Darwha Taluka of Yavatmal and 27 kilometres from district headquarters at Yavatmal. The forest around study area is dense with great floral and faunal diversity. The temperature of area ranges from 32.0^0C to 40.0^0C. The region receives an annual rainfall of 290.3 mm to 508.9 mm during the monsoon between June to September. The relative humidity varies from 25-59%.

Study area showing cotton and Soyabean agroecosystem for assamblage of Butterflies

Fig:- Study Area observation after spraying after

B. Methodology:-

The present study was based on the field work in Cotton and soybean agroecosystems of Ladkhed Village of Yavatmal District by with the help of line transect and quadrate methods, observation were collected from September 2020 to Dec, 2020 and September 2021 to December 2021 for two consecutive years. In order to see the effect of different chemical fertilizers and pesticides on butterflies in the same field for two consecutive years, the results were studied every morning and evening for a week after spraying between 8:00 am - 11:00 am and 4:00 pm - 7:00 pm. study areas were divided in approximately in identical range of three lines transects and four quadrates with approximate length of 500 meter each for easy identification of butterflies without capturing the specimen. Photograph of butterflies and habitat were done by using Canon- P900, and Sony cyber shot with Carl Zeis lenses of 16 & 14 megapixels respectively.

III. Result and discussion

The above inspection observed that in the fields which had been sprayed with Profenofos, Cypermetrin and Proclaim not a single butterfly moved around for a week, on the contrary, in the fields which had been sprayed with same Profenofos , Cypermetrin and Proclaim for 15 to 20 days or had not been sprayed at all, butterflies were found roaming freely. In most common conditions, there are two basic neurological effects of Pesticides and fertilizers excitation and inhibition. These two common properties equally can effect since a diversity of connections between the various neurotoxic insecticides and their target sites. From this it can be seen that the butterflies are also being affected by spraying and because of this, sometimes other insects which have survived despite spraying are becoming more important for pollination.

References:-

1. **Aiswarya V. Nair, Pradarsika Mitra and Soma Aditya (Bandyopadhyay),(2014**):- Studies on the diversity and abundance of butterfly (Lepidoptera: Rhopalocera) fauna in and around Sarojini Naidu college campus, Kolkata, West Bengal, India, pp 129-134.
2. **Ashish D. Tiple,(2012**):- Butterfly species diversity, relative abundance and status in Tropical Forest Research Institute, Jabalpur, Madhya Pradesh, central India 4(7): pp 2713–2717
3 **Manoj R Borkar, Neelam Komarpant(2004):-** Diversity, abundance and habitat association of Butterfly species in Bondla wildlife

sanctuary of Goa, India. 19(10):1648-1653.

4 **Mathur S.C. (1999):-** Future of Indian pesticides industry in next millennium. *Pesticide Information.* ;24(4):9–23. [Google Scholar

5 **May, P.G.(1992):-** Flower selection and the Dynamics of Lipid Reserves in two Nectarivorous Butterflies. *Ecology*,73, 2181-2191

6 **Venkataramani, G., (1986):-** In the shadow of extinction, In, Frontline, India's National Magazine, (July 26 – August 8),3, 58.

INVESTIGATING THE DIMESNSIONS OF SUSTAINABLE FINANCE AND SUSTAINABLE DEVELOPMENT

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Abstract

Better economic development and financing are made possible by sustainable finance (SF).Protecting and restoring the ecological system is what sustainable development is all about.SIDBI, NITI Aayog, and the World Bank facilitate Sustainable Finance to encourage businesses to grow from SME to large industries and have a massive global impact. The World Bank estimates that climate change will lower the standard of living for the populace and decrease India's GDP by almost 3%.The CCPI tool is used to track the country's climate protection performance. Banks, Corporations, International Financial Institutions, Institutional Investors, and International Organizations are the primary sustainable finance providers to companies and MSME's through various instruments. This article analyses various financing mechanisms for sustainable development and green production using theoretical concepts. The effectiveness of sustainable finance or climate finance is required for MSME and companies for greener production infrastructure and government of India climate change missions on a regular basis to boost the ESG to promote sustainable development and economic growth.

Keywords: Sustainable Development, Green Finance, Green Growth, Sustainable Finance.

INTRODUCTION

At the intersection of finance and the SDGs, sustainable finance has emerged as an important concept (Kumar et al.,2022). Sustainable finance aims to increase finance's contribution to inclusive and sustainable growth. It aims, in particular, to support economic growth while reducing environmental pressures, addressing greenhouse gas emissions and pollution, and improving natural resource efficiency. Furthermore, sustainable finance aims to improve financial stability and asset pricing by better assessing and managing long-term material risks and intangible drivers of value creation, such as those related to environmental, social, and governance (ESG) factors. In a simple terms, sustainable finance refers to "better development," "better finance," a financial system that is centred on the long term, as well as significant ESG factors(Sustainability,2018). Sustainable development in the role of allocation, finance can help with strategic choices regarding the trade-offs between sustainable goals. Additionally, investors have control over the businesses they invest in. Thus, long-term investors can influence businesses to adopt responsible business practices. Last but not least, the field of finance excels at valuing risk and can thus help in coping with the inherent ambiguity surrounding environmental issues, such as the impact of carbon emissions on climate change. Finance and sustainability both take the future into account. The 17 Sustainable Development Goals (SDGs) must all be accomplished, according to reports from the World Bank and International Monetary Fund (Schoenmaker,2018). India has one of the world's fastest-growing emerging market economies. According to the Global Climate Risk Index 2021, India is ranked seventh among the countries most vulnerable to the effects of climate change, with losses totaling USD 69 billion in 2019.The use of land for agriculture accounted for 17% of global GHG emissions and 16% of all GHG emissions in India. More investment opportunities in solar power generation will become available thanks to One Sun, One World, One Grid (OSOWOG), an initiative for solar energy generation launched by India through the International Solar Alliance (ISA) at the Paris climate change summit. (Mahesh et al., 2022).

Table 1. Green Growth Indicators

1.	Air and Water Population
2.	Forest
3.	Bio-Diversity
4.	Water
5.	Climate Change
6.	Energy
7.	Urbanization

(Source: Global Green Growth Initiative)

Nearly 8% of the GDP, 45% of manufacturing output, and 40% of exports in India come from MSMEs. They can legitimately be referred to as the "Backbone of the country." MSMEs are important to the Indian economy and have significantly boosted the country's socioeconomic development. Along with providing job opportunities, it also assists in efforts to develop the country's rural and underdeveloped areas. (lendingkartn.d.).updated standards for defining MSMEs and businesses based on revenue and capital expenditure Micro-Enterprises Companies with investments under Rs. 1 crore and annual revenues under Rs. 5 crores are referred to as small enterprises. Core medium enterprises are businesses with investments under Rs. 10 crore and turnovers of less than Rs. 50 crore. Small and medium enterprises are businesses with investments under Rs. 50 crore and turnovers of less than Rs. 250 crore(Mahesh et al.,2022).

REVIEW OF LITERATURE

Soundarrajan and Vivek(2016) in their authored paper highlight current developments in green finance, challenges and potential opportunities in emerging India. Regulatory shortcomings, little knowledge, and the roles of various banks that finance green projects, such as SIDBI and MSMEs reorientation and adoption of alternative technologies maximising production and processes for energy conservation.

Gu et.al(2018) emphasises engagement with the BRIC framework and the participation of developing nations, the co-financing of infrastructure through the New Development Bank, and India's investment Key Human Development in Africa Climate Change Energy equity in sustainable development presents challenges, technological skill transfers and a techno-economic strategy promoting international collaborations. Evidence suggests that renewable Opportunities for inclusive Green growth are provided by energy.Green growth is being transformed by practises and policies.

Sharma(2015)concentrates on 4 districts to understand the MSME in favour of sustainable development and the accessibility infrastructure and financial institution backing comprising entrepreneurial abilities, innovative marketing, opportunities for classes who are socially inferior. a worldwide challenges relating to sustainability are highlighted the planet's environment, the social environment (people), and Environment/Profit of the Economy

Verma and Nema (2019) The paper highlights the Sustainable Development Goals and the Due to their enormous potential for sustainability, MSMEs subsidiary organisation through the implementation of policy approach taken by the Ministry of MSME to promote Lean manufacturing, waste management specific to industry, credit support, cooperation, and awareness campaigns for Entrepreneurs in MSMEs. The author promoted and aided by the proper government interventions highlights the MSMEs.

Acosta and Suresh (2016)focuses on the financial support for solar financial assistance for MSMEs, solar policy, and energy support from NABARD, the Solar Energy Corporation of loan from IREDA, National Housing Bank (NHB), and India (SECI) plan, skill-building exercise linking solar and rural population, the solar OPEX MODEL (Build-own- operate), competitive market and a better system of government in the MSMEs.

Pathaket.al (2014)in this paperhas connected the economy and green growth. Products and services related to green finance include carbon finance, green technology leasing, and green securitization.The author emphasises the importance of both environmental and economic growth that MSMEs are overlooked due to technological limitations know-how and appropriate financial products. He also suggests that energy sustainability measures. The efficiency loan model and training should be provided to the MSME industry

Straub(2021) Sustainability finance is a new financial vehicle (ESG funds, Green Bonds) to

combat climate change, according to the article "Black Rock Global Investment Banks." The paper describes SASB - Sustainability Accounting Standard Board for reporting ESG from Companies and discusses how the "Goldman Sachs, HSBC, Morgan Stanley, and UBS institution" can play a significant role in sustainability and adapting the global economy to limit carbon emissions.

Durranietal (2020) The study looks at priority sector lending (PSL) for banks in Bangladesh, India, China, Indonesia, Singapore, and Vietnam, as well as the regulatory framework for promoting green finance and long-term financing options for banks, insurance companies, and refinance in the low-carbon industry

Mohd and Kaushal (2018) The author examines the significance of green finance monetary assistance for green development, the equator principles, the UN Global Compactthe future of green finance in India, green finance products and sustainability initiatives by the RBI, SEBI, The Companies Act 2013, IREDA, Exim Bank, and governmental policies and incentives for climate change adaptation and mitigation.

OBJECTIVES

- To analyze the development of Sustainable Financing in India.
- To assess ABCD analysis for Sustainable Growth and Development.

RESEARCH METHODOLOGY

A research methodology describes how a researcher intends to carry out their investigation. It is a rational, systematic approach to solving a research topic. A methodology describes a researcher's approach to the research in order to provide trustworthy, valid results that fulfil their goals and objectives. It specifies what data will be collected and from where it will be collected, as well as how it will be collected and evaluated. Under the study, a systematic approach is followed to collect data purely from secondary sources, i.e., Articles, Journals, Newspapers, magazines and government websites.

ANALYSIS

Development of Sustainable Financing in India

Sustainable finance refers to financial arrangements that are environmental-friendly and distinctive to their use in projects and initiatives that are environmentally sustainable or ones that use the consequences of climate change. Environmental Energy production is one example of a sustainable endeavour from renewable sources such as solar, wind, biogas, and so forth; clean transportation with fewer greenhouse gas emissions, green energy initiatives; greenhouse gas emissions construction; garbage management, including recycling effective disposal and energy conversion, etc. (RBI, 2021). Climate change has always been on the G20 agenda. Since its first summit in 2008, the focus has shifted to the circular carbon economy. (CCE) to address hazardous emissions. There are numerous key programmes with the goal of increasing raising awareness and boosting green funding initiatives all throughout the world. These are the programmes that encourage financial and nonfinancial firms to collaborate and include environmental considerations in their financing. Principals is a major flagship programme. Equator Principles for Responsible Investment (PRI) (E.P.) for financial institutions, U.N.'s Statement of the United Nations Environment Programme (UNEP), and commitments of Financial institutions to long-term sustainable development propose methods for achieving green among the signatories to finance a number of entities from India.

India began emphasizing green financing as early as 2007. In December, the Reserve Bank of India released a notification in December 2007 on the aspect "CSR, Sustainable Development, and Nonfinancial Reporting - Role of Banks," which emphasizes the importance of global warming and climate change in the framework of sustainable development. The National Action Plan on Climate Change (NAPCC) was established in 2008 with the goal of outlining a broad policy framework for mitigating the effects of climate change (Jain, 2020).The Climate Change Finance Unit (CCFU) was established by the Ministry of Finance in 2011 as a coordinating

organization for the numerous institutions in India responsible for green finance. Since 2012, the key strategic shift has been the implementation of sustainability disclosure standards.

Since 2012, the Security and Exchange Board of India (SEBI) has required the top 100 listed companies on the BSE and NSE based on market capitalization to publish annual business responsibility reports and has revised them on a regular basis. In May 2017, SEBI issued guidelines for green bond issuance that specified disclosure requirements.Furthermore, under the Companies Act of 2013, the Ministry of Corporate Affairs imposed mandatory reporting of progress on Corporate Social Responsibilities (CSR). The Committee on Corporate Governance proposed in its October 2017 Report that the board of directors meet annually to specifically discuss strategy, budgets, board evaluation, risk management, ESG, and succession planning.

Progress of Green Finance in India is highlighted in the below-mentioned points:

There is a scarcity of data from traditional sources for assessing awareness of green finance and sustainable development. Google Trends can be a useful tool in this regard for determining the pattern of Google searches conducted in various locations at various times.Based on the number of Google searches can help us understand the level of interest in a given topic. In Google Trends, the information on the number of Google searches on any topic is normalized as aavaerage of the total number of searches for all topics in a region over a specified time. This normalization removes the bias caused by changes in overall Google search activity over time. For example, the overall search volume is much higher today than it was in 2004 due to the global expansion of internet accessibility. As a result, the absolute number of searches on any topic may not provide a useful comparison of interest in that topic over time. According to Google Trends, there is an increase in awareness of green finance and its role in long-term economic development.

NABARD also made climate finance for sustainable development more accessible, and it also provides many e adaptation fund green climate funds, as well as promotes advanced technology for agriculture and an increase in green technology for various development projects. APL I is one of the schemes introduced by NABARD. Linked incentives to promote organic farming, efficient use of renewable resources, proper waste management, job creation, and so on.

SIDBI has introduced sustainable finance schemes for MSME growth and development. Micro, small, and medium-sized manufacturing enterprises contribute 6.11% and 24.63 per cent to the country's GDP, respectively, and it also contributes 33.4% of Indian manufacturing output, which aids in the country's economic growth.

SIDBI provides finance to MEMEs in two ways. First, it introduced sustainable finance to MSMEs in order to achieve sustainable green projects. The primary goal of financing the green revolution is to promote low-carbon living, efficient use of renewable resources, and increased MSMEs' profitability.

Five pledges were made at the Glasgow Climate Summit to help achieve a cleaner world by 2050. CoP-26 in India The primary goal is to reduce carbon emissions and reliance on renewable energy.

Table 1. Five Pledges

1.	Non-fossil energy capacity will touch 500GW by 2030
2.	Reduce the Carbon emissions by 1billion tonnes till 2030
3.	50% energy requirements from renewable energy
4.	Carbon intensity target of 35% (45%)
5.	Net-zero by 2070througGreen house gas emissions

(Source: EIB)

The linkage matrix and sustainable development goals show each goal's level of association, from highest to lowest to not directly related.

Table 2: Sustainable Development Goals and linkage Matrix

(Degree of Association: 3 = Highest, 2 Moderate, 1 = Lowest, and 0 = Not directly linked)

Sustainable Development Goals	**Degree of Linkage: SDG & Renewable Energy**
No Poverty	0
Zero Hunger	2
Good Health and Well Being	1
Quality Education	0
Gender Equality	0
Clean Water and Sanitation	1
Affordable and Clean Energy	3
Decent Work and Economic Growth	1
Industry, Innovation and Infrastructure	2
Reduced inequalities	0
Sustainable Cities and Communities	2
Responsible Consumption and Production	3
Climate Action	3
Life below Water	3
Life on Land	3
Peace, Justice and Strong Institutions	0
Partnerships for the Goals	1

(Source: YOJANA December 2021)

Impact of sustainable finance on climate finance

By 2030, the Indian green economy will provide 50 million job opportunities, increasing to 15 trillion by 2070. (according to IBEF). According to the report of the World Bank, the GDP of India will be reduced by 3% as a result of climate change, which has a negative impact on people's living standards.

In 2020, the CFA Institute Trust conducted a survey of 3525 retail investors and 921 institutional investors in 15 major markets, including India, and discovered that while the remaining 76% and 69% of institutional investors and retail investors were interested in environmental, social, and governance (ESG), only 19% of institutional investors and 10% of retail investors were investing in the sector.

The main players in sustainable finance in India are banks, international financial institutions, governments, institutional investors, operations through CSR initiatives, social stock exchanges, international solar alliances with World Solar Bank, and New Development Banks. The United Nations Framework Convention on Climate Change (UNFCCC) was established to give developing nations access to financial aid.

ABCD Analysis

A brief analysis of the advantages, benefits, constraints, and disadvantages of sustainable finance on MSME & Company, green growth, and sustainable developments provides an idea to the beneficiaries. NABARD, SIDBI, RBI, and NitiAyoga schemes and programmes were used for analysis.

Analysis

(1)Economic governance and global cooperation between developed and developing nations are two factors that support climate change adaptation and mitigation.

(2) Multiple organizations, such as International Finance Institutions, Bankers, and Governments have a greater impact on achieving long-term goals.

(3) The RBI has established a framework for ESG disclosure and has incorporated environmental impact into commercial lending.

Benefits

(1) Climate change presents challenges for both the government and institutions in implementing green policies.
(2) Digital innovations and inventions are transforming Indian industries into environmentally conscious and sustainable enterprises.
(3) The commitment of the Government of India to decarbonize and green the economy.
(4) Large corporations are shifting to green energy, expanding investment opportunities in the green economy.
(5) Emerging technologies such as blockchain, GPU, A.I., and quantum computing have the potential to be game changers in environmental protection.

Constraints

(1) The producer incurred high costs in order to establish infrastructure and implement eco-friendly practices.
(2) A policy of ease of doing business will be implemented in order to convert fossil fuels to non-fossil fuels.
(3) Institutional participation in ESG Funds is more concentrated in the Western Market than in the Eastern Market.

Disadvantages

(1) In order to achieve sustainable development, different types of finance, such as Green asset-backed securities, must be used to develop RE technology, as well as more subsidies.
(2) Financial institutions are becoming more interested in funding long-term projects that promote prosperity and ensure our future.
(3) ESG regulation should be framed in a way that benefits society, the investment community, and the industry.
(4) More collaborative policy measures with global stakeholders are needed to achieve a green future.
(5) The government can issue bonds through private or public banks in order to attract both domestic and international investors via the World Bank and regional development banks.

CONCLUSION

The government of India must establish separate financial institutions to advise and re-finance financial intermediaries relating to climate transition risks as a result ofpolicies, rules, laws, and market changes that integrate social, environmental, and governance for the flow of capital related to green and environmental change in the fields of clean energy, climate adaptation, sustainable agriculture, waste management, and efficient use.To accelerate the adoption of electric vehicles and charging stations, as well as to strengthen the economy and the environment, a sustainable and cost-effective solution is required. More foreign direct investment in waste management, ecotourism, renewable energy, organic agriculture, and the development of cutting-edge technology in MSME will be encouraged. Collaboration with global partners is critical in implementing climate change, and large corporations are shifting to green energy to reduce the negative environmental impact of their operations, as well as focusing regulation on the green economy. Every ESG fund is Sustainable finance is a profitable opportunity for both investors and corporations, and it has a positive impact on the environment and society. In order to adopt green or sustainable finance in the ESG global wave, the government must start policy measures because economic growth has not been consistent.

REFERENCES

1. Acosta, L. A., & Suresh, S. (2016). Solar energy and inclusive green growth in India: A study of policy impacts on green employment generation in the private sector along the solar energy value chain. *Case study prepared for Deutsche GesellschaftfürinternationaleZusammenarbeit (GIZ) GmbH, German Development Institute/ DeutschesInstitutfürEntwicklungspolitik (DIE)*, *2*(2), 1-40.
2. Durrani, A., Rosmin, M., &Volz, U. (2020). The role of central banks in

scaling up sustainable finance–what do monetary authorities in the Asia-Pacific region think?.*Journal of Sustainable Finance & Investment*, *10*(2), 92-112.

3. Kumar, S., Sharma, D., Rao, S., Lim, W. M., &Mangla, S. K. (2022). Past, present, and future of sustainable finance: insights from big data analytics through machine learning of scholarly research. *Annals of Operations Research*, 1-44.
4. Mahesh, K. M., Aithal, P. S., & Sharma, K. R. S. (2022).Impact of Sustainable Finance on MSMEs and other Companies to Promote Green Growth and Sustainable Development. *International Journal of Applied Engineering and Management Letters (IJAEML)*, *6*(1), 60-76.
5. Mohd, S., & Kaushal, V. K. (2018). Green finance: a step towards sustainable development. *MUDRA: Journal of Finance and Accounting*, *5*(1), 59-74.
6. Pathak, Devendra, Srivastava, Vishal and Sharma, Mohit (2014). Green Finance: How to Beneficiary in Indian Economy. *SSRN Journals*, *1*(1), 1-7.
7. Renwick, N, Gu, J &Xue, L (2018). The BRICS and Africa's search for green growth, clean energy and sustainable development.*Energy Policy*, *120*(1), 675-683.
8. Schoenmaker, D. (2018). A framework for sustainable finance. *Available at SSRN 3106807*.
9. Sharma, N. (2015). Constructs and Constraints of MSME in India for Sustainable Development.*Asian Journal of Research in Business Economics and Management*, *5*(4), 8-24.
10. Soundarrajan, P., &Vivek, N. (2016).Green finance for sustainable green economic growth in India.*Agricultural Economics*, *62*(1), 35-44.
11. Strauß, N. (2021). Framing Sustainable Finance: A Critical Analysis of Op-eds in the Financial Times.*International Journal of Business Communication*, *1*(1) 1-14.
12. Verma, T. L., &Nema, D. K. (2019).Role of micro, small and medium enterprises (MSMEs) in achieving sustainable development goals.*Int. J. Res. Eng. Appl. Manag*, *4*(1), 575-582.
13. https://www.lendingkart.com/msme-loan/what-is-msme/

PSB - THE UNSUNG HERO OF SUSTAINABLE AGRICULTURE

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Abstract:

Sustainable agriculture is reliable,acceptable and trustworthy way to maintain a healthy soil and thus to produce good quality and quantity of food. To achieve this task there is often use of biofertilizers which contain nitrogen,phosphorous and potassium as major nutrient. Soil is living entity contain variety of Macronutrients and Micronutrients. Phosphate is one of the major nutrients required by plants but not easily available to them because of itsinsoluble nature. Phosphate solubilizing bacteria (PSB) make it soluble thus play important role in sustainable agriculture. The use of PSB as a biofertilizers has concurrently increase phosphorus uptakein plants and improve yields in several crop species. A laboratory study has conducted to isolate, identified and characterize the phosphate solubilizing bacteria from different soils of Vidarbha region, four isolates were obtained from four districts respectively. The four strains (S1, S2, S3 and S4) were screened by biochemical study and their phosphate solubilizing ability.

Keywords: Characterization, Identification, Isolation, Phosphate solubilizing bacteria, NPK

Introduction

To maintain the quantity of products farmers use fertilizers. fertilizersare nutrients which are necessary for the growth of plants and thus for the productivity of cultivated plants. use of fertilizers for increasing productivity is one of the aspects of green revolution. fertilizers are classified as inorganic (chemical) and organic (biological). inorganic fertilizers are synthetic where mineral salts of NPK are mixed in definite proportion and then dusted in the field. non judicious or excessive use of such fertilizers lead to pollution of soil air and groundwater, soils become acidic

Organic fertilizers are biological in origin and include farm yard manure (FYM), compost and green manure. use of this fertilizers increases the fertility of soil.Nowadays for better and sustainable agriculture production farmers use biofertilizers and practice organic farming. Biofertilizers are commercial preparation of ready to- use live bacterial or fungal formulations. their application to plant soil or composting pits helps to enrich the soil fertility due to their biological activity. Use of biofertilizers is cost effective and eco-friendly. they play a vital role in maintaining a long-term soil fertility and sustainability.

Phosphorus (P) is the second most important nutrientfor plant growth, accounting for 0.2% (w/w) of plant dry weight(Mahajanet al., 2018.). Phosphate plays an irreplaceable rolein the ecosystem by the participating in most aspects of energy metabolism, Nucleic acid and protein synthesis,and kinase regulation. (Nesemeet al., 2018). P affects root development, stalk and stem strength, crop maturity and nitrogen fixation in legumes (Khan et al., 2009). The average phosphate content in soil is. Nearly 0.05%. (w/w)with the main two forms being inorganic P (Pi) and organic P (Po). Nevertheless. Only 0.1%. of P can be utilized by plants, rendering available P arestrictive factor for plant growth (Lambers and Plaxton, 2018).

The phosphate content in the soil. Can exist incalcium-, aluminium- or iron-complexed forms that are unavailable for plant use. As a result, mineral phosphorus. P2O5 is often used as a fertilizer to supplement the nutrients for crop growth. To reduce the addition of mineral phosphorus to agricultural soils, research in naturally occurring phosphate solubilizing microorganism has been conducted for decades (Sharon et al., 2016). Progressive depletion of major plant nutrients in soil due to intensive cultivation has necessitated the use of higher dose of chemical fertilizers, particularly in tropical soil where the organic matter content is very low (Kucey, Janzen, Legett 1989, 1983). This huge drain on nutrients will continue to impoverish the soil unless these are replenished by natural means. Biological fertilizers are best remedy for this purpose. In agriculture systems, ‘P’ fertilizers are routinely applied to promote crop yield (Gaur, Gaind 1984). The P in these fertilizers is initially available to the plant but it rapidly

reacts with soil and becomes progressively less available for plant uptake (as much as 90%). This is known as chemical fixation of phosphorous. Hence, the current trend throughout the world is to explore the possibility of using alternate nutrient sources for increasing the efficiency of chemical fertilizers since the since the available P from the rocks is very low or negligible. The phosphate solubilizing microorganisms dissolving interlock phosphates appear to have an important implication in Indian agriculture.

Many bacteria, fungi, actinomycets and cynobacteria are potential solubilizers of bound phosphates in soil (Bank and Dey, 1983; Illmer and Schinner, 1992; Sing and Kapoor, 1992and Anusuya and Jayarajan, 1998). Phosphate solubilizing microorganisms are found in all soils but their numbers varies with soil climate as well as history (Gupta et al. 1996; Illmer and Schinner, 1992). Efficiency and economic uses of phosphate fertilizers could be achieved by using phosphate-solubilizing microorganisms in legumes, cereals and useful crops (Dadarwal et al1997; Yadav and Dadarwal 1997).

This study aims to investigate and characterize various species of phosphate solubilizing bacteria found in soil of Vidarbha region of Maharashtra state.

Identification of PSM

When classifying microorganisms, all known characteristics are taken into consideration, but certain characteristics are selected and used for the purpose of identification. Primary identification usually involves a few simple testssuch as morphology (usually shown by Gram stain), growth in the presence or absence of air, growth on various types of culture media, catalase and oxidase tests. Using these few simple tests it is usually possible to place organisms, provisionally, in one of the main groups of agricultural importance

Materials and Methods

Collection of representative soil samples:

Representative soil samples were collected for the isolation of phosphate solubulizing bacteria at the rate 1 sample from each district and from most of the district of Vidarbha to avoid any wash out by rain soil samples were collected in summer, when the fields were dry and micro flora in the soil was most adaptive to local environment.

In the field soil samples (approx. 40-50g portions) were collected, after removing organic debris, rocks, and big sand particles from its surface.

Screening of soil samples for Phosphate solubulizing microorganisms:

Take 1gm of soil sample of each district, suspended in flask containing 50ml of Pikovskaya's broth, Phosphate solubulizing bacterial colonies were obtained by repeated streaking on Pikovskaya's agar and then repeated streaking for purity. Tri-calcium phosphate was used as P source in the medium. P-solubilization by the isolates was confirmed by the appearance of a transparent zone around a single colony (Photoplate 1 and 2).

Microbial solubilization of insoluble phosphate in the liquid medium:

Take 25ml of Pikovskaya's medium in 100ml of flask, inoculated it with PSB of each district respectively, flasks put on rotary shaker at 120 rpm at 28 ± 2^0c for 24, 36, 48, 60, 72 hrs time interval. Centrifuge it at 10,000 rpm for 15 min. supernatant used to estimate solubilized P by measuring intensity of blue colour at 600nm on spectrophotometer. The soluble P content in culture supernatant was determined by bromophenol blue (Sangeeta mehata, C. Nautiyal).

Identification of PSB:

The isolated bacterial strains were identified using standared biochemical tests as listed in the Bergey's Manual of Bacteriology (Krieg &Dobereiner 1984).

PHOTOPLATE 1- Four way streaking of PSB
PHOTOPLATE 2- Pure culture of PSB

Results and Discussion

Isolation of phosphate solubilizing bacteria

1. Four PSB isolates were obtained from four district's soil labeled as S1, S2, S3 and S4 respectively (table 4.1).The PSB isolates were distinct in their morphology; they produced distinct clearing zones of varying thickness in Pikovskaya's agar, which was an indication of their P-solubilization abilities (photoplates 3 and 4).
2. The isolates strains formed white-colored colonies, which were also white on reversed side. The texture of the colonies was powdery, with entire margins.
3. A clear halo zone was formed around the colonies within 1-5 days. The P solubilization by bacteria other than PSB was low, as distinct clearing zones were observed around their colonies in Pikovskaya's agar.

Table - Various isolates

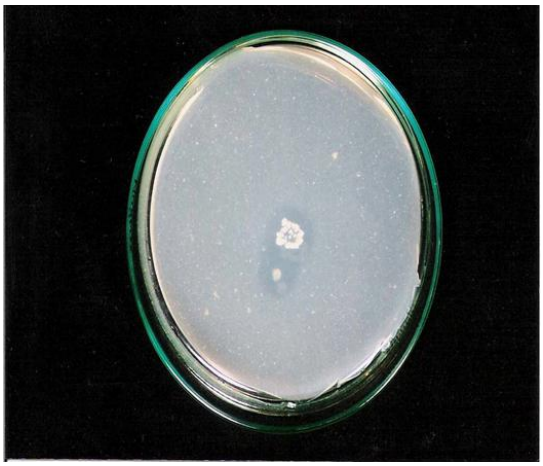
Name of District	Isolates
Amravati	S1 (I)
Bhandara	S2 (II)
Wardha	S3 (III)
Nagpur	S4 (IV)

Solubilizing activity of PSB

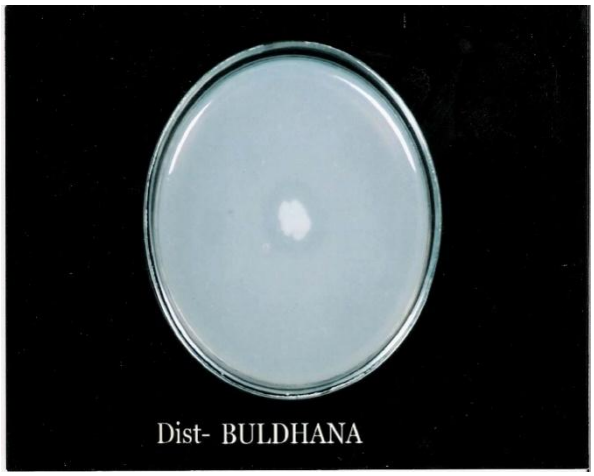
The drop in pH and soluble content in the TCP- supplemented Pikovskaya's broth at different times was different depending upon PSB strains. The maximum amount of soluble P was found in **Nagpur** [S4] (at 48 h after incubation) district soil, followed by Buldhan [S3] (36 h after incubation) and Bhandara[S2] (table). The fastest rate of P solubilization was observed in S4 inoculated broth, i.e. maximum soluble P content at 48 h after incubation. Similarly, pH drop of the medium was maximum in S3 inoculated broth and least pH drop was recorded in P1 and P2 inoculated broth. The relation between pH drop and soluble P content in the Pikovskaya's broth was not statistically significant for all PSB strains; therefore, it appears that production of organic acids by the isolates was not the sole mechanism of solubilization of TCP. The proton associated with extracellular polysaccharides secreted by the microbes is also responsible for dissolution of TCP in the pikovskaya's broth (Illmer et al.). The P solubilization by the bacteria of other districts was low, as less distinct clearing zones were observed around their colonies in Pikovskaya's agar.

Table- Effect of pH and rate of phosphate solubilization using Pikovskaya's broth against time.

Isolates	**Incubation (hour)**	**pH**	**Soluble P (ppm)**
Initial value at the time of inoculation	0	6.90	6.3
S1 (Amravati)			
S2 (Bhandara)	48	4.9	39.2
S3 (Wardha)	72	4.8	60.0
S4(Nagpur)	36	4.4	129.9
	48	**4.6**	**200.0**



PHOTOPLATE 3- Phosphate solubilising



PHOTOPLATE 4-Phosphate solubilizing activity of isolate III

Identification

Four morphologically different aerobic as well as anaerobic bacterial colonies were isolated from soil sampled on selective Pikovskaya's agar after 72hrs of incubation at 30^{o}C.all the four cultures were gram positive rod.

Isolate S3 were motile while isolate S2, S3 and S4 was non motile. Isolate S2 and S3 was found to produce endospores.

The isolates were identified using Bergey's manual of determinative bacteriology (Holt *et. al.* 1994). Isolates S3 and S2 were might be *Agromyces sp.* and*Bacillussp* while Isolates S1 and S4 were might be *Arthrobacter sp.*and*Acetogenium sp.* respectively (Table).

Table-Biochemical characterization of isolates

Observation	S1	S2	S3	S4
Gram reaction (young culture)	+	+	+	+
Shape	rod	Rod	rod	Rod
Aerobic growth	+	–	+	+
Anaerobic growth	–	+	–	–
Endospores	–	+	+	–
Motility	–	–	+	–
Catalase reaction	+	+	+	–
Oxidase reaction	–	+	+	+
Glucose fermentation to acid **or** to acid+gas	+	–	A	–

Glucose O/F Medium	O	F	O	O
Arthrobacter	**X**			
Aeromicrobium			**X**	
Agromyces		**X**		
Arcanobacterium		**X**		
Alcaligenes				
Bacillus			**X**	
Brochothrix	**X**			
Acetogenium				**X**
Listeria	**X**			**X**

Where X shows similarity with the known strains presented in the table.

Discussion

In this study, a total four PSBs were screened from the Vidarbha region soils. These PSB isolates may possess the potential to be applied in improving soil recovery and crop production, A higher P- solubility capacity of S4 was observed compared to others. The PSB strains were selected based on theP solubilization zone. Gaind (1987)reported that the PSB strains were isolated using the Pikovskaya's medium based on the formation of halo zone around these microorganisms. Screening of PSB clearly indicated that there was wide variation the PSB strains in solubilization zone formation, pH change, P solubilization in the liquid medium, phosphatase activity and organic acid production.

The pH of the culture medium turned to acidic was indicated that production of organic acids by PSB, which facilitate the solubilization of phosphate (Gaur & Sacher 1980). The maximum decline in pH was recorded with S4-up to 4.6. A fall in pH accompanied phosphate solubilization due to the production of organic acids.

The PSB strains were identified upto species level by studing the bacterial cultures morphology, cultural, physiological and biochemical characteristics using the manual of microbiological methods and identified using Bergey's manual of Determinative Bacteriology.

We can further investigate the all four strains to confirm there identification. We can further use these strains for the preparation of consortia as well as to prepare the culture bank for the benefit of farmers.

References

1. Anusuya, D., and Jayrajan, R. 1998. Solubilization of phosphorus by Trichoderma *viridi, Gaur. Sci.*75, 464-466.
2. Baink, S. & B. K. Dey. 1983. Phosphate- solubilizing potentiality of the microorganisms capable of utilizing aluminium phosphate as a sole phosphate source. Central Micrology. 138, 17-23.
3. Bank, S. and Dey, B.K. 1983. Phosphate solubilizing potentially of the microorganisms capable of utilizing aluminium phosphate as a soul phosphate source.Zentralmicrobil.138, 17-20.
4. Gaind, S. 1987. Studues on thermo tolerant phosphate solubilizing microorganisms. Ph.D. Thesis, P.G. School, IARI, New Delhi.
5. Gaur, A. C. & S. Sachar. 1980. Effect of rock phosphate and glucose concentration on phosphate solubilization by Aspergillus gwanori. Current Science. 49, 533-554.
6. Gupta, R.D., Bhardwaj, B. C., Marwah, B.C., and Tripathi B.R. 1986. Occurrence of phosphate dissolving bacteria in soils of north-west Himalayas under varying bio-sequences and climo-sequence.' *J. Ind. Soc. Soil. Sci*. 34.498-504.

7. Illmer, P. & F. Schinner. 1992. Solubilization of inorganic phosphates by microorganisms isolated from forest soils. Soil Biology and Biochemistry. 24, 389-395.
8. Illmer, P., A. Barbato & F. Schinner. 1995. Solubilization of heardly- soluble AlPO4 with P- solubilizing microorganisms. Soil Biology and Biochemistry. 27, 265-270.
9. Khan, A.A., Jilani, G., Akhtar, M.S., Naqvi, S.M.S., Rasheed, M. 2009. Phosphorus solubilizing bacteria: Occurrence, Mechanisms and their role in crop production. J. Agric. Biol. Sci. 1, 48-58.
10. Kucey, R. M. N. 1983. Phosphate solubilizing bacteria and fungi in various cultivated and virgin Alberta soils. Candian Journal of Soil Science. 63, 671-678.
11. Kucey, R. M. N., H. H. Jenzen & M. Leggeett. 1989. Microbial mediated increases in plant available phosphorous. Advances in Agronomy. 42, 199-228.
12. Lambers, H., and Plaxton, W.C., 2018. P: back to the roots. Annu. Plant Rev. 48,3-22.
13. Maharajan, T., Ceasar, S. A., Ajeesh Krishna, T. P., Ramkrishnan, M., Duraipandiyan, V., Naif Abdulla, A. D., et al. 2018. Utilization of molecular markers for improving the P efficiency in crop plants. Plant Breed. 137, 10-26.
14. Neseme, T., Metson, G. S., and Bennett, E. M., 2018. Global P flows through agricultural trade. Glob. Environ. Change 50, 133-144.
15. Sharon, J. A., Hathwaik, L. T., Glenn, G, M., Imam, S. H., and Lee, C. C.,2016. Isolation of efficient phosphate solubilizing bacteria capable of enhancing tomato plant growth. Journal of Soil Science and Plant Nutrition. 16, 525-536.
16. Yadav, K.S., and Daderwal, K.R., 1997.*Phosphate solubilization and mobilization through soil microorganisms,* In: Biotechnology Approaches in soil microorganisms for sustainable crop production, (ed. Daderwal, K.R.) Scientific Publishers, Jodhpur, India. 293-308.

GAS CHROMATOGRAPHY AND MASS SPECTROSCOPY STUDIES INSTEM BARK OF *Ficus hispida* L.

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ABSTRACT

The GC- MS Analysis determined the presence of 15 different phytochemical compounds in benzene stem extract of F. hispida. The phytoconstituents compounds were found in the mass spectra matched with the CIL/ SAIF Panjab University Chandigarh Library. The major phytoconstituents in ethanot extract of stem bark observed the presence of cyclopentasiloxane, (3.94%) decamethyl benzoic acid (3.94%)a – 3 – Dodecene Cyclohexasalioxane (7.2 %), 8-Hepadecene (1.63%), Tetradecamethyloctasiloxane (4.83%), 1.1 dimethylethyl (0.67%) 5- methoxyindane (6.31%),1 – tert Buty 1-3 (4.13%), Naphtalene (28.52%). a – iso butyl 2 (6.27%), phenol, 4- Naphtalene (47.32%) This may be the first report of documentation of active constituents from stem bank of F. hispida. The results of the present study revealed that the stem bark of F. hispida having effective potential bioactive Compounds, which may be leads to the formulation of new drugs to treat various skin diseases.

Keywords: *Ficus hispida*, phytoconstituents, Secondary metabolites, GC–MS, Skin atiments

1.Introduction

Plants have formed the basis of sophisticated traditional medicine systems that have been in existence for thousands of years and continue to provide mankind with new remedies [5]. Still today medicinal plants remain significant as natural alternatives to synthetic drugs with about 80% of the world population depending upon plants for their primary health care. According to WHO estimation [2, 11] Plant products have been part of phytomedicines since time immemorial. These can be derived from any part of the plant like bark, leaves, flowers, roots, fruits, seeds etc.,[1] i.e. any part of the plant may contain active components. Herbal medicines have become more popular in the treatment of many diseases due to popular belief that green medicine is safe, easily available and with less side effects. Many plants are cheaper and more accessible to most people especially in the developing countries than orthodox medicine, and there is lower incidence of adverse effects after use. These reasons might account for their worldwide attention and use [17]. The medicinal properties of some plants have been documented by some researchers [3, 4, 7]. Medicinal plants constitute the main source of new pharmaceuticals and healthcare products [9]. Extraction and characterization of several active phytocompounds from these green factories have given birth to some high activity profile drugs [12]. Indeed, the market and public demand has been so great that there is a great risk that many medicinal plants today, face either extinction or loss of genetic diversity.[13] Knowledge of the chemical constituents of plants is desirable because such information will be value for the synthesis of complex chemical substances. Such phytochemical screening of various plants is reported by many researchers [14- 16]. A growing body of evidence indicates that secondary plant metabolites play critical roles in human health and may be nutritionally important [8]. It is believed that crude extract from medicinal plants are more biologically active than isolated compounds due to their synergistic effects.[10] Phytochemical screening of plants has revealed the presence of numerous chemicals including alkaloids, flavonoids, tannins, steroids,glycosides and saponins. Secondary metabolites from plant serve as defense mechanisms against predation by many microorganisms, insects and herbivores [6]. Gas chromatography and mass spectroscopy technique is compatible in many ways. GC can separate the compounds of volatile and semi volatile nature with great efficiency but cannot identify them.

On the other hand MS can identify the compounds with the great efficiency but cannot separate them. This technology provides its application in identification as

well as quantification of organic compound which are volatile and semi volatile in nature present in complex biological mixture. It can determine the molecular weights of compounds and elemental composition of unknown organic compounds. It can also elucidate the structure of unknown organic compounds in mixture by matching their spectra with reference spectra. Combination of these powerful separation and detection techniques like gas chromatography and mass spectroscopy (GC-MS) provides the non-biased, large scale analysis of known and unknown metabolites present in the complex mixtures.

Ficus hispida Linn f. is a shrub or small tree without aerial roots; all parts hispid-pubescent. Leaves opposite, ovate, abovate, elliptic or oblong-lanceolate, subcordate or cuneate, serratetoothed or crenate in upper part, hispid-pubescent on both surfaces. Receptacles paired, pedunculate, globose, 1.2 - 2.5 cm in diameter, scabrous hispid, yellow when ripe, generally borne on elongate branches near the base of main stem. Bark is emetic, laxative and applied as poultice to buboes. The fruits are refrigerant, astringent, anti-dysenteric, antiinflammatory, depurative, vulnerary, haemostatic and galactagogue. They are useful in ulcers, leucoderma, psoriasis, anaemia, haemorrhoids, jaundice, epistaxis, inflammations and intermittent fever. Leaves are useful in cough and asthma and root in intrinsic haemorrhages. Decoction or powder of fruits is used in constipation, ascites, piles and jaundice. Ripe fruit is used as a haemostatic agent. It is used as a tonic, aphrodisiac and galactogogue. Root and fruit are useful in dermatoses. The plant has chief action on vitiligo. Bark powder - 2 to 5 gms. (for detoxification), as a tonic 1 to 2 gms. Despite of these applications as there are no reports on phytoconstituents of this plant, the present study aims at the identification of phytoconstituents from stem bark.

Materials and Method Collection of Plant Material

The stem bark of *Ficus hispida* were collected from forest of Yavatmal district, Maharashtra, India. The collected plant were carefully examined for infected parts and were removed accordingly. Only fresh parts were taken for the analysis. These plant parts were dried in the shade till all its moisture gets evaporated. These dried stem bark then pulverized to the powder form for further analysis.

Extraction

20 gram of stem bark powder was extracted using Soxlet's apparatus for 24 hours in benzene solvents separately. These extract then evaporated to dryness. At the time of analysis dried extract was dissolved in same solvent and these samples taken for GC – MS analysis.

GC – MS Analysis

The analysis was carried out using gas chromatography – high resolution mass spectrophotometer. Dried extract were dissolved in the 5 ml of acetone solvent. 0.4 ml of this solution is employed for GC – MS analysis. The GC-MS analysis was carried out using Trace GC Ultra (Thermo Scientific) with column (HP-5) of 30 meter length, 0.25 mm diameter and 0.25 film. Helium gas is used as carrier gas at constant flow rate of 1ml/ minute. Injector temperature was set at 250 ^{0}C. The oven temperature were programmed from 80 ^{0}C to 280 ^{0}C. 80 ^{0}C 1 minute hold up to 200 ^{0}C at 8 ^{0}C/ minutes, 7 minutes hold up to 280 ^{0}C at the rate of 10 ^{0}C/minutes. The sample was injected in split mode as 20:1. Identification of the compounds was done by comparing the spectral data of sample compound with the compound spectra present in spectral libraries CIL/SAIF Panjab University Chandigarh.

Results

The stem bank extracted in benzene show the presence of fifteen phytoconstituents in each extract. Figure 1 represents the chromatogram of ethanol extract And table 1 represents the phytoconshituents indentified in the ethanol extract with retention times (RT) relative percentage, and molecular formula of metabolites. Figure 2 displays the

Chromatogram of acetone extract and table 2 demonstrate the identified metabolites in acetone extract with their retention times, relative percentage, and molecular formula of metabolites. Table 3 represent the activity of important phytoconstituents identified in the benzene stembark extract of *Ficus hispida* L.

Table 1: Phytocompounds identified in ethanol extract of *F. hispida* L. Stem bark

SR No	Rt	Name of Compound	Rel %	MF
1	8.54	Cyclopentasiloxane	3.94	C10 H30O5 si 5
2	9.18	3 Dodeceme	1.62	C12 H24
3	11.2	Cyclohexasalioxane	7.20	C12 H36 I O6 Si6
4	11.98	8 – Hepadecene	1.63	C17 H34
5	13.26	Telradecamentyoctasilo xane	4.83	C18 H52 O7 Si7
6	13.64	Phenol	0.67	C14 H22 O
7	13.95	Hepasiloxane	1.11	C14 H44 O06 Si7
8	14.08	Trimethylsilyl ester	0.62	C11 H29 05 PSi3
9	14.47	1 - Hsexadecanol	0.75	C21 H42

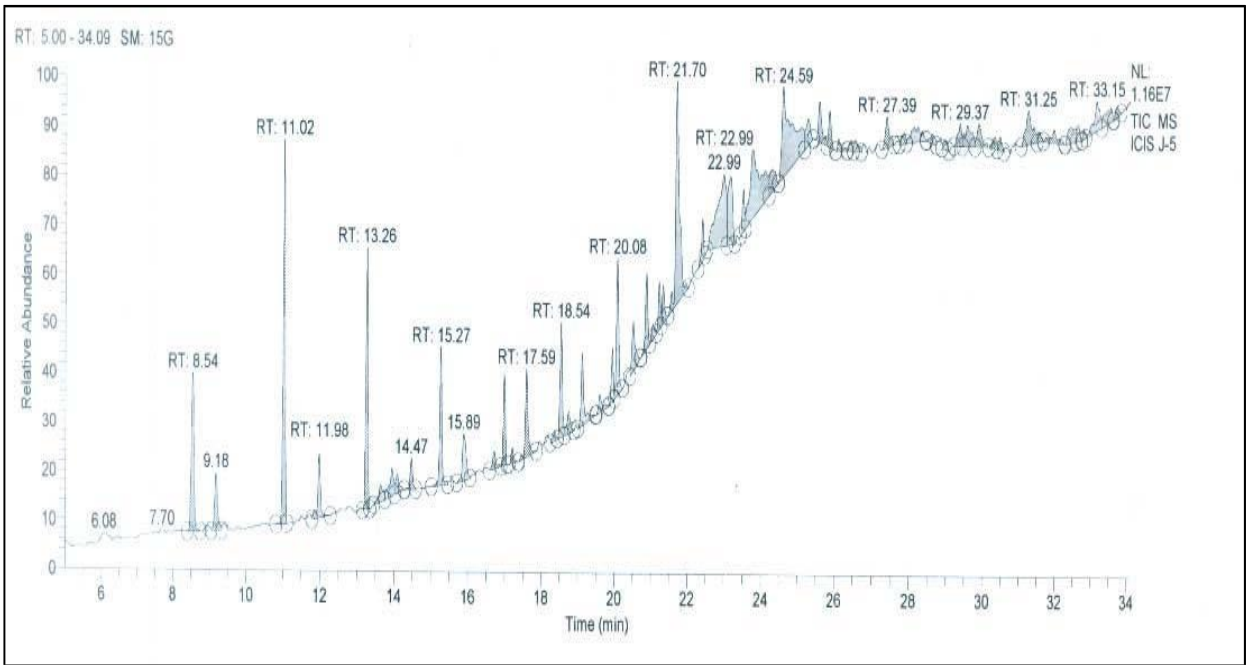

Fig 1: The total ion chromatogram of ethanol extract of F.hispida stem bark peaks with retention times.

Discussion

In the present investigation stem bark of *Ficus hispida* were extracted usingbenzene solvent followed by the GC – MS analysis which authenticates the fifteen compounds in each respective sample. benzene extract of stem bark observed the presence of Cyclopentasiloxane (3.94 %),3 Dodeceme (1.62%),Cyclohexasalioxane (7.20%), 8 Hepadecene (1.63%),Telradecamentyoctasiloxane (4.83%), Phenol (0.67%),Hepasiloxane (1.11%), Trimethylsilyl ester (0.62%), 1 – Hsexadecanol (0.75%), 5-Methoxyindane(6.31%),1 – Tert – Butyl 3(7.46%), 1 – Methyl (4.13%), Naphthalene(28.52%),a – isobutyl – 2 (6.27%), 4-5- trimethyl, Phenol (47.32%). Using Dr. Duke's phytochemical andethanobotanical database (online), the biological Activity of the identified phytocomponents was ascertained. The various important Phytochemicals which contributes to the medicinal activity of the plant given in Table: 3.Biological activities listed are based on Dr**.** Duke's Phytochemical the results indicated the important phytoconstituents are Cyclopentasiloxane (3.94 %),3Dodeceme (1.62%), (1.63%), Telradecamentyoctasiloxane (4.83%),Phenol (0.67 Cyclohexasalioxane (7.20%), 8-Hepadecene %), Hepasiloxane (1.11%), Trimethylsilyl ester(0.62%), 1 – Hsexadecanol (0.75%), 5-Methoxyindane(6.31%),1 – Tert– Butyl 3(7.46%), 1 – Methyl (4.13%), Naphthalene(28.52%),a – isobutyl – 2 (6.27%), 4-5- trimethyl, Phenol(47.32%). These phytoconstituents shows activity as antibacterial, Pilar cyst, Hairy Scalp, bald Patches, Tinea capitis, Head lice, Dandruff, Tinea capitis, Alopecia areata, Folliculitis, Decalvans, Anagen effluvium, Telogen efftuvium, Psoriasis, Eczema, Tumours, Naevus sebaceous, Keloidscars, Acne, Keloid, Muchalis

Conclusion

This may be the first report ofdocumentation of activeconstituentsfrom stem bark of *F. hispida* L. The results of the present study reveal that the stem bark of *F. hispida L.* having effective potential bioactive compounds, which may be leads to the formulation of new drugs to treat various skin diseases.

Acknowledgment

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References

1. Cragg GM, David JN. J Pharm Biol. 2001; 39:8-17.
2. Akerele O. Summary of WHO guidelines for the assessment of herbal medicine, Herbalgram, 1993; 28:13-19.
3. Ayitey-Smith E, Addae-Mensah IW. Afr. J Pharmacol Drug Res. 1977; 4:7-8.
4. Banso A, Adeyemo SO. Afr J Biotechnol 2007; 6:1785- 1787.
5. Ameenah Gurib-Fakim, Medicinal plants: Traditions of yesterday and drugs of tomorrow, Molecular Aspects of Medicine, 2006; 27:1-93.
6. Cowan MM. Clin Microbiol Rev. 1999; 12:564-582.
7. Gill LS. Ethnobotanical uses of plants in Nigeria: University of Benin Press, Benin city, 1992; 350.
8. Hertog MGL, Feskens EJM, Kromhout D, Hollman PCH. Lancet. 1993; 342:1007-1011.
9. Ivanova D, Gerova D, Chervenkov T, Yankova T. J Ethnopharmacol. 2005; 96:145-150.
10. Jana S, Shekhawat GS. Res J Med Plant 2010; 4: 206- 212.
11. Kettner C, Kosch H, Lang M, Lachner J, Oborny D, Teppan E, Creating a Medicinal Plant Database, Workshop on Database Issues in Biological Databases (DBiBD), Edinburgh, 2005.
12. Mandal V, Mohan Y, Hemalatha S. Pharmacog Rev 2007; 1:7-18.
13. Misra A. J Med Plants Res 2009; 3:1140-

1146.
14. Mojab F, Kamalinejad M, Ghaderi N, Vahidipour HR. Iran J Pharm Res. 2003; 3:77-82.
15. Parekh J, Chanda S. Afr J Biomed Res. 2007; 10:175- 181.
16. Sofowora A. Medicinal plants and Traditional medicine in Africa: Spectrum Book Ltd,Ibadan, Ibadan, Nigeria, 1993, 289.
17. Parekh J, Chanda S. Plant Arch 2008; 8:657-662.

Observation on Flower Visitors and floral nectar in *Allamandablanchetii*A.DC. (Apocynaceae)

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Abstract

The present paper deals with the study of flowering phenology, flower dynamics, nectar production, chemical composition and flower visitors of AllamandablanchetiiA.DC. (Apocynaceae)

Allamandablanchetiiis a perennial shrubby climbing plant species belonging to the family Apocynaceae. The flowering season of this plant is throughout year.It is an ornamental plant bears showy rose-purple trumpet flowers. And last for 2days. Anthesis occurred during the morning. Anther dehisces in the mature bud. Flower produce nectar from the nectary disc located at the base of ovary. The amount of nectar and nectar concentration from flowers was recorded after every two-hour interval from 08.00hrs -17.00hrs. The average volume of nectar was found to be 5.7µl. The average nectar concentration was found to be 34.25%. Sugars and Amino acid from floral nectars were detected by one directional thin layer chromatography. Nectar showed the presence of two sugars fructose and Glucose. Nectar showed three amino acid DL-alanine,glycine tryptophan. Flower visitors were observed for their visits and behaviour during the flowering period. Bees and Ants were the main flower visitors.

Key words: *Allamandablanchetii*, Nectar, sugars, Amino acid, Visitors

Introduction

*Allamandablanchetii*is a perennial shrubby climbing plant belonging to Apocynaceae family native to Brazil. The flowers of the Apocynaceae usually have a well-developed nectariferous disc around the ovary. Presence of nectaries is a biological character as it is related to a vital function of pollination.Pollination is successful in many plant species as consequences of pollinators seeking nectar.(Southwick*etal*, 1981). A recent analysis of functional flower trait diversity showed that among various floral characteristic the concentration of amino acid is one of the important traits shaping plant pollinator interactions(Fornoff et al 2017). Sucrose-rich nectar present. (Faegri and Van der pijl 1980).Nectar characteristic patterns of nectar secretion and availability, flower production spatial arrangement and morphological aspects of flowers and flower -visiting birds are important in order to understand the foraging behaviour of birds on flowers (Waser, 1982; Kearns and Inouye, 1993). This phenological pattern is associated with long-lived pollinators that set fixed daily foraging routes (Gentry 1974). Bird-pollinated plants are usually characterised by having brightly colour, odourless flowers, tubular and evenly curved corollas,diurnal anthesis(Faegri and Van der Pijl 1980).Flowers produce nectar and are adapted for pollination.In *A.blanchetti* due to bright colour of flower maximum bees and butterflies are attracted.

Thus, the aim of the present work was to study flowering phenology, the nectar volume (µL), nectar concentration, chemical composition of sugars and amino acid and flower visitors in *Allamandablanchetii.*

Material and Methods

Study Area

The present study was carried out in the Botanical garden of Shri Shivaji Arts, Commerce and Science College, Akot during March to September 2022.

Flowering phenology

A cultivated population of *Allamandablanchetii*in college campus was chosen for observations. Flowering phenology, time of anthesis and time of anther dehiscence was recorded during the peak flowering period.

Nectar Analysis

The time of nectar secretion was noted during the peak flowering period. The amount of nectar from flowers was recorded at 2hrs intervals during the flowering period. Nectar was extracted with micro-capillary tubes. Nectar concentration was determined using a hand-held sugar refractometer (Erma Japan) from 8.00hrs to 17.00hrs for 5 days during the peak bloom. For the analysis of sugar and

Amino acid nectar samples preserved in isopropanol as well as fresh nectar samples were used. The sugars present in nectar were studied by using thin layer chromatography. Nectar sample was loaded on the plate along with standard sucrose, fructose and glucose keeping a comfortable distance between the loaded nectar sample and standard sugars. Later the plates were run in a solvent prepared by mixing butanol-4 parts + acetic acid 1 parts + distilled water 5 parts (4:1:5). After solvent run, the silica gel plate was allowed to dry, sprayed with 1% aniline, 1% diphenylamine and 85% Ortho-phosphoric acid prepared in 100 ml acetone. For amino acid detection solvent prepared by mixing n-butanol+aceticacid+water. (80:20:20).and sprayed with 0.1%solution of ninhydrin in acetone. A chromatogram for amino acids was developed as a standard for identification the colour characters were used to identify the amino acid and sugars present in the sample.

Flower Visitors

Observations were made on the type of flower visitors during the peak flowering period. The duration of visits, number of flowers was recorded at 2hrs interval.

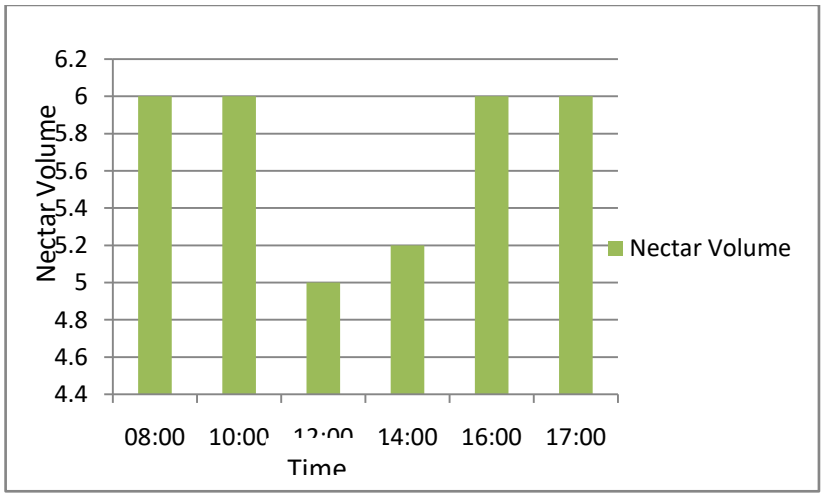
Result and Discussion

In *Allamandablanchetii*flowering period throughout years and but the peak flowering period was observed during month of AugusttoSeptember. But, some species delay flowering process by about one month. Flowers open daily 08.00hrs-10.00hrs. Anther dehiscence takes place before the flower opening07.00hrs-08.00hrs in the mature bud. Floral nectar is secreted by plants to attract and reward of pollinators, and it plays a key role in the functional ecology of plants (Baker and Baker, 1983; Gonzalez-Teuber and Heil, 2009). In *Allamandablanchetti* nectar secretion begins in the young flower during morning 8.00hrs-9.00hrs. The quantity of nectar was measure on the day of flower opening at two hours intervals between 8.00hrs-17.00hrs. Nectar is thin. On an average the total amount of nectar measure during this period in each flower was 5.7µl (Table 1 & Graph 1). Maximum nectar production occurred during 14.00hrs-15.00hrs.The average nectar concentration was found 34.25% during the peak flowering period (Table 1 & Graph 2).In *A.blanchetti* nectary disc is located at the base of ovary. The observations found that nectar secretion begins in the flower during morning 08.00hrs-09.00hrs. The two nectar sugars fructose and glucose were identified. Nectar amount in ornithophilous species is commonly high with diluted concentration 22-26% of sugar. (Howe and Westley 1997, McDade and Week 2004). Nectar showed three Amino acid DL-alanine, glycineand tryptophan. The flowers are large, nectar-rich, pink toviolettrumpetto attract the butterflies, birds, bees and Ants. The present observations showed that in *Allamanda*butterflies,small birds, bees and ants were the main pollinators. Among the peak flowering period observed in the study, in morning between 08.00hrs -14.00hrs had greater number of pollinator visits per bout. butterfly visited the flower throughout the day. Most of the bees visited in between08.00-15.00hrs.Ants visited throughout day. (Table 2).The hummingbirds was both high and low reward trapliner because of the corolla lengths and nectar offer in the visited flowers; and it visited flowers in foraging bouts at regular interval.(Sazima 1981, Machado and Sazima 1987, piratelli 1997, Vasconcelos and Lom-bardi 2001).

Table 1. Nectar Volume and Nectar Concentration in*A.blanchetii*

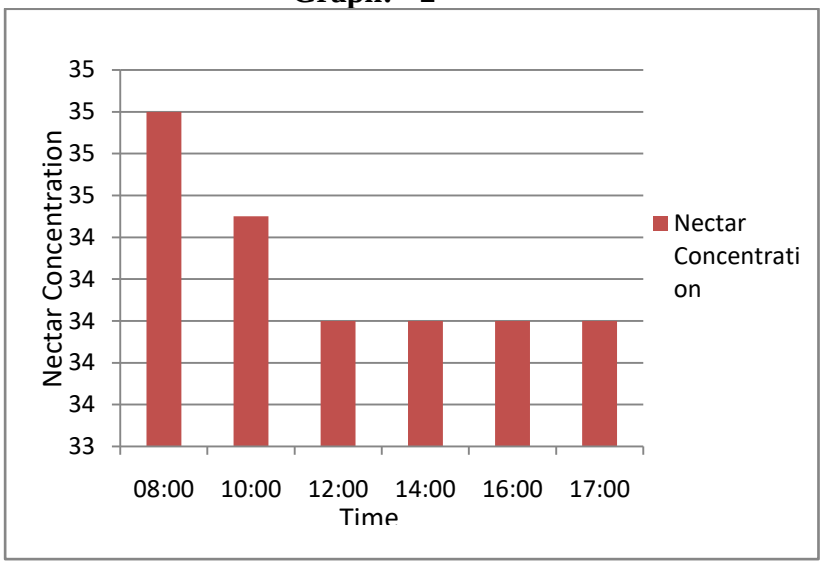
Time (hrs.)	Nectar Volume	Nectar Concentration
8.00	6µl	35%
10.00	6µl	34.5%
12.00	5µl	34%
14.00	5.2µl	34%
16.00	6µl	34%
17.00	6µl	34%

Graph: - 1



Nectar Volume in*A.blanchetii*

Graph: - 2



Nectar Concentration in*A.blanchetii*

Table 2 : Flower visitor's census in *Allamandablanchetii*

Flower visitors	Forage type	Time of visit	Flower visit per bout (sec)
Bees	Nectar	08.00-15.00hrs	3-4
Butterfly	Nectar	Throughout day	2-3
Ants	Nectar	9.00- 17.00hrs	4-5
Purple sunbird female	Nectar	10.00-12.00hrs	5-10

References

1. Baker, H.G and Baker, I. 1983. A brief historical overview of the chemistry of floral nectar. (Eds).B.Bentley and T.Elias.In: *Thebiologyofnectaries*. The Columbia UniversityPress, New York.
2. Faegri k and van der pijl l. 1980. The principles of pollination ecology, 2nd ed., Toronto, Pergamon Press, 244 p.
3. Fornoff,F; Klin, A.M; Hartig,F Benadi,Gita,Venjakob,Christine and Ebeling,Anne(2017). Functional flower traits and their diversity drive pollinator visitation. Oikos 126:1020-1030.
4. González-Teuber M, Eilmus S, Muck A, Svatos A, Heil M. Pathogenesis-related proteins protect extrafloral nectar from microbial infestation. *Plant J.* 2009; 58:464–473.
5. Howe H.F and Westley LC. 1997. Ecology of pollination and seed dispersal. In: Crawley MJ.(Ed), Plan Ecology. 2nd ed., Oxford: Blackwell Scientific Pub, p. 262–283.
6. Heil, M. 2011. Nectar: Generation, regulation and ecological functions, trends Plant Science 16:191-200.
7. Kearns C, Inouye DW (1993) Techniques for pollination biologists. University Press of Colorado, Colorado.
8. Mcdade L.A and Weeks J.A. 2004. Nectar in hummingbird-pollinated Neotropical Plants I: Patterns of production and variability in 12 species. Biotropica 36(2): 196–215.
9. Piratelli A.J. 1997. Comportamentoalimentar de beija-flores emduasespécies de *Hippeastrum*Herb. (Amaryllidaceae) Rev Bras Biol 57: 261–273.
10. Sazima M. 1981. Poliniza..o de duasespécies de *Pavonia*(Malvaceae) porbeija-flores na Serra do Cipó, Minas Gerais. Rev Bras Biol 41: 733–737.
11. Southwick, E.E; G.M Lopar and S.A sadwick(1981). Nectar production,composition, energetics and pollinator attractiveness in spring flowers of western New York. *Amer.J.Bot*.68; 994-1002.
12. Vasconcelos M.F and lombardi J.A. 2001. Hummingbirds and their flowers in the camposrupestresofsouthernEspinha.o Range, Brazil. Melopsittacus 4: 3–30.
13. WaserNM (1982) A comparison of distances flown by different visitors to flowers of the same species. Oecologia 55:251–257.

"MANAGING NATURAL RESOURCES: FOCUS ON FOREST AND WILD-LIFE OF INDIA"

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Abstract:

The environment has been extensively utilized by humans to provide for their basic necessities of food, clothes, and shelter. Natural elements such as forests, rivers, land, mountains, water, and the sea are a part of the environment. Resources refer to all of these aspects of nature that are beneficial to humanity.Resources are essential to human life and existence. Population and natural resources are intertwined. Conflicts over human resources persist as a result of the unequal distribution of natural resources around the world. Term "management of natural resources" refers to a course of action involving both renewable and non-renewable energy. Natural resources including land, soil, water, plants, and animals are severely impacted by a number of issues, including global warming, overcrowding, rapid industrialization, and other related factors. The current study sheds light on how to manage forest and wildlife resources.

Introduction:

All elements of human society and the natural environment, notably forests, are already being impacted by climate change. The environment has been extensively utilized by humans to provide for their basic necessities of food, clothes, and shelter. Natural elements such as forests, rivers, land, mountains, water, and the sea are a part of the environment. Resources refer to all of these aspects of nature that are beneficial to humanity.Resources are essential to human life and existence, according to this statement. Population and natural resources are intertwined. Conflicts over human resources persist as a result of the unequal distribution of natural resources around the world. Humans have consumed a lot of natural resources during the course of development, which has led to a daily decline in their availability. The impacts of human interference with nature are getting worse(Ed., 1956). Management of natural resources refers to a process for regulating resource use so as to prevent resource waste and utilize them as efficiently as possible. Natural resources are mainly of two types, 1. Renewable ResourcesIn a sense, renewableresources are limitless. They are able to restock themselves through techniques like recycling, replication, and replacement. Sunlight, living things like plants and animals, soil, water, etc. are examples of renewable resources.2. Nonrenewable ResourcesNuclear power, natural gas, coal, and oil are examples of nonrenewable energy sources. The fact that we now rely on these resources to provide the majority of our energy needs makes the fact that they cannot be replenished after they are depleted a serious issue for humanity.

Forests are a renewable natural resource that can provide a variety of major and minor forest goods and make a significant contribution to economic growth. The woodlands contain and protect a diversity of plants and animals, which together comprise a great bio-diversity and are essential to the environment with stable conditions and ecological harmony. In addition to several items, which woodlands give people jobs and bring in money for the government. Theyreduce temperature extremes and act as rain to impact the climate, preserve soil, control moisture levels, and manage river flowand because they clean the air, they are also crucial for health.

India's forest cover has steadily increased over the past ten years, rising from 6.92 lakh sq. km in 2011 to almost 7.14 lakh sq. km by 2021, an increase of about 21,762 sq. km, or about 3.14%. This rise almost equals the size of the Mizoram state. Similar to this, the country's tree cover has gradually increased over the past ten years, growing by 4,904 sq. km (5.4%) from 90,845 sq. km in 2011 to 95,749 sq. km in 2021. However, between 2011 and 2021, the country's total forest area was almost 7.7 lakh square kilometers.**(India, 2021)**

Problems related with natural resources

The unequal consumption of natural resources

Natural resources are frequently consumed in the technologically developed or "developed" world, also known as "the west," today. Due to their larger populations, the "emerging nations" of "the east," such as India and China, likewise overuse many resources. However, rich countries consume up to 50 times more resources per person (per capita) than the majority of poor nations. Over 75% of the world's industrial effluents and greenhouse gases are produced in developed nations

Making land use plans

Land is a valuable resource that is necessary for rising human populations, industry, and animal husbandry in place of food production and livestock husbandry. These intensive land use practices are frequently expanded at the expense of our remaining "wild lands," including our forests, grasslands, marshes, and deserts. This necessitates a practical policy that evaluates the distribution of land among various purposes.

Important renewable resources include forests. Any country's economic development can benefit greatly from forests, which vary in both composition and diversity. Along with trees, plants are crucial for preserving the ecosystem since they cover enormous areas, provide a range of goods, and feed living things.

Review of literature

Forest management

Forest management attempts to effectively manage forests in a way that meets present-day demands without compromising the capacity of future generations to satisfy their own needs. Forest management, in other words, attempts to guarantee future generations' equal access to forests. This must be ensured, and the rate of consumption of forest products must be within the range of regeneration(Rothkar, 2015). The distinct management strategies include maintaining forest area by reducing deforestation, increasing forest area by afforestation, harvesting trees, Prescribed burning.

Afforestation

The trees are renewable natural resources. This implies that plants can be grown, harvested, replanted, and harvested once more and again in a never-ending cycle to produce thousands of goods, clean air and water, habitat for wildlife, stunning views, and other benefits both now and in the future. Reforestation is the practice of planting trees on land that has previously been used for harvesting or for clearing brush. Natural regeneration and artificial regeneration are the two primary reforestation techniques (R.F., 1959). In Natural regeneration of plants, when trees are felled, an area is converted back to forestland through natural regeneration. Through natural regeneration, new trees are created from seeds that are dispersed on a site by mature trees, carried by the wind, animals, or buried by them. Furthermore to growing seedlings from seeds.

Artificial regeneration is achieved through human seeding or seedling planting. Compared to natural regeneration, this form of forest rejuvenation offers a number of benefits. It offers more control over the species present in the new forest, better control over tree spacing, the chance to plant genetically enhanced seeds or seedlings, and a higher rate of tree survival. Despite being more expensive than natural regeneration, artificial regeneration typically produces a more fruitful stand in less time.

Prescribed burning

The prescribed burning is a forest management technique that include the lowering the number of leaves, branches, and dead trees that build up on the forest floor and could ignite a wildfire. The removal of this "litter layer" aids in the emergence of new forage and succulent plants, which are vital food sources for many wildlife species, such as rabbits and deer, in addition to aiding in the suppression of wildfires. A planned fire also benefits a range of nongame species, including birds, by increasing the amount of insects and grains that are readily available. This management technique helps in preventing the spread of disease and insect infestations, lowering plant competition for nutrients, water, and sunshine, and enhancing wildlife habitat, controlled fire improves the health of the forest.

Harvesting trees

Trees are harvested as part of forest management for a variety of reasons, such as enhancing the health of the forest, regulating

the kinds of trees that grow there, attracting specific wildlife species, supplying income for the landowner, producing paper, lumber, and a variety of other forest products, and enhancing access to the area for hikers, hunters, and other recreational users.

There are various techniques of harvesting, each technique for harvesting trees has advantages, disadvantages, and circumstances in which it is most appropriate. There is no perfect harvesting technique for every circumstance.

Thinning Harvesting

Trees are more competitive for sunlight, nutrients, and water when they are close together. They consequently tend to be less healthy and grow more slowly. Forest managers may remove a part of the trees in the early stages (10–15 years) of a growing stand of trees to reduce competition for sunlight, water, and nutrients. This will enhance the health and output of the forest. A fixed number of trees are removed to "thin" the forest. The leftover trees will evolve into larger, stronger trees. The forest's growth is enhanced by the thinning.

Clear-cut harvesting

Clear-cutting involves the complete removal of all the trees in an area. Clear-cutting can be used to produce margins, or regions where two habitat types or two ages of the same ecosystem meet, which makes it a crucial tool for forest management. Edges typically feature more varied wildlife communities than broad blocks of a single habitat because they offer simple access to multiple habitats.

Educate for a response to climate change

All elements of human society and the natural environment, notably forests, are already being impacted by climate change. Due to the precisely balanced ecosystems that many species depend on, a warmer temperature will cause the extinction of many species. Additionally, it is predicted that droughts and fires would occur more frequently and be more severe in regions like Australia, Indonesia, California, and the incredibly bio diverse Amazon rainforest. By storing carbon, forests prevent climate change and directly affect weather patterns like rainfall. (V.B., 1982)Work to lessen your individual impact to climate change while advocating for the adoption of progressive climate policies in your neighborhood.

Preventing forest fires

Large forested areas can be quickly destroyed by wildfires, which can then move to populated areas. Wildfire spread and severity can be reduced to a manageable level through active forest management. This can save lives by preventing the destruction of vast ecosystems and areas close to those ecosystems.

Wildlife management

A traditional goal of wildlife conservation is to preserve ecological diversity. Along with the wild animals, human beings have flourished on the earth, but in the last 2-3 centuries, humans killed wild animals excessively and started competing with them for food. Thus, it became difficult for wild life to survive in the struggle for life, because they could overcome these difficulties before them.

The practical reasons for maintaining diversity in organisms are also becoming clearer. Certain animals and plants, though unfamiliar and neglected, are of great scientific and economic importance. Some species have become indispensable in laboratories. They have shed light on important physiological processes in humans and have paved the way for disease prevention and treatment. It has become possible to breed new varieties of livestock using breeds like wild bulls. Wildlife Management include

Strict adherence to the wildlife protection act and in-situ conservation

Pradesh, Saga in India, since the time of Emperor Asoka (3rd century BC), wildlife conservation was conscious. He wrote down strict restrictions on his fifth column, not to hunt bats, monkeys, rhinoceroses, porcupine, tree squirrel, etc. and not to set fires in the forest, and these were the first laws in history. Kautilya Arthashastra mentions that there should be sanctuaries for the protection of wild animals. Mentions about it are also found in Rig-Veda and Other Vedas.

Bombay Natural History Society was established in 1883 in India. In the above matters, the Government of India has made some laws and formulated a National Forest Policy and appointed a Central 'Wildlife

Protection Board' and appealed to the State Governments to make and implement the above laws. Although not all states in India have uniform laws regarding animal protection and conservation, there are a few efforts underway. As a result, Melghat Tiger Reserve in Maharashtra, Tiger Reserve in Karnataka, and Crocodile Conservation Project in Andhra in Orissa.

Reintroduction of extinct species and protect endangered species

Recent efforts by biologists to reintroduce extinct species and to save endangered species have taken a new turn in wildlife management. In the case of some species, even with the use of ideal management techniques such as full legal protection and the establishment of wildlife sanctuaries, their numbers have not stopped, when biologists resort to the 'hospital approach' or 'ecological improvement' techniques. It focuses more on eradicating the cause of decline rather than preventing it. (direct, n.d.)The fastest mammals in the world, cheetahs, are about to be brought back to India from Namibia. The only large cat that was entirely exterminated from India was the cheetah, primarily as a result of overhunting and habitat destruction. In 1948, the last spotted cheetah in the nation perished in the Sal forests of Chhattisgarh's Koriya district, and in 1952 the country officially proclaimed the wild cat extinct.

Public awareness

Zoos, television programs and books and magazines devoted to wildlife have created more and more public interest in wildlife and the issues they face. Hence, finding the causes of wildlife loss and promoting measures against them has given a boost. Dams, highways etc. If the projects pose a threat to the survival of wild life, the plans of such projects are changed. E.g., Silent Valley Project in Kerala State.

Prohibit the use of animal products and the sale of their byproducts.

Poaching which is illegal trading of wildlife animals can be considerably reduced by outlawing the sale and purchase of wildlife animal parts, particularly in animal markets. Few individuals would buy animal parts if they were made illegal, and the bulk of those in the trade would also go out of business.

Disease management in wildlife

A population's health is normally evaluated by looking at how each individual animal is doing, including their physical condition, stress levels, and the quality of their nourishment. This is accomplished through the measurement of several metabolites (such as urea, nitrogen or actual physiological measurements. Vaccination program should be considered to deal with diseases.

Afforestation and habitat preservation

The most efficient strategy to increase wildlife population and sustain ecological balance is to protect and enhance animal habitats and to conduct afforestation. It represents a restoration to our core values of reverence for nature.

Conclusion

Forest and wildlife management attempts to guarantee future generations' equal access to forests. It must be ensured that the rate of consumption of forest products must be within the range of regeneration. Despite being more expensive than natural regeneration, artificial regeneration typically produces a more fruitful stand in less time. A planned fire also benefits a range of nongame species, including birds, by increasing the amount of insects and grains that are readily available. Edges typically feature more varied wildlife communities than broad blocks of a single habitat because they offer simple access to multiple habitats. Natural resource preservation does not imply non-use. It entails controlling them for long-term optimal use, which may include deferring use when doing so will ensure their continued use by upcoming generations. A "natural resource" is a component of the natural world that is "utile" to us, supporting our survival and well-being. Natural resources, however, are not limitless; the tendency of renewable resources to regenerate itself can be damaged. Natural resources are nature's gift to humanity that should be conserved.

References

1. direct, S. (n.d.). Forest conservation and Environmental awareness. Retrieved from www.google.com/conservation of forest.html
2. Ed., T. W. (1956). International Symposium on mans Role in the changing face of the Earth. Chicago.
3. India, F. S. (2021). Forest Survey Report. Ministry of Environment.
4. R.F., D. (1959). Environmental Conservation. New York .
5. Rothkar, K. V. (2015). Forest conservation and environmental awareness. Procedia Earth and planetary science, 212-215. Retrieved from www.google.com/conservation of forest.html
6. Samuel sinclair, T. (1967). Indian Wildlife. Israel.
7. V.B., S. (1982). Wild Life In India. Dehradun.

Effectiveness of Multimedia in Teaching of Environmental Issues among Secondary School Children

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Abstract :

The multimedia play a dynamic role in secondary education. Using multimedia material in education and teaching during delivery of learning material as students to enhance the knowledge & skill at any situation and any place. This paper is based on a research to understand the effectiveness of multimedia supported instructional material adopted by the teacher in a school. In this study questionnaire on effectiveness of multimedia classroom was developed and accurately selected sample of students from a secondary school. Only those schools were selected where multimedia technology has been used in teaching and learning. The sample of the study consists of total 150 students of 8th, 9th and 10th standard. To assess the effectiveness of multimedia in teaching researcher used self administered achievement test in environmental issues. An experimental research design has been selected to conduct the present study. The findings of the study revealed that the multimedia teaching was support to develop innovative approach towards learning on various environmental issues. Results of the study show that the effectiveness of multimedia embedded classroom was found effective for teaching and improved the achievement of the students. Therefore no one students was found in low level of achievement in environmental issues.

Keywords : Effectiveness, Multimedia, Teaching, Secondary school children, Environmental issues.

Introduction :

The effective use of ICT in education to change the scenario of the traditional form of education. ICTs education develop information and communication technology specially for teaching or learning purposes. Teachers are using different tools to improve their teaching skills.

Accordingly, teachers from all disciplines use ICT to improve their teaching method (Lio, 2011; Liu and Velasquezbryant, 2003; Hew and Brush, 2009, Donnelly *et al.*, 2011).

Effective use of ICT in education create new reforms in teaching and learning process in all faculties/disciplines of education (Pulkkinen, 2007; Wood, 1995).

In India, technology is a useful tool for application in education and teacher help to teach complex concepts in science (NCERT, 2006).

At present situation, several media materials are being used in classroom. Media materials like computer/laptop, smartphones, digital cameras various multimedia softwares supported and enriched classroom (Riodan, 2008). For the purpose of this study classroom are being referred to as multimedia classroom.

In today's scenario there is a need that the school children in India aware and understand major environmental issues. The study focuses on the today's environmental issues and challenges and creates sense of responsibility of students towards protection of environment. Multimedia based teaching enhancing the level of understanding of students the different environmental issues and build up the capacity decision regarding environmental protection.

The present study would be help to the learners and teachers making teaching-learning in environmental education more interesting and understanding. It creates effective learning environment and students encourage self-learning and teachers facilitates current information transmitters.

Review of Literature :

The use of multimedia in text comprehension improve the learning and memory retention. (Chiou, Tien & Lee, 2015)

The use of picture and audio is presented at the same time to ensure the teacher can relate both modes of presentation and

words are better presented in auditory form rather than in text form in animation or video (Liu, Lin, Tsai &Paas, 2012).

Modality presenting information in two modes one combination of words and picture or animation and audio narration. Modality helps pupils to learn in easy way and enhancing the higher-order thinking skills (Fiorella, VogetWalcut& Schatz, 2012).

Nasir, Munir&Shafqut (2011) investigated that ICT have effective in improving information and learning aptitudes of their studies and show the changes in proficiency and new approach towards utilization and advantages of ICT.

Ali, Haolader& Muhammad (2013) found that utilization of ICT to make educating and learning successful and bringing the advancement in learning process.

Objectives of the Study :

1] To compare the effectiveness of the multimedia teaching method and conventional method of teaching on the achievement of 8th, 9th & 10th standard students.
2] To assess the level of understanding of the students by means of an environmental issues.
3] To study the effectiveness of multimedia classroom in terms of gender.
4] To develop an achievement test on environmental issues for 8th, 9th & 10th standard students.

Hypothesis :

1] There will be no significant difference between the pre and post test scores of the control and experimental group students.
2] There will be no significant difference in the achievement of environmental issues between male and female students.

Methodology :

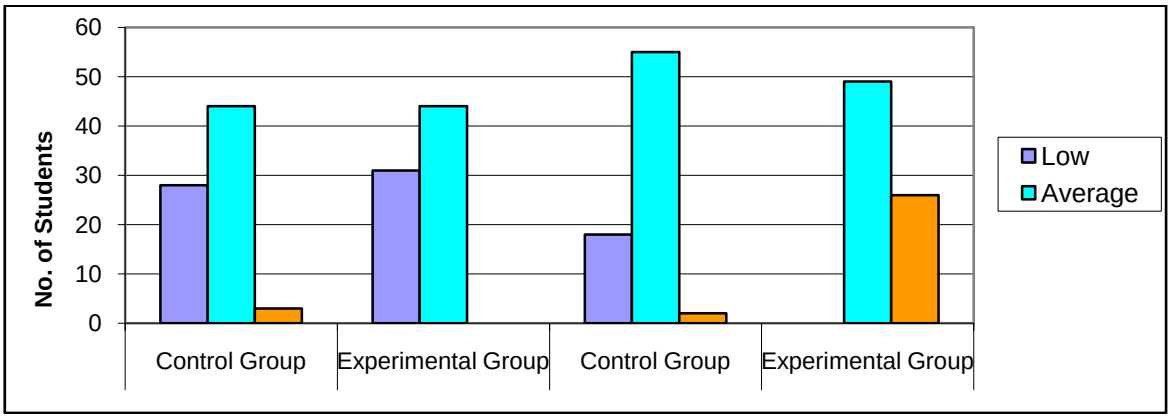
- **Research Design :-** The pre-test, post-test experimental design was used for this study.
- **Sampling and Sampling Techniques :-** The population of the study comprises secondary school level students. The sample was selected from schools in Amravati city, State of Maharashtra. Random sampling technique was adopted for selection of the secondary school students. Total 150 students of 8th, 9th and 10th standard were selected and divided into identical two groups viz. control and experimental. From each class 50 students were selected and divide into two groups, 25 students in control group and 25 students in experimental group.
- **Research Tool Used :-** A self administered achievement test in environmental issues for class 8th, 9th and 10th standard was used for data collection. Achievement test was prepared giving due to consider for areas related to the environmental issues. The test was for 30 marks. It was designed to assess the level of understanding of the students on the concept of environmental issues before and after treatment.
- **Statistical Technique Used :-** The data was analyzed with the help of descriptive statistics and 't' test was used.

Result and Discussion :

For the present study total 150 secondary school students were selected randomly. Further they were equally divided into Control and experimental groups. The following Table-1 shows the number of students under the various levels of achievement test in environmental issues at pre and post test from control and experimental group.

Table 1 : Distribution of students according to their level of achievement test in environmental issues

Group	Level	Range	Pre-Test	Post-Test
Control	Low	Upto 10	28	18
	Average	10-20	44	55
	High	21-30	03	02
Experimental	Low	Upto 10	31	00
	Average	10-20	44	49
	High	21-30	00	26



Graph 1 : Number of students from control & experimental group at various levels of achievement test in environmental issues at pre and post test

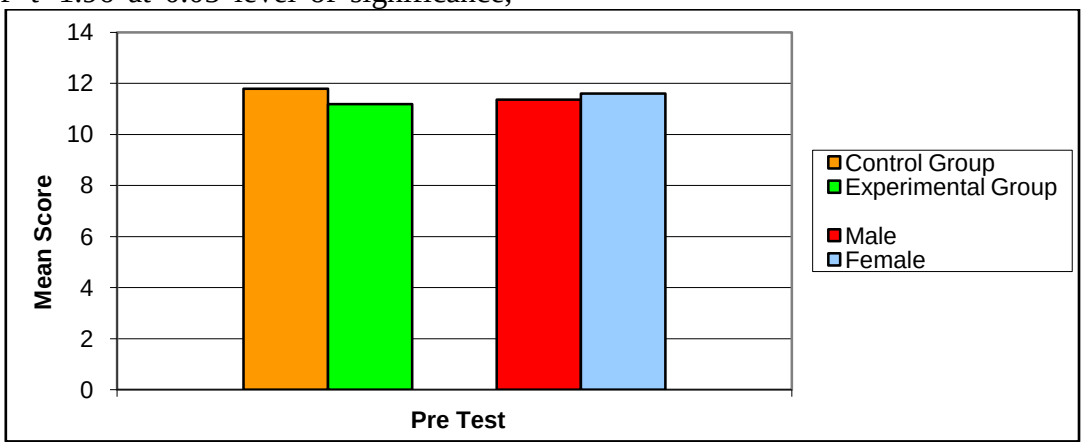
On analysing the pre and post test scores of achievement in environmental issues of 75 students of control group, it was observed that there was not significant increment of students in post-test under high level of achievement in environmental issues. But in the case of experimental group students there is a significant increment in high level of achievement in environmental issues while no one was found in low level category.

Table 2 : Comparison pre-test mean scores of students

Group	N	Mean	SD	df	SEdm	Mean Difference	Table 't' Value	Calculated 't' Value
Control	75	11.79	5.7405	148	0.8857	0.60	1.96	0.667@
Experimental	75	11.19	5.0876					
Male	75	11.36	5.3465	148	0.8868	0.25	1.96	0.282@
Female	75	11.61	5.5138					

(@ - Not significant at 0.05 level of significance)

Table-2 reveals that the calculated t-ratio of the pre-test scores of achievement in environmental issues between control and experimental groups was found to be 0.667 and for male and female it was 0.282. Since both the calculated 't' values were less than tabulated value of 't' 1.96 at 0.05 level of significance, statistically there is no significant difference. It clearly indicate the selected control and experimental groups were identical and there is no significant difference in the pre-test scores of achievement in environmental issues among the male and female students.



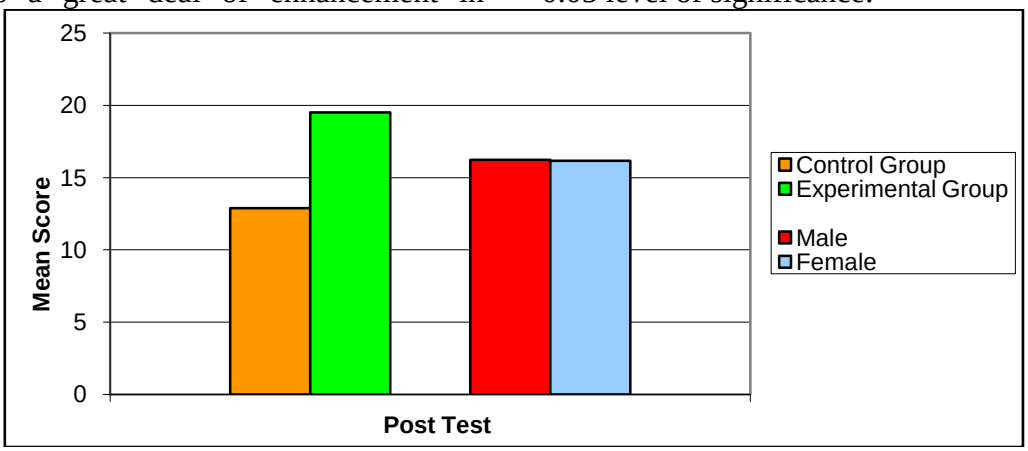
Graph 2 : Comparison of control-experimental group and male-female students with respect to their mean achievement in environmental issues test's mean score in pre test

Table 3 : Comparison post-test mean scores of students

Group	N	Mean	SD	df	SEdm	Mean Difference	Table 't' Value	Calculated 't' Value
Control	75	12.89	4.0322	148	0.7379	6.62	1.96	8.971*
Experimental	75	19.51	4.9576					
Male	75	16.23	5.7200	148	0.9165	0.06	1.96	0.065@
Female	75	16.17	5.5028					

(* - Significant &@ - Not significant at 0.05 level of significance)

Table-3 shows that the calculated t-ratio of the post-test scores of achievement in environmental issues between control and experimental groups was found to be 8.971 which is quite greater than the tabulated value of 't' 1.96 at 0.05 level of significance. Hence, there is a significant difference in the achievement in environmental issues scores of control and experimental group students. Further the mean score of experimental group students is higher than control group indicating there was a great deal of enhancement in achievement in environmental issues instructed through multimedia technology. The multimedia teaching was effective as the result shows that the students of experimental group scored better at post-test in achievement test in environmental issues in comparison to their counterpart, the students of the control group. But there is no significant difference in the achievement in environmental issues scores of male and female students as calculated 't' value 0.065 is less than tabulated value of 't' 1.96 at 0.05 level of significance.



Graph 3 : Comparison of control-experimental group and male-female students with respect to their mean achievement in environmental issues test's score in post test

Conclusion and Implication :

Multimedia technology influencing teaching-learning process and redirected the conventional method in a new path of innovation. When the control group students were taught different concepts of environmental issues by traditional method and experimental group of students were taught by multimedia instructional method, it was found that achievement of experimental group was better than the control group in post-test. The multimedia instructional teaching method was effective. The result of the study shows that no one student was found to be under low level of achievement in environmental issues. Multimedia approach enhance for better development of teaching techniques which open a new way of thinking teachers and students. It improve the students' academic achievement in environment science.

The findings of the study shows that multimedia instructional method is useful to various subjects at secondary stage. Multimedia teaching technique enhancing the students learning capabilities and enrich educational activities. Multimedia instructional strategy constructed paradigm in education.

References

1. Chiou C.C., Tien L.C. & Lee L.T. (2015). Effect on learning of multimedia animation combined with multidimensional concept maps. Computers and Education, 80, 211-223.
2. Liu T.C., Lin Y.C., Tsai M.J. & Pass F. (2012). Split-attention and redundancy effect on mobile learning in physical environments. Computers and Education, 58(1), 172-180.
3. Fiarella L., Vogel-Waleutt J.J. & Schatz S. (2012). Applying the modality principle to real time feedback and the acquisition of higher-order cognitive skills. Educational Technology Research and Development, 60(2), 223-238.
4. Ali G., Hailader F.A. & Muhammad K. (2013). The role of ICT to make teaching-learning effective in higher institution of learning in Uganda. International Journal of Innovative Research in Science, Engineering and Technology, 2(8), 4061-4073.
5. Nisar M.W., Munir E.U. &Shafqat A. (2011). Usage and impact of ICT in education sector : A study of Pakistan. Australian Journal of Basic and Applied Sciences, 5(12), 578-583.
6. NCERT (2006). Position paper national focus group on teaching of science. Retrieved on November 2010 from http://www.ncert/rightside/links/pdf/focus_group/science-pdf.
7. Riordan M. (2008). Moodle : An electronic classroom. Cuyahoga Valley Christian Academy.
8. Donnelly D. McGarro, O'Reilly J. (2011). A framework for teachers' integration of ICT into their classroom practice. Comput. Educ., 57(2), 1469-1483.
9. Hew K.F., Brush T. (2007). Integrating technology into K-12 teaching and learning current knowledge gaps and recommendations for future research. Etr& D-Educational.
10. Lei J. (2010). Quantity versus quality : A new approach to examine the relationship between technology use and student outcomes. Br. J. Edu. Technol., 41(3), 455-472.
11. LiutVelasquezbryant N. (2003). An information technology integration system and its life cycle. What is missing computer in the schools, 20(1), 91-104 (May Liu S.H. 2011), Factor related to pedagogical beliefs of teacher and technological integration.
12. Pulkkinen J. (2007). Cultural globalization and integration of ICT in education in K. Kumpulainen (Ed.). Educational technology : Opportunities and Challenges. Oulu, Finland : University of Oulu, pp. 13-23.
13. Wood D. (1995). Theory, training and technology Part I. Education Train., 37(1), 12-16.

ENVIRONMENT ISSUES: CAUSES, CONCERNS AND PREVENTIVE MEASURES

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Abstract:

Enviornment is the source of healthy life.Human beings need natural environment to live and breathe. But the various factors that damage and pollute environment have influence the very essence of cycle of it. The protection of environment has becaome a cause of great concern across the globe. Pollution has a negative and dangerous effect on every animal. Polluted environment damages human health in various ways. Apart from humans, natural resources also suffer from this major concern. Pollution in environment appears in the forms like Air pollution,water pollution, noise pollution, chemical pollution etc.The present paper dicusses the importance of environment, the major forms of environmental pollution as well as the major causes of envirnmental imbalnce. It suggests some of the useful preventive measures to control envirnmental damage.

Key Words: Environment, pollution, climate change, measures etc

Development of life is possible in a clean environment. When some harmful element enters the environment, it pollutes the environment. This dirty environment is harmful to living organisms in many ways. Contamination of the atmosphere in this way is called pollution. The extraordinary growth of population and industrial progress has given rise to the problem of pollution. Land, air and water are being polluted due to dumping of industrial and chemical wastes. Pollution has a negative and dangerous effect on every animal. Polluted environment damages human health in various ways. Due to the increasing rate of environmental pollution, humans can become victims of various diseases. Because of this, the lives of many animals are in serious danger. From children to adults, everyone is affected by pollution.

Apart from humans, natural resources also suffer from this major concern. Due to pollution, the air turns yellow and the water turns black. The increasing rate of environmental pollution disturbs the balance of the ecosystem. Other organisms such as aquatic species, plants and wildlife are also threatened. We can see increased mortality rates in some species.

Environmental pollution means disturbing the ecosystem. People need to be aware of this problem. They enjoy the present but are unaware of the future results. Polluting the environment will disturb the earth's balance. So we need to take this problem seriously. Pollution in today's environment appears in the following forms-1. Air pollution, 2. Water pollution, 3. Noise pollution, 4. Chemical pollution.

Air Pollution – Various types of gases are present in the atmosphere in a particular ratio. Organisms release oxygen and carbon dioxide through their activities. Green plants take in carbon dioxide and expel oxygen in the presence of light. This keeps the balance of oxygen and carbon dioxide in the atmosphere, but humans keep destroying this balance due to their ignorance and in the name of necessity.

Water Pollution- Water is very important and necessary for all living beings. Plants also obtain their food through water. This food remains submerged in water. Many types of mineral elements, organic-inorganic substances and gases are dissolved in water. If this substance in the water becomes more than the requirement then the water becomes polluted and harmful and it becomes polluted.

Noise pollution- Noise pollution is a new problem today. It has been created by scientific progress. Motor-cars, tractors, jet planes, factory sirens, machines and loudspeakers etc. create noise pollution by disturbing the balance of sound. Loud noise causes hearing loss and also affects the ability to work. Sometimes the loudspeakers in the neighborhood keep me awake all night. It causes many types of diseases. Excessive noise pollution can lead to mental disorders.

Chemical Pollution- In addition to the residual substances flowing from the factories, pesticides and chemical fertilizers used to

increase the yield of food grains also have an adverse effect on health. These substances are carried along with the water and reach the rivers, lakes and finally the sea and harm the life in many ways.

Causes of pollution

The biggest cause of environmental pollution is the rapid increase in the population of the world. The population of the world is spreading like a lion. As the population is expanding, the facilities are deteriorating at the same rate. Places to stay are in short supply. Having a balanced diet to eat has become difficult. A "threat multiplier" is climate change. Massive refugee movements resulting from environmental catastrophes could cause regional instability. Direct flooding and other natural disasters can harm power plants and transmission lines, interfere with the delivery of imported energy fuels, and destroy crops for biofuels. However, climate change also has severe effects on food security, health, and environmental refugees that can all lower the income base of Asian countries and increase government debt, making it even more difficult to implement sensible energy policy. Environmental deterioration can have a detrimental effect on ecological and human health, leading to a considerable number of early fatalities linked to both indoor and outdoor air pollution as well as significant costs associated with lost productivity and healthcare.

Insufficient access to clean drinking water can compromise a region's security. The ability to produce energy and the ability of nations to sustain themselves could be threatened by declining water supplies because fossil, hydro, and nuclear power plants demand significant amounts of freshwater. Alongside, deforestation can interfere with agriculture and the protection of nature reserves, disrupt social order, raise the cost of fuelwood, and harm biodiversity.

While the inventions of science have proved to be a boon to mankind, they have also caused terrible harm to mankind. Science has created many machines to produce various things. Petrol, diesel, coal, wood, oil etc. are used as fuel to run these machines. The huge amount of smoke coming out day and night from the tall chimneys of factories pollutes the entire atmosphere. The burning of fuel in industrial plants and houses pollutes the air by releasing smoke. Due to combustion, the amount of oxygen in the air decreases and the amount of carbon dioxide increases. This causes air pollution. Petroleum products are used as fuel in automatic vehicles. Combustion of petroleum products produces many toxic gases including carbon dioxide. Like carbon monoxide, sulfur dioxide, hydrogen sulphide, hydrogen chloride, hydrogen oxide etc. are released and pollute the air. The whole environment looks sooty due to smoke. Along with this, the polluted water coming out of these factories gets into the clean water wherever it goes and the water becomes toxic. Wherever the water of such factories is found in big rivers, the water of the rivers becomes toxic for a long distance. No animal can survive in them. The water of most of the rivers gets poisoned due to the discharge of waste materials from the industrial factories into the rivers. It also affects aquatic animals and plants. Toxic substances of aquatic animals and aquatic plants reach humans through the food chain and harm them. Compounds of copper, iron, zinc, lead etc. are particularly harmful to water. Sulfur Dioxide (SO,2), Carbon Dioxide (CO,2), Monoxide (CO), Nitrogen Peroxide (NO,2) etc. emitted from cement, steel, glass, petroleum industries and brick kilns etc. Gases and carbon and zinc particles pollute the air. Thermal power plant for power generation (thermal power plant) release of sulfur dioxide (SO,2) in excessive amount from the combustion of coal It pollutes the air. Burning of fuel reduces the amount of oxygen in the air. Such substances which are used for bathing, washing and cleaning etc. are called household detergents; Like- Detergents, Phenyl, DDT, Gamexin etc. The water becomes polluted because the detergents cannot be completely oxidized. These substances are harmful to aquatic life. Oxygen is reduced due to excess of sewage. As a result, microorganisms are destroyed. Due to the stoppage of the decomposition process, the atmosphere becomes polluted. Many harmful gases are released from the discharged faeces and pollutes the air. Polluted water is not fit to drink, polluted water causes skin diseases. In order to end this problem, the Indian

government has prepared a scheme for building toilets from house to house, which is in progress in all the urban and rural areas of India.

Pesticides are used for spraying on crops to kill insects, bacteria and fungi etc. These substances are in gas, liquid or solid form. Sulfur dioxide (SO,2) gas is used to disinfect the habitat. Chlorine, formalin, carbolic acid, phenyl etc. are used in liquid form to kill germs. Disinfectants used in solid form are DDT, lime, bleaching powder etc. Disinfectant chemicals reach humans through the food chain and harm them. The use of pesticides destroys the microorganisms found in the soil, this stops the process of decomposition of organic matter and the fertility of the soil starts to decrease.

Prevention measures

Conditions that contaminate the environment pose a challenge to humans today. We are all responsible for polluting the environment. Therefore, the first solution to control this problem is to control the increasing population. Due to limited population, there will be less chance of environmental pollution. Also, planting more and more trees also helps in making the environment clean and the atmosphere of that place will also be beautiful. To save the water of rivers from pollution, we should not let dead bodies or dead bodies flow in that water. An easy way to prevent smog is to locate factories in places where the population is not high.

The lifestyle of new generation youth is contributing more to environmental pollution. They are getting lazy due to technological implementation. Now they use bikes and cars which create more air pollution instead of eco-friendly bicycles. Their comfort needs are met by manufacturing industries which are the main cause of air and water pollution.

However, youth can protect the environment by raising more awareness. Adopting healthy and environmentally friendly habits will help them achieve these goals. Planting a tree, choosing a bicycle or walking for nearby distances etc. will be of great help.

Pollution itself is such a big problem that it cannot be eliminated easily. But by changing the thinking, taking small measures, this problem can be completely eliminated. And from which we can make India safe again, clean and safe .

Every technology is being used more and more in modernization, which has led to the threat of global warming. Like- mobile, computer, modern machines at least By which the danger of global warming can be reduced by stopping the outgoing waves. Vehicles should be used at least So that consumption of minerals can be prevented. Alonside, reducing the use of machines, increase the use of handmade items, use of solar powered machines will be beneficial. Similarly, as Indian is agricultural nation minimising the use of organic fertizers and applying natural ones is desirable. We should stop the increasing use of plastic and recycle and use the plastic that is thrown away as waste. We need to plant more and more trees, collect water and make good use of it.

In order to control environmental pollution, population growth must first be stopped, so that forests are not cut down for housing. In order to increase the production of food items, biological fertilizers have to be used instead of chemical fertilizers and pesticides. Garbage will have to be recycled, so that this earth will not become a heap of garbage.

The dirty water coming out of the factories will not be discharged directly into the rivers and drains, but it will be cleaned in the rivers. Different means of transport should be used with awareness. The horn should not be used unnecessarily, the engine should be switched off when not required and the silencer of the vehicle should be checked regularly, so that the excessive spread of smoke can be controlled.

The industrialists will have to leave their selfish interests and raise the chimneys of the industries and the industries will have to follow the rules of pollution control. Violent activities must be prohibited. The most important thing is that people have to be made aware by providing complete information about the environment, only then pollution can be controlled. In order to make people aware, they need to be given detailed information about the benefits of the environment and the problems caused by its pollution. To make people aware, they have to be made aware through their entertainment media in an

attractive way. This work has to be done by all earthlings together, so that we can save our environment from further pollution, which provides us with the support of life. Vehicles that generate excessive noise must be banned. Whatever the cause of pollution, it always harms humans and all living things as well as inanimate objects.

If we do not think about this problem today, nature itself will take some terrible steps to restore balance and we humans will have to suffer the terrible consequences of pollution. To avoid pollution we have to plant more trees. Indiscriminate exploitation of natural resources present in nature shall be avoided. We must refrain from using plastic. Garbage should not be thrown here and there.

Efforts should be made to conserve underground water while storing rain water. Apart from petrol, diesel, electricity, we have to find energy alternatives from other sources of energy. Emphasis will be placed on the use of solar energy and wind energy. Unnecessary and useless sounds must be banned. In the field of technology, there are constant new experiments and tests.

We have to develop such technology so that pollution is not spread by means of transport. The most important thing is that we humans have to have positive thinking to save our earth and work selflessly to avoid environmental pollution. We have to work with this goal in mind that we are protecting ourselves, our family, our country and this earth.

Conclusion

We can keep the environment clean by the above measures. The problem of environmental pollution is all over the world. No country can escape this area. So why should we try to solve this problem collectively. We should also support the efforts being made by the government in this direction with all our might. We are residents of poor countries and regions. Running on expensive programs for environmental pollution is not easy for us. If we include the production side of these programs then it will be easier for us.

Environmental pollution is a major concern that will devastate our future. Pollution is a threat to the present and is becoming a major threat to the future. Every human being is responsible for this imbalance. So we need to work together, a little help today will pay off big tomorrow.

Reference

1. https://www.adb.org/sites/default/files/publication/42604/ewp-399.pdf
2. https://en.wikipedia.org/wiki/Environmental_issues
3. https://byjus.com/biology/environmental-issues-solutions/
4. https://www.iberdrola.com/sustainability/most-important-environmental-issues
5. https://www.epa.gov/environmental-topics
6. https://earth.org/the-biggest-environmental-problems-of-our-lifetime/
7. Sovacool, Benjamin K. "Environmental Issues, Climate Changes, and Energy Security in Developing Asia" ADB Economics Working Paper Series,

PHYSICOCHEMICAL CHARACTERIZATION OF METAL COMPLEXES WITH SCHIFF BASES LIGAND AND ITS BIOLOGICAL IMPORTANCE

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Abstracts:

In the given work we complexes of transition metal with Schiff baseligand. Initially Schiff base are synthesized from aromatic amine and aldehyde under acidic medium. All the synthesized compound show a good yield, and further it's prepared for biological activity.Characterization of metals complexes withligand as Schiff basesand its biological important aredescribed in this paper.

Keywords: Schiff bases**,** Aromatic amine, aromatic aldehyde, sulphuric Acid, Ethanol, and metals halide.

Introduction:

The Schiff base contain R-N=CH-R group obtain by primary condensation of aromatic aldehyde or ketone with aromatic amine in acidic medium are known as Schiff bases (SBs), and it is found that the substituted aromatic aldehyde and substituted aromatic base act as bi, tri dentate ligand to form a stable metal complexes with transition metal ion because of azomethine nitrogen atom and donor atom or group on aromatic ring which act as donor atom. Azomethine nitrogen chelating nature is responsible for stability of Schiff base metal complexes, andthe chelating of azomethine and the halogen atom on the ring responsible for biological activity of metal complexes.

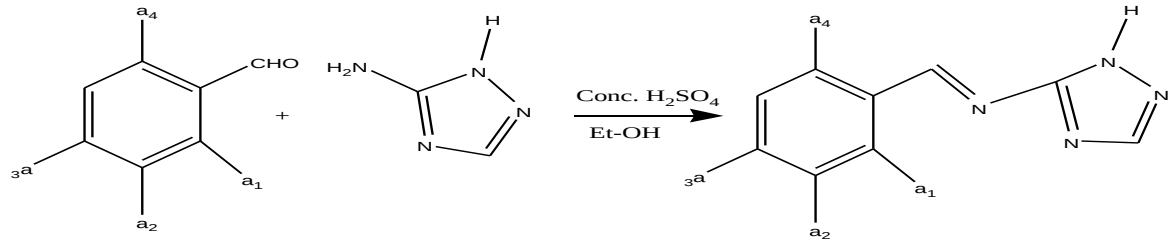
EXPERIMENTAL

Material and Methods:

All solvents were labouring as commercial anhydrous mark without further Refining. The column chromatography was carried out over silica gel (100120esh). Melting points determined by open capillary tube. ^{1}H NMR spectra were recorded on a Bruker300 MHz spectrometer in DCl3solvent TMS as internal standard. The crude product was recrystallizing from 80 percentage ethanol.

Step I: General Procedure for the synthesis of Schiff base:

A mixture of alcohol (20 ml) and aromatic aldehyde (0.02 mol) was taken into a 100 mlround bottom flask. The mixture was stirred until a homogeneous solution was obtained;aromatic amine (0.02 mol) was added with stirring. (As the reaction is exothermic it should becarried out by placing flask in a freezing mixture). Reaction mass is stirred for another 45 min.the Schiff base was precipitated out. The reaction mixture was cool with stirring. The isolatedcrude product is purified by the washing in acetone.



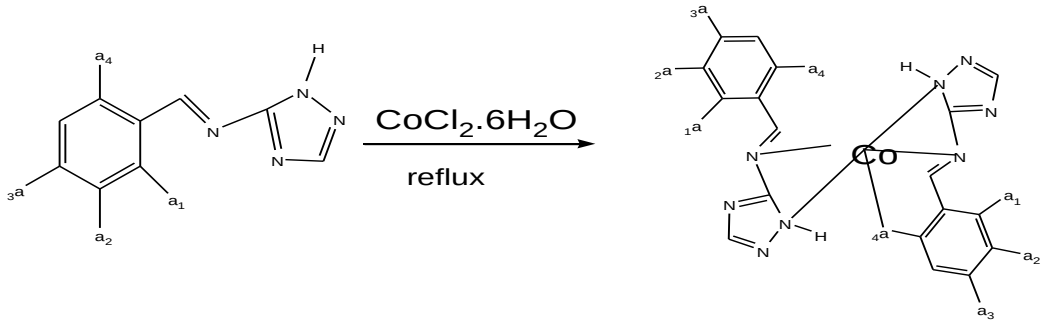
Scheme I

Compound also purify by silica gel column chromatography eluent ethyl acetate hexane reaction was. Monitored by TLC & spot were visualized in iodine.

Step II: -General Procedure for the synthesis of Metal Complexes with Co^{+2} Ion [$MnCl_2$ $4H_2O$]

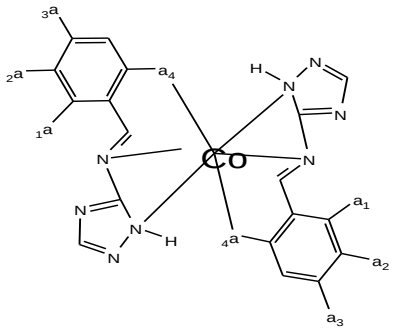
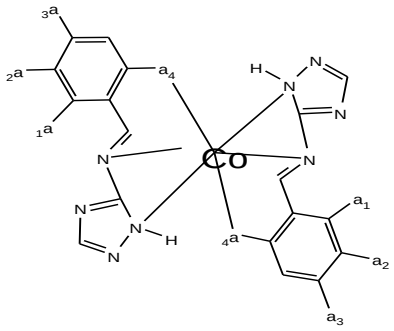
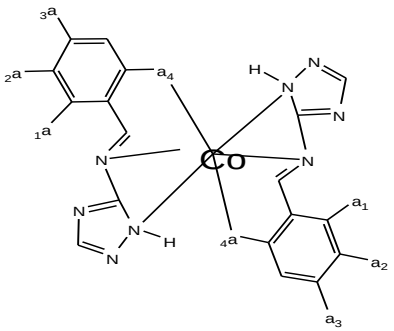
A mixture 0.1 mole of Schiff base in 30 ml alcohol and 0.5 mole of Cobalt chloride hex hydratewas stir to form a homogeneous

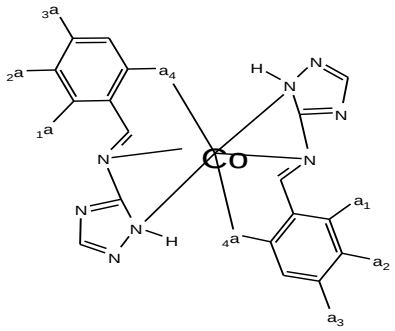
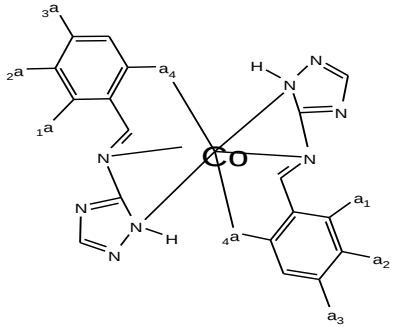
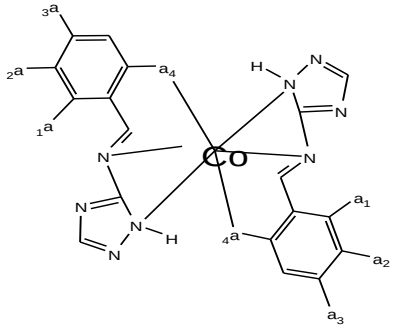
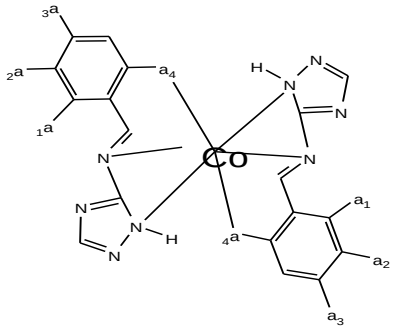
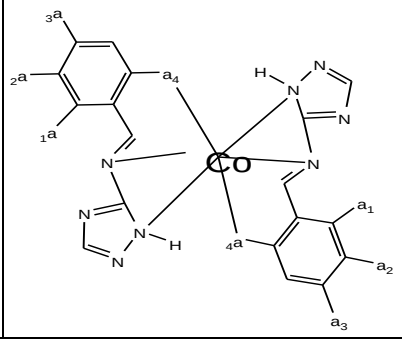
mixture then the reaction mixture was refluxed on a water bath for 6-8 hours. The precipitated complexes were filtered and dried.



Scheme II

Table I:

Sr. No.	**Comp.**	**Product**	**Melting point**	**Colour**	**Percentage yield**
1.	A_1		170^0C	Faint Green	55%
2.	A_2		182^0C	Green	70%
3.	A_3		210^0C	Pink	64%

4.	A_4		260^{0}C	Faint blue	77%
5.	A_5		230^{0}C	paleBlue	80%
6.	A_6		190^{0}C	Bluesh	75%
7.	A_7		150^{0}C	Light Perple	72
8.	A_8		168^{0}C	White Bluesh	59

1)A**1 :-M.P.170^{0}C (a_1 = I)**
FT-IR740 $cm^{-1}$for aromatic C-C stretching, 2350cm^{-1} for CN triple bondstretching, 890 cm^{-1}1for C-Istretching, 1680 cm^{-1}forC=Nstretching.
NMR :δ6.5,s for Ar 6H,δ 7.1to 8.7 m for Ar 2H, δ 6r Ar 4H,δ 7.5 S for 2, H
2)**A2:-M.P.182^{0}C**.(a_2=Cl& a_3= Br)
FT-IR754 $cm^{-1}$for aromatic C-C stretching, 1120 cm^{-1} for C-O-Cstretching, 1160 $cm^{-1}$for C-N stretching ,1235$cm^{-1}$for–$NO_2$for stretching, 1720 cm^{-1} for C=N stretching,
NMR δ 7.2 m, for Ar 6H,δ7.9m for 2H,δ 8.1sfor 2H,δ 9.2 m for 4H.
3) **A3M.P.210^{0}C** (a_2=Cl& a_3= Br)
FT-IR: 770 cm-1for aromatic C-C stretching, 890 cm^{-1} for C-Cl stretching,1150 for C-O-C stretching, 1650 cm^{-1}forC=Ostretching , 1140 cm^{-1} for C-N stretching, 1590 cm^{-1} for C=O Amide stretching.
NMR: δ2.5,s for 6H,δ3.9s for 6H,δ 7.2 m for 10 H,δ 7.9 m for 8H.
4) **A4 M.P.260^{0}C.**(a_2=CH3& a_3= Br)
FT-IR 746 $cm^{-1}$for aromatic C-C stretching, 1260 $cm^{-1}$for–NO2for stretching, 1710$cm^{-1}$for C=O stretching ,1610 cm^{-1} for C=O Amide stretching,1160 cm-1for C-N stretching.
NMR :δ7.2,s for Ar 6H,δ 6.6 to 8.0 m for Ar 2H, δ 6.6 to 8.2 m for Ar 4H,δ 7.5 S for 2, H
5) **A5 M.P.230^{0}C.**(a_2=Cl& a_3= I)
FT-IR 660 $cm^{-1}$for aromatic C-C stretching, 1190 $cm^{-1}$for C-Clstretching,1560$cm^{-1}$for C=C Ar stretching ,3032 $cm^{-1}$for Ar C-H stretching.
NMRδ 4.2 s for 6H, δ3.8 s for 6H,δ 7.2 m, for Ar 8H,δ7.9 m for 10HAr-H,δ 8.1s for 2H.
6) **A6M.P.190^{0}C.**(a_2=NO2& a_3= Br)
FT-IR 660 $cm^{-1}$for aromatic C-Cl stretching, 1230$cm^{-1}$for C=N stretching,1590 cm^{-1} for C=cAromatic stretching,3060 for C-H Arbond stretch, 1560 cm-1for C-N stretching.
NMR: δ7.2,m for Ar6H,δ7.6 m for Ar 2H,δ8.4m for 4 H, δ 5.5 s for 2H.
7) **A7M.P.150^{0}C.**(a_1=Cl& a4= Cl)
FT-IR 660 $cm^{-1}$for aromatic C-Cl stretching, 1230cm^{-1} for C=N stretching,1590 cm^{-1} for C=c Aromatic stretching,3060 for C-H Arbond stretch, 1560 cm-1for C-N stretching.
NMR: δ7.2,m for Ar 6H,δ7.6 m for Ar 2H,δ8.4 m for 4 H, δ 5.5 s for 2H.
8) **A8M.P.168^{0}C.**(a_1=CH3& a_3= I)
FT-IR 660 $cm^{-1}$for aromatic C-Cl stretching, 1230cm^{-1} for C=N stretching,1590 cm^{-1} for C=c Aromatic stretching,3060 for C-H Arbond stretch, 1560 cm-1for C-N stretching.
NMR: δ7.2,m for Ar 6H,δ7.6 m for Ar 2H,δ8.4 m for 4 H, δ 5.5 s for 2H.

3.2 Antibacterial Evaluation: A total six metal complexes with Schiff base have been synthesized recrystallized and six different concentrations of each compound were prepared and further used individually to analyse its antibacterial activity against two human pathogens viz. Escherichia coli, Salmonella typhi. The data on antimicrobial activity of metal complexes four human pathogens are presented in table-(3) and table (4). From the results it was observed that the compound have showed giant antibacterial potential against both pathogens.

Antibacterial properties of the synthesized Schiff base metal complex [Zone of inhibition (mm)]

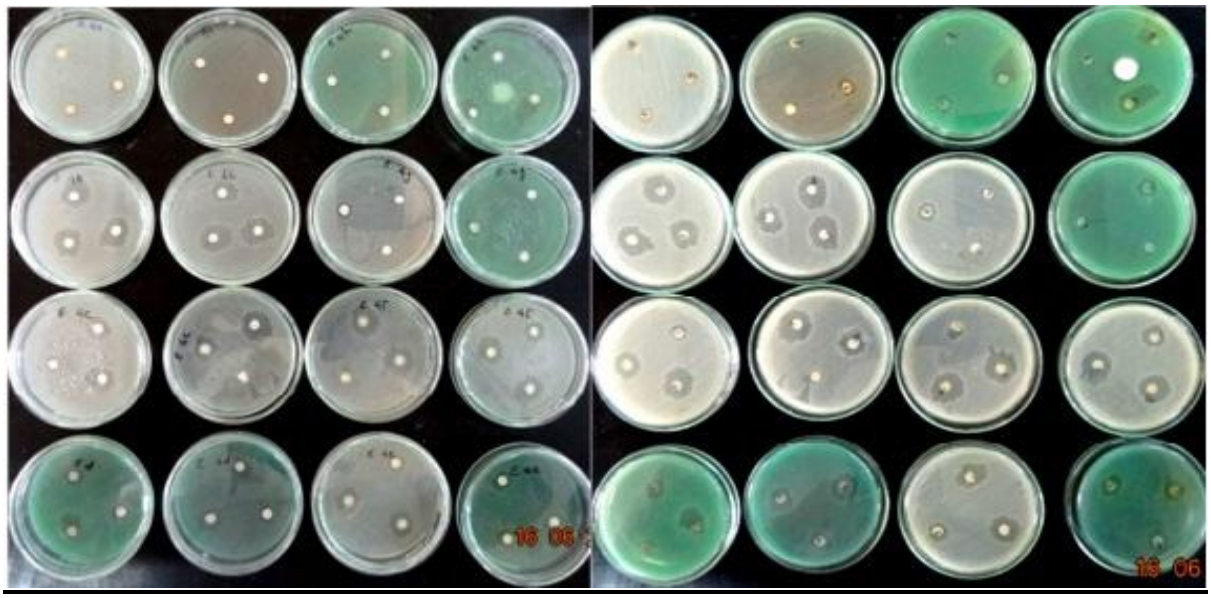


Fig. 1 Effect of 1B – 5B viz. on the growth response of E. coli

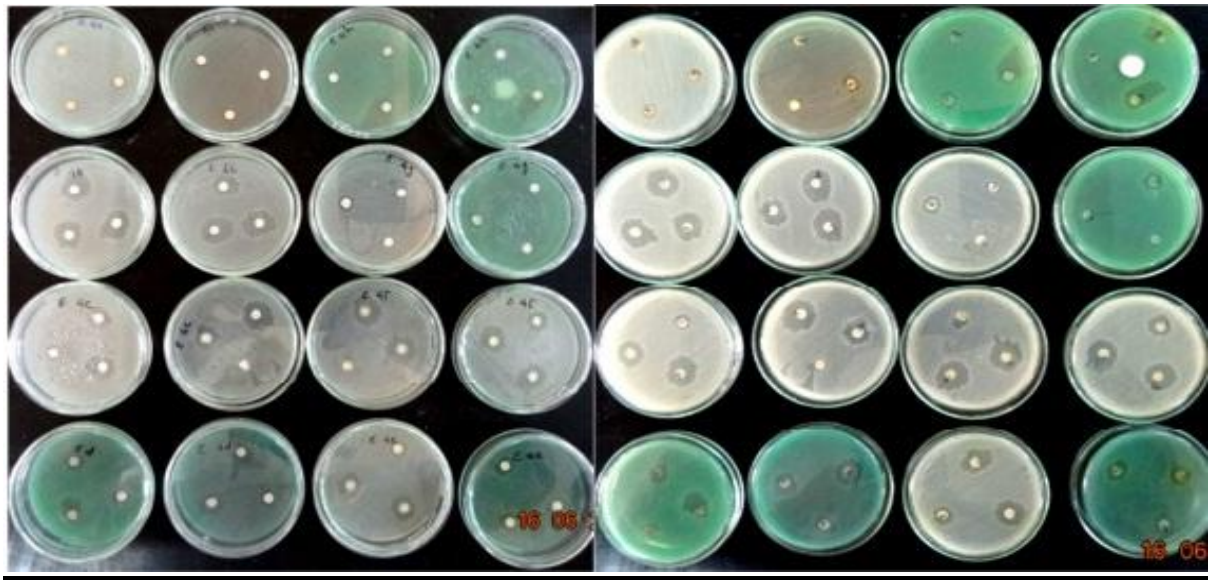


Fig. 2 Effect of 1B – 5B viz. on the growth response of Salmonella typhi

Table (3):- Effect of 1B – 6B on the growth response of Escherichia E. coli

Conc. (mg/mL)	1B	2B	3B	4B	5B	6B
0.5	I(10)	I (17)	I (12)	I (12)	I (12)	I(11)
1.0	I (12)	I (18)	I (16)	I (12)	I (12)	I(11)
1.5	I (12)	I (19)	I (20)	I (13)	I (14)	I(13)
2.0	I (14)	I (18)	I (19)	I (16)	I (12)	I(14)
2.5	I (13)	I (16)	I (15)	I (11)	I (12)	I(13)
3.0	I (15)	I (19)	I (17)	I (13)	I (13)	I(14)

Table (3):- Effect of 1B – 6B on the growth response Salmonella typhi

Conc. (mg/mL)	1B	2B	3B	4B	5B	6B
0.5	I (11)	I (17)	I (12)	I (12)	I (16)	I (11)
1.0	I (11)	I (18)	I (16)	I (12)	I (12)	I (11)
1.5	I (11)	I (19)	I (20)	I (13)	I (14)	I (13)

2.0	I (NI)	I (18)	I (19)	I (16)	I (12)	I (14)
2.5	I (11)	I (16)	I (15)	I (11)	I (12)	I (13)
3.0	I (11)	I (19)	I (17)	I (19)	I (13)	I (14)

I = Inhibition, Values of inhibition are given in parenthesis, NI= Not inhibition

The results regarding antibacterial activity of six Schiff base metal complexescompounds againstE.Coli are presented in figure (1) and table (2). The maximum antibacterial activity was observed in case of derivative 2B, 3B, 4Bfor which, all the concentrations used were showed remarkable antibacterial effect against E.Coli and the average diameter of zone of inhibition ranges from 12 – 20 mm. This is followed by 4a, 4g derivatives for which all the different concentrations showed pronounced antibacterial effect with average diameter of zone of inhibition ranges from 10 – 15 mm recorded.

The pursuit of data on antimicrobial effect of six Schiff base metal complexes compounds (1B-6B) against Salmonella typhi is shown infigure (2) table (3) and. The maximum antibacterial activity was recorded at all the six different concentrations in derivative 2B, 3B, 4B and 5B with average zone of inhibition ranging from 10 – 20 mm with maximum zone of inhibition 19 mm recorded at 3.0 mg/mL for 4b.

Results and Discussion:

All the six Schiff base metal complexes compounds 1B–4B containing nitrogen containing heterocyclic moiety were successfully synthesized in excellent yield and their structures are elucidated using elemental analysis, FTIR, &1HNMR spectroscopy. The results on antimicrobial activity reveals that all the eight newly synthesized compounds viz 1B–6B found to have outstanding antibacterial effect against E.Coli, and Salmonella typhi nearly at all the concentrations analysed. The results revealed, the broad spectrum potential of all the compounds in inhibiting the growth of human pathogens, and this finding instruct the possible help to medicinal.

References :

1. Y .Z.L., Zhu. H.L..Anorg Z. (2004). Allg. Chem., 630, 2754.
2. Balasubramanian. K.P., Parameswari, K. Chinnusamy,V. Prabhakaran, R. K. (2006). Spectrochim.Acta, Part A, 65, 678.Natarajan.
3. Nakajima,K. Ando,Y. Mano, H. Kojima. M. (1998). Inorg.Chim.Acta, 274, 184.
4. Rai B.K 2008 J.India council chem 25(2), 137-141.
5. NagajothiA,ChitraS.andparameswarik 2013 Rese.j.chem.Sci 3(2) 35-43
6. Asieh Y. and vahidAzimi 2013 Eur-chem. Bull 2 (7) 453-455 .
7. Khalid J AL- Adilee 2015 Researcher Journal of Pharmaceutical Biological and Chemical Sciences 1297-1308 .

STUDY OF TRANSITION METAL-LIGAND STABILITY CONSTANTS WITH HYDROXY SUBSTITUTED CHALCONE pH-METRICALLY

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Abstract

In the present work we have investigated the Proton-ligand stability constants and metal-ligand stability constants of reported ligand 1-(5-bromo-2-hydroxyphenyl)-5-phenylpenta-2,4-dien -1- One (L_3) with transition metal ions like Co(II) and Fe(III) were determined by pH-metrically at 0.1 M ionic strength. (30±1^{0}C) in 70% Dioxane-water mixture by Bjerrum method as adopted by Calvin Wilson. 1:1 and 1:2 complexes were formed in between 1-(5-bromo-2-hydroxyphenyl)-5-phenylpenta-2, 4-dien -1- One (L_3) and Co(II) and Fe(III). Values of pK and log k were evaluated and compared from resultant data.

Keywords: Substituted chalcone, Dioxane – water mixture, stability constant.

Introduction

Stability constant is one of the very important concepts in coordination chemistry. Stability constants forehead plays a critical role in the identification and increase in efficiency of ligand design for selective complexation of metal ions in solution. Thus, it is important to assess the potential of metal-binding ligand organic in the complex formation process. During the complex formation in aqueous medium, two types of stabilities are considered, one is the thermodynamics stability, and the other is kinetic stability. This stability may be affected by various factors like nature of central metal ion and ligands, chelating effect, etc are useful for the determination of stability constants. Various modern techniques are used to determine the stability constant of simple as well as mixed ligand compound.

Bjerrum[1] and Calvin[2] were given good contribution in the field of stability constants of organic ligands and their metal complexes. Jagtap studied investigated the stability constant of Ni (II) with substituted pyrazole carboxylic acid derivatives at temperature 298K is done in 70% DMF-Water mixture.[3] Thakur et al[4] investigated the the stability constant of seven Schiff bases with trivalent rare earth metal ion Lanthanum using a pH metric titration technique in 80% (v/v) ethanol-water mixture at three different temperatures 298K, 308K & 318K at an ionic strength of 0.1M NaClO4. The Calvin-Bjerrum method as adopted by Irving-Rossotti has been employed to determine metal-ligand stability constant logK values. The thermodynamic parameters such as, Gibb's free energy change (ΔG), entropy change (ΔS) and enthalpy change (ΔH) associated with the complexation reactions were calculated.

The interaction of Ce(III), Pr(III), Nd(III), Sm(III), Gd(III), Dy(III), Yb(III) and Lu(III) metal ions with 2-hydroxy-(3,4-dioxymethylene)-5-methyl chalcone and 2-hydroxy-5-methyl-4-methoxy chalcone have been investigated by pH-metric technique at 0.1 M ionic strength at 27 ± 0.1 ºC in 70 % dioxane-water mixture[5]. The stability constants and thermodynamic parameters of transition metal complexes of substituted aminothiazole Schiff bases have been studied by R.P Giram et al.[6]. Thorat et al.[7] have been studied The complex formation between Pr (III) & Sm (III) metal ions and 3-(2-hydroxy-3-nitro-5-methylphenyl)-5-(3-nitrophenyl) isoxazoline, 3-(2-hydroxy-3-nitro-5-methylphenyl)-5-(4-chlorophenyl) isoxazoline, 3-(2-hydroxy-3-nitro- 5-methylphenyl)-5-(2-furyl)isoxazoline.

2. Experimental methodology

2.1Material and Methods

All chemicals used are of AR grade. The ligand (L_3) was synthesized in the

laboratory by reported protocol[8]. The stock solution of the ligand was prepared by dissolving required amount of ligand in a70% (Dioxane + water) mixture.

2.2 General procedure

Types of Titrations

i) Free acid HNO_3 (0.01 M)

ii) Free acid HNO_3 (0.01 M) and ligand (20 x 10^{-4}M)

iii) Free acid HNO_3 (0.01 M) and ligand (20 x 10^{-4}) and metal ion (4 x 10^{-4}M) against standard 0.1N NaOH solution.The ionic strength of all the solutions was maintained constant 1M by adding appropriate amount of KNO_3 solution. All the titrations were carried out in 70% (Dioxane+water) mixture and the reading were recorded for each 0.1 ml addition. The graph of volume of alkali added (NaOH) against pH were plotted. The ligand involved in the present work may be considered as a monobasic acid having only one dissociable H+ ion from phenolic -OH group and it can therefore, be represented as HL. The dissociating equillibria can be shown as.

$HL \rightleftharpoons H^+ + L^-$

By the law of mass action, we have,

$K = [HL] / ([H^+] [L^-])$ (1)

Where, the quantities in bracket denote the activities of the Species at equilibrium.

3. Result and Discussion

3.1 Calculation of Proton-Ligand Stability Constant (n_A)

The plots between volume of NaOH and pH of the solution were used to determine the proton ligand stability constant (representing the replacement of H+ ions from functional group of ligand with respect to pH value). The horizontal difference (V_2-V_1) was measured accurately between the titration curves of free acid and acid + ligand. It was used to calculate the formation number n at various pH values and fixed ionic strength μ = 0.1 M using Irving and Rossotti's equation [1, 2].

$$\bar{n}_A = \gamma - \frac{(E_0+N)(V_2-V_1)}{(V_0+V_1)TL^0} \quad (2)$$

Where, V^0 is the initial volume of the solution. E^0 and $T_L{}^0$ are initial concentrations of the mineral acid and ligand respectively. V_1 and V_2 are the volumes of alkali of normality N during the acid and ligand titration at given pH. γ is the replaceable proton from the ligand. The data of n_A obtained at various pH along with the horizontal difference for some representative systems are represented in Table 1. The metal ligand Ligand formation number (n) is estimated by Irving- Rossotti's equation.

$$\bar{n} = \frac{(E_0+N)(V_3-V_2)}{(V_0+V_2)Tm^0} \quad (3)$$

Where, the notations have the same meaning as given in earlier equation. The horizontal difference (V_3-V_2) between the metal complex (A+M+L) and reagent (A+L) curve is used to evaluate the value of n using Irving Rossotti's equation.

Table 1 Proton ligand stability constant (pK)

Ligand	System	pK	
		Half integral method	Point wise method
L3	1-(5-bromo-2-hydroxyphenyl)-5-phenylpenta-2,4-dien -1- One	7.7871	6.4506

Table 2: Metal-ligand stability constant (log K)

System	$LogK_1$	$LogK_2$	Δ LogK
Co(II)+L_3	5.1781	2.9043	2.2738
Fe(III)+L_3	5.1015	1.8056	3.2956

Conclusion

From the titration curves, it is observed that the departure between acid + ligand (A+L) curve and acid + ligand + metal (A+L+M) curve for all systems started from pH 3.6 this indicated the commencement of complex formation. Also change in colour from yellow to orange in the pH range from 3.9 to 8.6 during titration showed the complex formation between metal and ligand.

The difference between $LogK_1$ and $LogK_2$ is less than 2.5, indicating the simultaneous formation of 1:1 and 1:2 complexes when the difference is more then 2.5, then in such a case a stepwise complex formation takes place[9]. From the table 2, it is observed that the difference between log K_1 and log K_2 values are not sufficiently large that indicates the simultaneous formation of complex between metal ions and ligand in system Co (II) - L3 and system Fe (III)-L3 metal complex shows the difference between logK1 and logK2 is more than 2.5 therefore stepwise complex take place.

Acknowledgement

The author is also thankful to the Dr. R.D. Deshmukh, Principal, R.D.I.K. & N.K.D. College, Badnera, for providing useful guidance and facilities throughout the research work.

Reference

1. Bejerrum J. (1941). Metal Ammine formation in aqueous solution, haase, copengegan. 296p, 8(9), 20 (1982).
2. Calvin M, Wilson KW. (2003). stability of chelate compounds, J Am. Chem. Soc, 1945, 67.
3. Jagtap V. S (2019). Determination of Stability Constant of Some Coordination Compound by pH Metric Technique. Pramana Research Journal, 9 (8): 22-29. https://pramanaresearch.org/
4. Thakur S.V, Farooqui M.N, Jadhav R. L, Joshi S. U. (2021). Complexation of La (III) metal ion with novel Schiff bases. Thermodynamic study. Journal of Advanced Scientific Research, 12(2): 133-136. http://www.sciensage.info
5. Tambatkar, G.D, Meshram, Y.K, Gadpayale, M.R. (2008). Stability Constants of Lanthanides (III) Chelates with Substituted Chalcones. Asian Journal of Chemistry, 20(7):
6. 5414-5418. https://asianpubs.org/
   Giram, R.P, Muthal, B.N, More, P.G. (2019). The study of stability constants and Thermodynamic parameters of transition metal complexes of substituted aminothiazole Schiff Bases. The Pharma Innvation Journal, 8(1): 249-252. https://dx.doi.org/10.22271/tpi
   Thorat, S.A, Thakur. S.D. (2015). Metal ligand stability constant of substituted 3,5-Diaryl
7. isoxazolines complexes in 70% dioxane solvent media. J. Curr. Chem. Pharm. Science, 5(2): 67-74.
8. Swapnil, K.W, Kakade, K.P. (2013). Synthesis and characterization of substituted 5-bromo-2-benzylidine-1-benzofuran-3-one and its structural determination. International Journal of chemical and pharmaceutical science, 4(3): 119-122.
9. Deolankar, D. S, Deshpande, Y.H. (1987). La(III), Pr(III), Gd(III), Tp(III) and Dy(III)
   Complexes of aryl furyl and aryl thienyl β-diketones. Indian Journal of Chemistry, 26(A): 68-69. http://nopr.niscpr.res.in/handle/123456789/47785

GUT CONTENT ANALYSIS OF FRESH WATER FISH *CYPRINUS CARPIO* (COMMON CARP)

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Abstract:

The present study is an attempt to investigate the food items of cyprinus carpio which is a major economic as well as food fish in the present study area. The cyprinus carpio tolerate wide range of environmental stress because of this culture of this fish easy and rapid growth also has and plus point. The present study is carried out for four months in which 50 fish samples were collected and there gut content was examine to check the food and feeding of the fish. The study reveals mixed type of food items consumed by the fish. The stomach content of cyprinus carpio is majorly composed of plant origin matter, detritus and zooplanktons and some semi digested matter were also seen during this study. The feeding intensity and the food conversion were the future topics in the study of cyprinus carpio. This clearly indicates that this fish is an omnivorous and can shift on detritus.

Keywords: Cyprinus carpio, freshwater fish, gut content, zooplankton

Introduction:

The feeding behavior of fish was studied by various researchers and noted key observations to enhance the aquaculture production. Fish is an eminent source of food for mankind. In Recent years the world population and their demand of food is increasing, and creating big issue for the society. To tackle this problem the supplementary sources of food except agricultural crops were gained importance, the fresh water fish is a good source of nutritious and complete diet for mankind. Fish also has a medicinal value, considering this importance of fish the research on the different aspect of fresh water fishes were getting importance in recent years. 41.24% of all known species of fishes are fresh water fishes. Fishes forms the most important protein rich and less fat component of human diet. It contains lysine and sulphur containing amino acids which complement cereal based diets. Most fish contain 15 to 25 % protein and 1 to 5 % fat. Fish is a good source of vitamin A, B and D. The feeding behaviour of fish was studied by various researchers and noted key observations to enhance the aquaculture production.

A thorough knowledge on the food and food and feeding habit of fishes by the gut content analysis provides an idea about the abundance of plankton and other food material in the local rivers and reservoirs. The present work is carried out to study the feeding habits of *cyprinous carpio* (common carp) by analysing the gut content of fish. Therefore, the study of food and feeding habits of *cyprinous carpio* (common carp) is very important.

Shukla and Patel (2013) studied food and Feeding Behaviour of *Cyprinus carpio* and their Gastrosomatic Index from Govindgarh Lake., and concluded that the *cyprinus carpio* is omnivorous fish. Food habits of common carp (*Cyprinus carpio*) in Main Outfall Drain ,Al-Nassiriya, Iraq were studied by **Afrah and Awady(2013**) and found that, the *C. carpio*, was omnivorous. **Mandol *et al.*, (2013)** studied the diet and feeding habits of *Cyprinus carpio* in relation with water quality of integrated rice fish farming ecosystem. **Farag *et al.*, (2013)** carried out research on some gross morphological studies on the internal anatomy of the scaled common carp fish (*Cyprinus carpio*) in Egypt. **Wakil *et al.*, (2014)** examine the stomach contents of two fish species (*Clarias gariepnus* and *Oreochromis niloticus*) in Lake Alau, North – Eastern Nigeria. Food and feeding habits of the common carp (*Cyprinus carpio*) (in Lake Koka, Ethiopia, *Momona* were studied by **Dadebo *et al.*, (2015)**. **Vajargah and Hedayati (2015)** studied Morphological variations of common carp (*Cyprinus carpio*). Growth performance of common carp (*Cyprinus carpio*) fingerlings feed with various protein levels were examined by **Cristian, *et al.*, (2015). Nasir and Hamed (2016)** studied the growth development of young common carp *Cyprinus carpio* through dietary sodium chloride supplementation. Morphometeric

characters of *Cyprinus carpio* collected from Dal Lake, Kashmir, India., were reported by **Siraj *et al.*, (2017).**

Materials and methods:

Collection of fish samples

The fishes for the present study were collected from local fish markets such as Washim fish market and Malegaon fish market. Fishes were also collected different water resources such as Supkhela dam, Ekburji dam, Tornala dam, Sonkhas dam in Washim region of Maharashtra.

1:Washim Fish Market

2: Malegaon fish market

3:Supkhela damp

4: Ekburgi damp

Photoplate I: Sampling sites around Washim region

Identification of fish samples

The fish sample from different resources were collected and brought to laboratory for further investigation. The fish specimens were identified to species level using the available identification key of **Talwar and Jhingran (1991)**. The length and weight of the fish were recorded together with photography of fish.

Gut content analysis

For the present study 50 samples of experimental fish were collected, dissected and gutted at the site of collection. Furthermore the gut removed from fish was preserved in 10% formalin to prevent any further digestion and decomposition of the contents. Afterwards, the gut was dissected and its contents were preserved with 5% formalin. The preserved gut contents were then examined under the microscope and contents were then enumerated and identified to the lowest taxa possible.

For the qualitative study of the food of each species, its gut content was carefully examined under low and high power of the microscope. In order to find out the percentage composition of food, Numerical method **Hynes (1950)** was followed where the number of individuals of each food item were recorded and expressed as percentage of the total number of organisms found in all the fish examined.

Results and discussion:

For the present investigation the total 50 samples of freshwater fish *Cyprinus carpio* were studied and analyzed to determine the food and feeding habit of fish.

The gut content was classified in to four categories such as animal origin matter, plant origin matter, detritus and some unidentified matter. About 53 percent of fish gut samples were found to be fully filled which indicates that the *cyprinus* actively feeds. The fullness of

gut was classified in to three catagories in which semifilled, full and empty stomach. No such monthly variation is seen in case of animal origin matter. The animal origin matter is majorly consisting of zooplankton, Undigested Lorica of Zooplanktons, insect body parts and semi digested larvae. **Mandol *et al.*, (2013)** they were also found zooplankton in the gut content of *cyprinus carpio.*

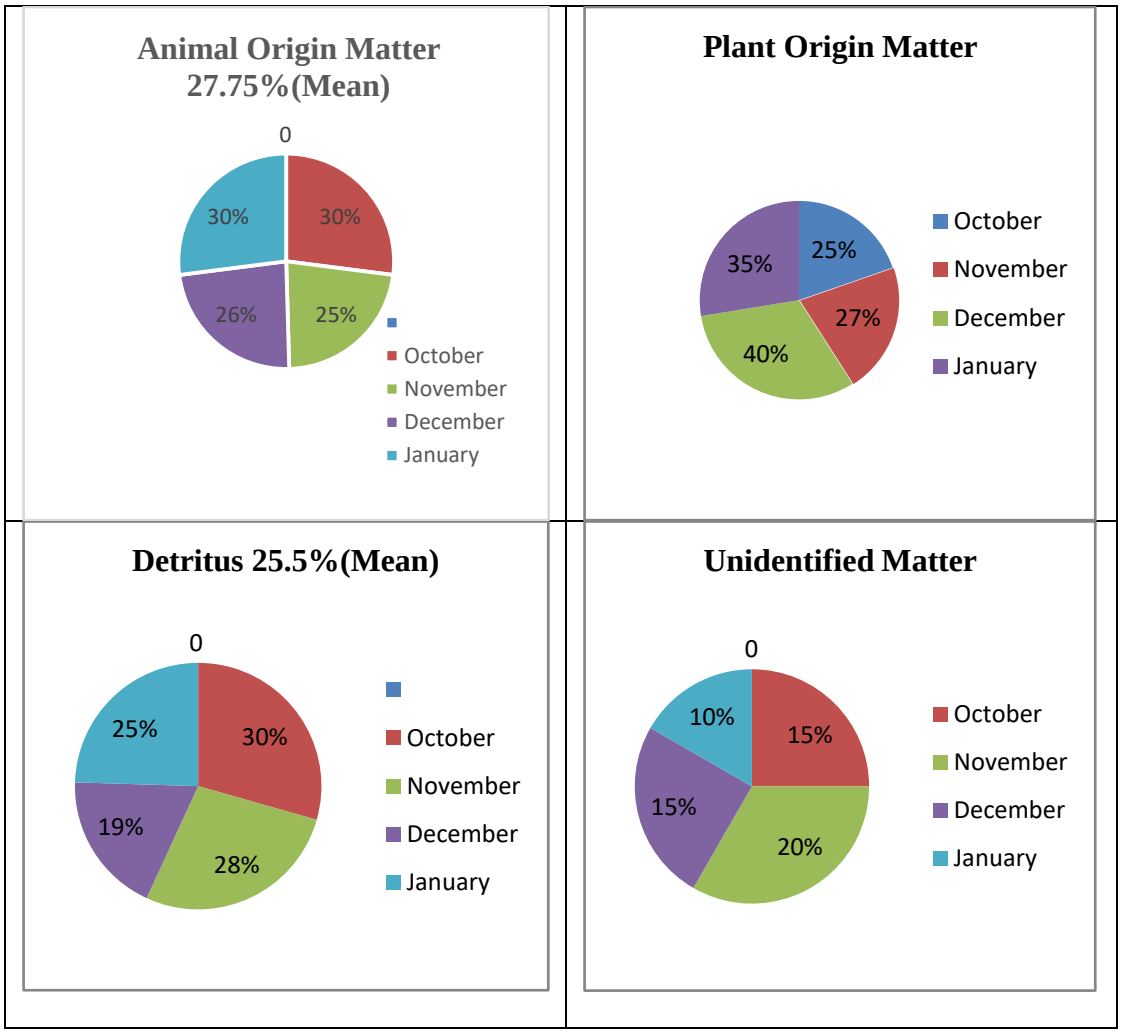
It was also observed that fish can digest the internal matter of Zooplanktons and outer Calcareous shell was undigested. During the study period approximate mean percentage value of animal origin matter was found to be 27.75%. The animal origin matter was observed 30% in the month of October. In November it was of 25%. In December in 26% and in January it was about 30 %. The plant origin matter is majorly consisting of Algae, Diatoms and Aquatic plant. The approximate mean percentage value of plant origin matter was found to be 31.75%, the highest amount of plant matter were also reported by **Manon and Hossain (2011).** The highest percentage of plant origin matter was found in the month December and the lowest values were recorded in the month of October. Nearly constant values of detritus were reported during the present study. The average value of detritus was found to be 25.5 % it suggests that the *Cyprinus carpio* is consistently feeds on the detritus, the highest reporting of detritus feeding of *Cyprinus carpio* which was 45.25%, were reported by **Shafi *et al.*, (2012).** Detritus, insects and macrophytes were the dominant food categories occurring in the gut content of cypernuscarpio were also reported by **Dadebo *et al.*, (2015),** the Zooplanktonic *(Cladocera, Copepoda, Ostracoda, Rotifera), benthic (Diptera, Gastropoda) and* phythoplanktonic *(Euglenophyta, Cyanophyta, Pyrrophyta, Chlorophyta)* organisms, plant residues and detritus in the digestive tract of the fish *cyprinus* were also observed by **Gul *et al.* in (2010)**.The mixed type diet confirms that the fish is been omnivores in feeding habit this type of results supported by the same findings of **Shukla and Patel (2013).**Near about 15 percent matter was unidentified; it may have digestive juices and sticky material. On the basis of these kind of finding it can concluded that *cyprinus carpio* is to be fit for polycultuer type of fishery practice which means, the *cyprinus carpio* can gives an extra benefit to fish farmers because it does not compete for food with indian major carp.

Month	Plant Origin Matter 31.75%(Mean)	Animal Origin Matter 27.75%(Mean)	Detritus 25.5%(Mean)	Unidentified Matter 15%(Mean)
October	25%	30%	30%	15%
November	27%	25%	28%	20%
December	40%	26%	19%	15%
January	35%	30%	25%	10%

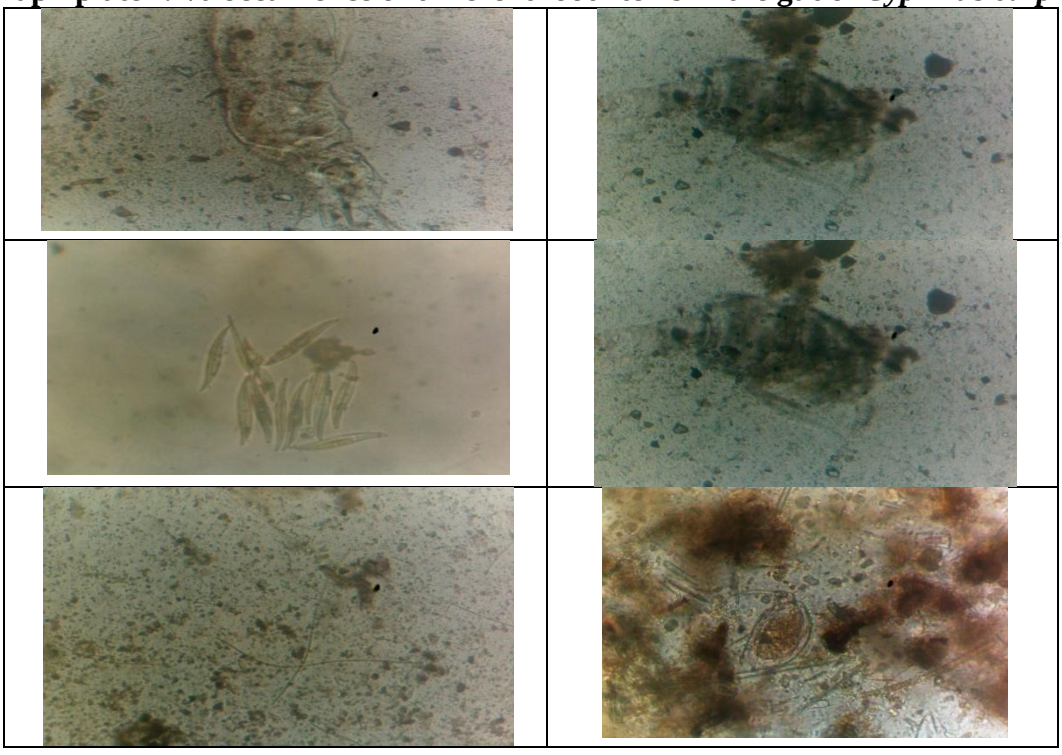
Table I: Percentage occurrence of different food items in the gut of *Cyprinus carpio.*

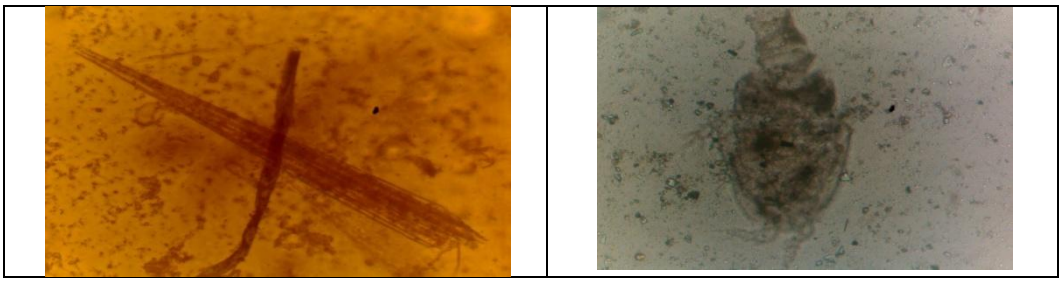
Month	No. of fish examined	Full filled gut	Semi filled gut	Empty gut
October	15	53.34%	20%	26.66%
November	13	46.15%	23%	30.70%
December	12	58.33%	16.66%	25%
January	10	60%	20%	20%

Table II: Gut content of *Cyprinus carpio.*



Graph plate I: % occurrence of different food items in the gut of *Cyprinus carpio*.





Photoplate II: Gut content of fish *Cyprinous carpio*

References:

1. **Afrah A., and M. A. Awady (2013):** Food habitat of common carp (*cyprinus carpio* l. 1758) in main outfall Drain , Al Nassiriya, Iraq, Thi-qar university. 3(4): 9-17.
2. **Cristian O., Coroian C.O., Vioara M.V., Daniel I., Cocan D.I., Razvan D.,Vaţu R.D., Răducu C. M. and A. Coroian (2015):**Growth performance of common carp (*Cyprinu scarpio* L.) fingerlings fed with various protein levels. AACL bioflux .8 (6): 1-15.
3. **Dadebo E., Eyayu A., Sorsa S. and G. Tilahun (2015):** Food and Feeding Habits of the Common Carp (*Cyprinus carpio* L. 1758) (Pisces: Cyprinidae) in Lake Koka, Ethiopia, *Momona Ethiopian Journal of Science (MEJS)*. 7 (1): 16-31.
4. **Farag M. M., Wally Y. R., Daghash S. M. and A. M. Ibrahim (2013):** Some gross morphological studies on the internal anatomy of the scaled common carp fish (*Cyprinus carpio*) in Egypt, Faculty of Veterinary Medicine, Cairo Univer-sity. 7(1): 15 – 29.
5. **Gul A., Yilmaz M., Kuşçu A. And S. Benzer (2010):** Feeding Properties Of Common Carp (*Cyprinus carpio* L.1758) Living In Hirfanli Dam Lak *Kastamonu Education Journal*. 18 (2): 545 – 556.
6. **Mandol M. R., Rahman M., Nahar D. A., Ahamed F. M., Sarker A.A., Subba R. B. and Y. Hossain (2013):** Diet and Feeding Habits of *Cyprinus carpio* in Relation with Water Quality of Integrated Rice Fish Farming Ecosystem. Yeamin Hossain Our Nature.11 (2): 138-151.
7. **Manon M. R. And M. D. Hassian (2011):** Food and feeding habit of *Cyprinus carpio* var, Niamotpur degree colleg, Naogaon. 9 (2): 13-18.
8. **Nasir N.A. and Q. Hamed (2016):** Growth development of young common carp *Cyprinus carpio* through dietary sodium chloride supplementation, *Mesop. Environ*. 2 (2): 12-18.
9. **Shafi S., Bhat F. A., Yousuf A. R. and M. Parveen (2012):** Biology of *Cyprinus carpio* commun is from Dal Lake, Kashmir with reference to food and feeding habits, length-weight, and fecundity Dal of Kashmir, Srinagar, J & K, India. 11(1): 79-87.
10. **Shukla S. N. and V. Patel (2013):** Food and Feeding Behaviour of *Cyprinus Carpio* and their Gastrosomatic Index from Govindgarh Lake, Rewa (M.P.) India. Online international interdisciplinary *journal*. 3: 2249-9598.
11. **Siraj S., Masarat S., Bashir M., Gudoo M. Y. and M. F. Mir (2017):** Morphometeric characters of *Cyprinus carpio* collected from Dal Lake, Kashmir, India. *International journal of fauna and biological studies*. 4 (4): 08-11.
12. **Vajargah M. F. And A. Hedayati (2015):** Morphological variations of common carp (*Cyprinus carpio*) by fixation and preservation in 10% formalin. *Journal of coastal life medicine*. 3 (7): 518-519.
13. **Wakil U. B., Haruna A. B., Mohammed G. A., Ndirmbita W. L., Yachilla B. M. and M. U. Kumai (2014):** Examinations of the stomach contents of two fish species (*Clarias gariepinus* and *Oreo chromisniloticus*) in Lake Alau, North – Eastern Nigeria, *Agriculture, Forestry and Fisheries*. 3(5): 405-410.

IMPACT OF CLIMATE CHANGE ON INDIAN AGRICULTURE

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Abstract:

The climate change, as realized through trends of temperature rise and increased CO_2 concentration, is a major concern. In the recent past, the number of studies for assessing its impact on agriculture has increased. Crop growth models have been modified and tested for various important crops of this region under different climate change scenarios. But most of the results happen to be region specific and with certain assumptions. Accuracy in assessing the magnitude of the climate change on higher spatial and temporal resolution scale is the prime requirement for accurate estimates of the impact. The extent of inter- and intra-annual variability in climate happens to be large in this region, and the crops respond differentially to these changes. Understanding of this differential behaviour can aid in working out the impact of climate change. The vast genetic diversity in crops provides a platform to identify suitable thermal and drought tolerant cultivars for sustained productivity in the changed climate. Identification of suitable agronomic management practices can be a potential solution to optimize agricultural production in the changed climate. To have an overall assessment of soil health with the climate change, the possible alterations in soil physical, chemical and biological characters need to be looked into by also including land use and land cover change driving forces.

Introduction:

Climate is changing naturally at its own nature, since the beginning of the evolution of earth, 4–5 billion years ago, but presently, it has gained momentum due to inadvertent disturbances. These changes may culminate in adverse impact on human health and the biosphere on which we depend. The multi-faceted interactions among the humans, microbes and the rest of the biosphere, have started reflecting an increase in the concentration of greenhouse gases (GHGs) i.e. CO_2, CH_4 and N_2O, causing warming across the globe along with other cascading con-sequences in the form of shift in rainfall pattern, melting of ice, rise in sea level etc. The above multifarious interactions among atmospheric composition, climate change and human, plant and animal health need to be scrutinized and probable solutions to the undesirable changes may be sought.

Vulnerability is the degree to which a system is susceptible to, or unable to cope with adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed as well as the system's sensitivity and adaptive capacity. Vulnerability to climate change varies across regions, sectors, and social groups. Understanding the regional and local dimensions of vulnerability is essential to develop appropriate and targeted adaptation efforts. At the same time, such efforts must recognise that climate change impacts will not be felt in isolation, but in the context of multiple stresses. In particular, the dramatic economic and social changes associated with globalisation themselves present new risks as well as opportunities.

Indian Agriculture and Climate Change:

Agriculture sector alone represents 13 per cent of India's Gross National Product (GNP), plays a crucial role in the country's development and shall continue to occupy an important place in the national economy. It sustains the livelihood of nearly 70% of the population. It seems obvious that any significant change in climate on a global scale will impact local agriculture, and therefore affect the world's food supply. Considerable studies have been carried out to investigate how farming might be affected in the different regions. Several uncertainties limit the accuracy of current projections. One relates to the degree of temperature increase and its geo-graphic distribution. Another pertains to the concomitant changes likely to occur in the precipitation patterns that determine the water supply to the crops, and the evaporative demand imposed on the crops in carbon dioxide enriched atmosphere. The problems of predicting the future course of agriculture in

the changing world are compounded by the fundamental complexity of natural agricultural systems, and socio-economic systems governing the world food supply and demand. Many climatologists predict a significant global warning in the coming decades due to rising atmospheric carbon dioxide and other green house gases. As a consequence, major changes in the hydrological regimes have been also forecast to occur. Changes in the temperature, solar radiation, and precipitation will have an effect on crop productivity and livestock agriculture. Climate change will also have an economic impact on agriculture, including changes in farm profitability, prices, supply, demand, trade and regional comparative advantages. The magnitude and geographical distribution of such climate induced changes may affect our ability to expand the food production area as required to feed the burgeoning population of more than 10,000 million people projected for the middle of the next century.

Agriculture is sensitive to short-term changes in weather and to seasonal, annual and longer-term variations in climate.

The Impact of Climate Change on Agriculture:

1. Crop Productivity:

Increase in atmospheric carbon dioxide has a fertilization effect on crops with C_3 photosynthetic pathway and thus, promotes their growth and productivity. On the other hand, an increase in temperature, depending upon the current ambient temperature, can reduce crop duration, increase crop respiration, effect the survival and distributions of pest populations thus developing new equilibrium between crops and pests, hasten nutrient mineralisation in soils, decrease fertilizer use efficiency. Indirectly, there may be considerable effects on land use pattern due to availability of irrigation water, frequency and intensity of inter- and intra-seasonal droughts and floods, and availability of energy. All of these can have tremendous impact on agricultural production and hence, food security of any region.

Wheat growth simulator developed at IARI, New Delhi, has been extensively tested for different agro-environments. In past, it has been successfully used for the resource management, forecasting of wheat yields and climate variability related studies. A strong linear decline in wheat yield was noticed with the increase in January temperature. For every degree increase in mean temperature, grain yield decreased by 428 kg/ha. Inter-seasonal climatic variability analysis carried out through yield response of wheat indicated that impact of the variability was lowest for Kota and highest for Solapur. Inter-seasonal climatic variability has been characterized through growth and yield response under different production environments, which clearly indicate the use of crop model as an indicator of climatic variability/change.

2. Soil Productivity and Rainfall:

The most important process is the accelerated decomposition of organic matter, which releases the nutrients in short run, but may reduce the fertility in the long run. Soil temperature influences the rates at which organic matter decomposes, nutrients are released and taken up, and plant metabolic processes proceed. Chemical reactions, that affect soil minerals and organic matter, are strongly influenced by higher soil and water temperature. Soil productivity and nutrient cycling are, therefore, influenced by the amount and activity of soil microorganisms. Soil microorganisms fulfil two major functions, i.e. they act as agents of nutrient element transportation as well as store carbon and mineral nutrients (mainly N, P and S) in their own living biomass, acting as a liable reservoir for plant available nutrients with a fast turnover. The doubling of CO_2 increases plant biomass production, soil water use efficiency by the plants, and C/N ratios of plants. The changes in the C/N ratios of plant residues returned to the soil have impact on soil microbial processes and affect the production of trace gases Nitrogen and N_2O.

Results of the All India Co-ordinated Long-term Fertility Trials indicate that regions, having higher organic carbon content (>0.6%) in the beginning, showed a declining trend, whereas the regions with lower organic carbon content remained more or less static or slight increase in the organic carbon content was noticed in around 25 years. In general, Indian

agricultural soils are low in organic carbon con-tent, and for achieving higher agricultural production, we have to depend upon thefertilizers. The hypothesis of increased organic carbon degradation with temperature rise has to be linked with the crop intensity factor, which is significantly higher for India, where proportion of the small and marginal land holdings is increasing due to rapid growth in population with time.

The interaction of nitrogen, irrigation and seasonal climatic variability, particularly at low input of irrigation, has several implications. Under adequate moisture supply situation, like for Punjab and Haryana, the yield benefits are obtained up to higher nitrogen application, whereas in the regions of limited to moderate water supply situations, the increasing trends in yield are noted up to relatively lower values of nitrogen. At low levels of water availability, it is difficult to decide opti-mal levels of N fertilizer for maximizing yield returns in view of uncertainty of N response, which is strongly related to a good post monsoon rainfall received during crop growing period.

Analysis of the food grains production data for the last few decades reveals a tremendous increase in yield due to technological advancement, but it appears that impact of vagaries of monsoon has been large throughout the period. The annual food production showed an increasing trend, and the deviations around the technology trend line were significantly related to seasonal rainfall. But no definite trend is noticed in case of rabi season food production with the winter season's rainfall, as majority of the food production in this season comes from the irrigated areas.

Rainfall Changes in rainfall due to global climate change may affect the surface moisture availability, which becomes important for germination and crop stand establishment in the rain fed areas. Modifications in the surface and ground water availabilities with the rainfall change are difficult to be observed when the land use and land cover are so rapidly changing.

Farmers have several agronomic management options to face the situation of water scarcity, through choice of crops, cultivars, adoption of suitable irrigation, nutrient and pesticides application schedules.

Soils dominate the cycling of many atmospheric trace gases because of the highest abundance and diversity of microbes in them. Earlier, equilibrium used to exist between the sources and sinks of GHGs, but a shift in this equilibrium has started becoming evident as a consequence of human induced activities. In order to comprehend the shift of source – sink equilibrium, one need to understand the processes involved in generating the net flux (a function of production processes, consumption processes and gas transport) at the soil atmosphere interface.

3. Insects and Pests:

Incidence of pest and diseases is most severe in tropical regions due to favourable climate/weather conditions, multiple cropping and availability of alternate pests throughout the year. Therefore, in the south Asia, pests and diseases deleteriously affecting the crop yields are prevalent. Climate sectors are the causative agents in deter-mining the population fluctuations of pests. They influence plant disease establishment, progression and severity. In fact, a clear understanding of population dynamics, as influenced by a biotic and biotic parameters of environment, is of much help in pest forecasting and to formulate control measures.

Indicators of climate change can be a few of the crop species, rhythm/migratory behaviour of specific insects/birds, etc. The global warming may affect growth and development of all organisms including insect-pests themselves. Among all the Abiotic factors, temperature is the most important one affecting insect distribution and abundance in time and space, since these are cold-blooded animals. The insects cannot regulate their body temperature and thereby, ambient temperature influences their survival, growth, development and reproduction.

The swarms of locust produced in the Middle East usually fly eastward into Pakistan and India during summer season and they lay eggs during monsoon period. The swarms as a result of this breeding return during autumn to the area of winter rainfall, flying to all parts of India and influencing kharif crops. Changes in

rainfall, temperature and wind speed may influence the migratory behaviour of locust.

Diseases are often hurdles in increasing rice productivity. The rice blast, caused by Pyricularia grisea, is most prominent disease across the eco-systems. In the past, rice blast, brown spot and stem rot, were the serious diseases. Consequent to the adoption of high yielding varieties and associated agronomic practices during 1970's, diseases like bacterial leaf blight, sheath blight, sheath rot, tungro virus (transmitted by Nephotettix spp.) and bacterial leaf streak, have gained importance over the traditionally known diseases, especially stem rot and brown spot. False smut and discolouration of rice grain, caused by several fungi, have been of minor significance with occasional concern in certain regions only. While analyzing the effect of climatic variability and change on disease status, the interaction of land use and land cover change should also be taken into consideration.

Climate and weather selectively induce specific diseases to develop. The mono-cyclic diseases, such as stem rot, sheath rot and false smut, are less influenced by

4. Socio-Economic Aspects:

Socio-economic linkage is relatively complex, and needs to be linked through the bio-physical modifications associated with the climate change. Land use and land cover change in our country is changing rapidly due to several driving forces. Socio-economic aspects can be dealt in two ways, one working out the cost-benefit analysis for various climate change scenarios by using econometric-process models and the other, generating the socio-economic scenario of future which links with the cropping system model for further impact analysis.

World Bank report (1998) analyzed climate change effects on Indian agriculture, through annual net revenues, by using Ricardian method the three methodologies, as adopted in the study, found Indian Agriculture sensitive to warming. The analyses further showed year-to-year climate sensitivity to the system's response. The studies revealed that net revenues fall precipitously with warmer April's, but also sensitive to warmer January and July. Crop revenues increased with October temperatures. Net revenues were also sensitive to precipitation, but the effects were smaller and off-setting. A warming scenario of +2.0 $^{\circ}$C rises in mean temperature and a +7% increase in mean precipitation levels will create reduction in the net revenues, as revealed from the three approaches. The impact is differential on spatial and temporal scales. But the study seemed to be weak for linking with the biophysical aspects. Even then, this kind of study is a beginning of future plans of initiating the work in this regard.

5. Mitigation Options of Green House Gases Emission

The possible strategies for mitigating methane emission from rice cultivation can be made by altering water management, particularly promoting mid-season aeration by short-term drainage Organic amendments to flooded soils increase methane production and emission. However, application of fermented manure, like biogas slurry, reduces the emission. In addition, nitrification inhibitors have been shown to inhibit methane emission. Another mitigation option may be selection of low CH_4 emitting rice cultivars, as cultivars grown in similar conditions show pronounced variations in methane emission. Screening of rice cultivars with few unproductive tillers, small root system, high root oxidative activity and high harvest index are ideal for mitigating methane emission from rice fields.

Combined with a package of technologies, methane emission can best be reduced by (a) the practice of midseason drainage instead of continuous flooding, (b) direct crop establishment like dry seeded rice and (c) use of low C: N organic manure and biogas slurry.

Appropriate crop management practices, which lead to increase N use efficiency and yield, hold the key to reduce nitrous oxide emission. Application of nitrate (NO_3–N) fertilizers e.g. calcium ammonium nitrate (CAN), in crops with aerobic conditions and ammonium (NH_4–N) fertilizers e.g., ammonium sulphate, urea, in wetland crops also help reducing the nitrous oxide emission. Curtailing the nitrification process by the use of nitrification inhibitor may further decrease the N_2O emission from soil. There are some

plant-derived organics, such as neem oil and neem cake, which can also act as nitrification inhibitors. These are being experimented in fields to reduce the emission of nitrous oxide and increase the fertilizer use efficiency. Other biotical inhibitors, such as karanja seed extract, have been found to retard nitrification by 60–70%. The efficacy of various mitigation technologies, however, needs to be tested in farmers' fields. Moreover, such technologies need to be also assessed for non-target effects and economic feasibility.

5. Vulnerability and Adaptation Strategies:

There must be a clear understanding of vulnerable populations and regions, based on an assessment of the capacities to cope with climate variability and change. We are conscious that coping and adaptation strategies are not equally available to all affected populations. At the same time, it is important also to develop formal measures of vulnerability and their application to planning adaptation measures and strategies. The inter-disciplinary work involved requires various Ministries, Agencies and Expert Institutions to pool their resources, knowledge and information. We need to know much more about the factors influencing vulnerability and the aspects related to planning for adaptation. Our understanding in the area of vulnerability and adaptation tools needs to be mature and be refined so as to enhance their applicability.

India is particularly vulnerable to likely increase in the incidence of extreme events. The impacts of climate change could hinder development and progress in eradicating poverty and potentially aggravating social and environmental conditions. In the context of the current debate about climate change, it is necessary to show that the developing countries, like India, are taking considerable actions in terms of policies, programmes and projects. Technology transfer can speed up the modernization process and additional funds can accelerate government initiatives in energy conservation. However, policies for poverty alleviation must be on high priority.

An evergreen revolution is the pathway to sustainable advances in productivity per units of land, water and time without associated ecological or social harm. One of the weaknesses is mismatch between production and post-harvest technologies and between production and market demand, and the consequent need for the Government of India to undertake "trade relief" operations like cyclone, flood and drought relief. We can face the internal threats through integrated attention to regulation, education and social mobilization through Panchayat Raj institutions.

The Rural Knowledge Centres should provide computer aided and internet connected information services, so that farm families have timely and relevant meteorological, management and marketing information. Another area, which needs an urgent attention, is the restructuring of the State Land Use Boards in a manner that they are in a position to offer proactive advice to farm families on land use and cropping systems, based on likely monsoon behaviour, ecological efficiency and trends in prices and markets. Assured and remunerative marketing opportunities hold the key to sustaining farmers' interest in producing more.

Immediately, an action is needed to defend the productivity gains we have already made and to extend the same to the areas which have been bypassed by the farm revolution, particularly dry farming areas, and to make new gains through sustainable intensification, market – based farming systems diversification, and value addition to primary produce through agro-processing and agri-business.

Conclusion

The climate change, as realized through trends of temperature rise and increased CO_2 concentration, is a major concern. In the recent past, the number of studies for assessing its impact on agriculture has increased. Crop growth models have been modified and tested for various important crops of this region under different climate change scenarios. But most of the results happen to be region specific and with certain assumptions. Accuracy in assessing the magnitude of the climate change on higher spatial and temporal resolution scale is the prime requirement for accurate estimates of the impact. The extent of inter- and intra-annual variability in climate happens to be large in this region, and the crops respond

differentially to these changes. Understanding of this differential behaviour can aid in working out the impact of climate change. The vast genetic diversity in crops provides a platform to identify suitable thermal and drought tolerant cultivars for sustained productivity in the changed climate. Identification of suitable agronomic management practices can be a potential solution to optimize agricultural production in the changed climate. To have an overall assessment of soil health with the climate change, the possible alterations in soil physical, chemical and biological characters need to be looked into by also including land use and land cover change driving forces.

Intensive cultivation in our country has already started showing signs of yield stagnation in some parts of north-west India, raising the alarm of sustaining the yields by adoption of suitable agronomic management options. This concern has now to be viewed along with the climate change and its variability. Increased frequency of droughts and floods in this region, as anticipated in the climate change scenarios, caution us to identify suitable "no regrets and no risks" management options to face the situation. Crop simulation technique offers an opportunity to link the climate change with the other socio-economic and bio-physical aspects. These models can effectively work out the impact and also suggest suitable mitigation options to sustain the agricultural productivity.

References

1. Ramana Rao BV, Katyal JC, Bhalra PC (1994) Final Report on Indo-USAID-Sus-Project, CRIDA, Hyderabad, India
2. Rao BVR, Rao MR (1996.) Weather effects on pest. In: Abrol YP, Gadgil S, Pant GB (eds), Climate Variability and Agriculture, Narosa Publishing House, New Delhi, pp 281–296
3. Rodhe AL (1990) A comparison of the contribution of various gases to the greenhouse effect. Science 248:1217–1219
4. Abrol YP, Gadgil S (eds) (1999) Rice – in a Variable Climate. APC Publishing House, New Delhi, p 252
5. Aggarwal PK, Kalra N (1994) Analyzing the limitations set by climatic factors, genotype, water and nitrogen availability on productivity of wheat. II. Climatically potential yields and optimal management strategies. Field Crops Res 38:93–103
6. Aggarwal PK, Kalra N (1994) Analysing constraints limiting crop productivity; New opportunities using crop growth modeling. In: Deb DL (ed) Natural Resource Management for Sustainable Agriculture and Environment, Angkor Publishers (P) Ltd., New Delhi, pp 315–332
7. Aggarwal PK, Mall RK (2002) Climate change and rice yields in diverse agro-environments of India. II. Effect of uncertainties in scenarios and crop models on impact assessment. Clim Change 52:331–343
8. P Bhattacharya S, Mitra AP (1998) Greenhouse gas emissions in India for the base year 1990. Global Change 11:30–39
9. Chatterjee A (1998) Simulating the impact of increase in carbon dioxide and temperature on growth and yield of maize and sorghum. M.Sc Thesis, Division of Environmental Sciences, IARI, New Delhi
10. Parry M, Rosenzweig C, Iglesiasc A, Fischer G, Livermore M (1999) Climate change and world food security: A new assessment. Global Environ Change 99:51–67
11. Pathak H, Nedwell DB (2001) Strategies to reduce nitrous oxide emission from soil with fertilizer selection and nitrification inhibitor. Water Air Soil Pollute 129:217–228

THE ENVIRONMENT AND DEVELOPMENT

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Introduction:

During the last few decades, many experts have drawn attention to the close link between environment and development. The mad rush for industrial growth has, over the years led to environmental degradation on a large-scale accompanied by massive resource depletion. In their study The Limits to Growth published in 1972, D. H. Meadows, D. L. Meadows and R. Randers drew attention to the fact that there are a number of non-renewable resources whose present levels of consumption are such that the known reserves will be exhausted in not so distant future. Many later studies have also highlighted the danger of environmental degradation. Thus, the focus has now shifted to ***'environmental protection'.*** *According to the World Development Report 1992, environmental problems can undermine the goals of development in two ways: 'First environmental quality-water that is safe and plentiful and air that is healthy is itself part of the improvement in welfare that development attempts to bring. If the benefits from rising incomes are offset by the costs imposed on health and the quality of life by pollution, this cannot be called development. Second, environmental damage can undermine future productivity. Soils that are degraded, aquifers that are depleted. And ecosystems that are destroyed in the name of raising incomes today can jeopardize the prospects for earning income tomorrow. Therefore, environmental protection should form a part of any comprehensive programme of industrial development.*

Key Words: Environment, Development, Sustainable Development, Environment Protection.

OBJECTIVE OF THE STUDY:

The object of the present study is to address the following issues-

1. Why is environmental protection necessary for sustainable development?
2. Does Economic Growth lead to environmental degradation?
3. What policy measures have been adopted by the Government of India for Protection of environment?

Limitations:

The study is limited to the issues of the environment and development only.

RESEARCH METHODOLOGY:

Coverage of the study:

The present study covers the issues like sustainable development, environmental degradation, protection of environment and global concerns regarding environment.

Data Collection:-

This study is done with the maximum use of secondary data. Secondary information has been made available from published sources like; World Development Repot, library books, journals, newspapers magazines, government publication and reports of committee etc.

Findings of the Study:

A) Environmental Protection and Sustainable Development:

The term sustainable development first came into prominence in the World Conservation Strategy, presented in 1980 by the International Union for the Conservation of Nature and Natural Resources. It was defined clearly in the Brundtland Report Our Common Future (1987) in the following words: **"Sustainable development seeks to meet the needs and aspirations of the present without compromising the ability of future generations to meet their own needs".** Sustainable development can be achieved only if the environment is conserved and improved. Moreover, a development path is sustainable **"if and only if the stock of overall capital assets remains constant or rises over time"**

This implies keeping the stock of Natural Capital at least constant. More strictly, the requirement is for non-negative quality. In basic terms, the environment should not be degraded further but improvements would be welcome. This requires that, "the preservation or loss of valuable environmental resources should be factored into estimates of economic growth and human well-being. Alternatively, policymakers may set a goal of no net loss of environmental assets. In other words, if an

environmental resource is damaged or depleted in one area, a resource of equal or greater value should be regenerated elsewhere".

B) Growth and Environmental Degradation:

Human activity in general and the process of rapid industrialization in particular have been causing massive environmental damage all over the world. Environmental degradation or damage is frequently discussed under the following categories-

1. **Water Pollution and Water Scarcity:**

   Water quality has continued to deteriorate world over because of a number of factors. The most widespread contamination of water occurs from industrial waste. Where industry and mining are expanding, rivers become contaminated with toxic chemicals and with heavy metals such as lead and mercury. These pollutants are hard to remove from dinking water with standard purification facilities. Actually, water pollution is the most serious environmental problem for large number of people in developing countries who lack access to clean water and sanitation.

2. **Outdoor Urban Air Pollution:**

   There is substantial evidence from around the world that outdoor urban air pollution has significant negative impacts on public health and results in premature deaths, chronic bronchitis, and respiratory disorders. Particulate matter less than 10-micrometers officially called PM10, many times finer than a human hair is generally taken as the primary measure of air pollution.

3. **Indoor Air Pollution:**

   WHO (2002) estimates that 1.6 million people die each year globally due to indoor smoke from the use of traditional fuels in the home. The most common is incomplete combustion of fuels such as wood agricultural residues, animal dung, charcoal and in some countries, coal. The strongest link between indoor smoke and health are for lower respiratory infections, Chronic Obstructive Pulmonary Disease (COPD) and for cancer of the respiratory system.

4. **Solid and Hazardous Wastes:**

   Many cities generate more solid wastes than they can collect or dispose off. Even where provision for collection is satisfactory, safe disposal of collected wastes often remains a problem. In many developing countries, open dumping and uncontrolled landfilling are resorted to. Inadequate collection and unmanaged disposal present a number of problems for human health and productivity.

5. **Soil Degradation:**

   A study sponsored by United Nations Environment Programme (UNEP) in 1990 revealed that 1.2 billion hectares almost 11 per cent of the earth's vegetated surface underwent moderate or worse soil degradation over the Seventy Five year period 1945-2020 because of human activity. One of the chief forms of soil degradation is soil erosion.

6. **Rangeland Degradation:**

   Land use reported in India suggests that the main causes of rangeland degradation in India are irrational land use management practices leading to denudation of vegetation from rangelands, which exacerbated by intermittent droughts, has resulted in many pockets of desertification. World Bank study estimates the annual cost of rangeland degradation at Rs. 405 billion in 2010.

7. **Deforestation:**

   Forests are of immense value in protecting the environment. They provide a livelihood and cultural integrity for forest dwellers and a habitat for a wealth of plants and animals. They protect and enrich soils, provide natural regulation of the hydrologic cycle, affect local and regional climate through evaporation, influence watershed flows of surface and groundwater, and help to stabilize the global climate by sequestering carbon as they grow. Therefore, they play a useful role in preserving the

ecological and environmental balance and in maintaining the biodiversity and ecosystems.

8. Loss of Biodiversity:

"Biological Diversity a composite of genetic information, species, and ecosystems provides material wealth in the form of food, fibre, medicine and inputs into industrial processes. It supplies the raw material that may assist human communities to adapt to future and unforeseen environmental stresses. Furthermore, many people value sharing the earth with numerous other forms of life and want to bequeath this heritage to future generations.

9. Atmospheric Changes:

Indiscriminate industrialization, urbanization and environmental pollution are bringing about certain atmospheric changes which are likely to cause uncertain and irreversible hazards to future generations. Though complete knowledge regarding these hazards does not exist, the scientists have already drawn attention to two hazards- greenhouse effect and global warming, and ozone depletion.

C) Environment Policy in India:

The year 1972 is a landmark in the history of legislative action in India. In the wake of the Stockholm Conference, the National Committee on Environmental Planning and Coordination (NCEPC) was set up in 1972. This was the first institutional arrangement for formally addressing environmental concerns. The NCEPC was entrusted with the responsibility of reviewing environmental policies and programmes.

The environmental safeguard policies are framed by the Government of India (GOI) to reduce the risks due to impacts of development. These environmental safeguards have the potential to address key challenges such as biodiversity conservation, natural resource management and pollution abatement through specific policies that integrate environmental concerns into decision-making. The following are the environmental safeguards-

1. To monitor the possible environmental risks and the impacts of associated development intervention.
2. To define measures and processes to effectively manage risks and reduce negative impacts of development.
3. To prevent and mitigate excessive burden on people and their environment.

Safeguard Policies:

Since the enforcement of the Environment (protection) Act in 1986, the Government of India has launched programs for conservation of natural resources and biodiversity. However, the challenges have increased with rapid urbanization, industrialization and other destructive human activities leading to climate change. The following table shows the key environmental safeguard policies of India and their Aim.

Sr. No.	Name of Policy and Year	Aim/Target
01	National Water Policy 1987	To govern the planning and development of water resources and their optimum utilization.
02	National Forest Policy 1988	To maintain ecological balance and safeguarding the interest of tribals and forest-dependent people by involving them in timber production and other local livelihood opportunities.
03	National Conservation Strategy and Policy Statement on Environment and Development 1992	To regulate the utilization of natural resources through joint efforts of local communities and other stakholders by incorporating traditional knowledge for environmental protection.

04	**Policy Statement for the Abatement of Pollution, 1992**	To strengthen the environmental compliance and enforcement of pollution control norms in India through CPCB and SPCBs.
05	**National Population Policy 2000**	To achieve a stable population by 2045 through strategically managing the Total Fertility Rate (TFR).
06	**National Environment Policy, 2006**	To achieve sustainable development, by incorporating environmental consideration into the development process.
07	**National Agroforestry Policy 2014**	To increase sustainable agricultural production by combining tree farming with agriculture.

Conclusion:

The rapid changes in climate and increasing environmental destruction requires effective upgradation of the existing policies and revision of acts, such as the current Wildlife Act that neglects the conservation of marine ecosystems. The effective identification, monitoring and management of environmental risks such as pollution and water stress by CPCB (Central Pollution Control Board) and SPCBs (State Pollution Control Boards), will reduce carbon emission from industries, vehicles etc., and improve the capabilities of environmental norms. It will also ensure resilience from economic losses due to increasing extreme weather events in India. The Non - Governmental Organizations (NGO's) and Civil Society Organizations (CSO's) can strengthen the environmental safeguard system in India by monitoring and evaluating the impacts of these policies. Ecological sustainability should be placed at the centre of all planning, budgeting and programmes related to development, rather than being considered and externality or a formality for clearance purposes.

By making the safeguard policies and their implementation for environmental protection more stringent, India can boost its potential achievement of the following Sustainable Development Goals (SDGs) by 2030:

1. No Poverty.
2. Good Health and well-being.
3. Gender Equality.
4. Clean water and sanitation.
5. Affordable and Clean Energy.
6. Reduced Inequalities.
7. Sustainable Cities and Communities.
8. Responsible Consumption and Production.
9. Climate Action.
10. Life Below Water.
11. Life on Land.

GLOSSARY:

1. **COPD:** Chronic Obstructive Pulmonary Disease
2. **CPCB:** Central Pollution Control Board
3. **CSO's:** Civil Society Organizations
4. **GOI:** Government of India
5. **NGO's:** Non - Governmental Organizations
6. **NCEPC:** National Committee on Environmental Planning and Coordination
7. **SDG's:** Sustainable Development Goals
8. **SPCB:** State Pollution Control Boards
9. **TFR:** Total Fertility Rate
10. **UNEP:** United Nations Environment Programme
11. **WHO:** World Health Organization

References:

1. The Limits to Growth published in 1972, D. H. Meadows, D. L. Meadows and R. Randers.
2. World Development Report 1992.
3. Brundtland Report Our Common Future (1987).
4. World Conservation Strategy, presented in 1980 by the International Union for

the Conservation of Nature and Natural Resources.
5. Indian Economy: V. K. Puri and S. K. Misra- Himalaya Publishing House.
6. Indian Economy: Rudradatta and Sundaram - Himalaya Publishing House.

IMPACT OF E-WASTE ON ENVIRONMENT

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Introduction:

Today the topic Impact of E-waste on Environment is very important topic of the era because the day by day the electronic gadgets are increasing continuously with new advancement and old are becoming useless so it is converting into the garbage and it is the E-Waste of today's E-contents which is more dangerous for every sectors of economy. The government has taken the measures towards the hazardous Effect on everything by E-waste.

E-waste is not miner problem but it is more complicated menace as the E-tools manufacturing will be increased day by day and with the advancement the old E-tools will be useless so it convert into the E-waste so this continuous process will increase the E-waste more and more in whole country.

Objectives: -

1) Management of E-waste:-E-waste management means best use of these all wastages for betterment of mankind ,it may take various technique and process by which the E-waste can be used for betterment of society, by E-waste we can make the Electricity, E-waste can be utilized in road making also the recycling is another way of E-waste there is lot of use of E-waste which is designed to make with all utensils with second hand product as well as the regenerated product with cheap prices in India so it can be used in management of E-waste.

2) E-Waste Rules &Regulation:-The rules and regulation tells that E-waste is dangerous to the public health and it should not throw into the public spots as like water bodies rivers and water channels as well as open dustbin as it may contain hazardous chemicals and the metals that may be dangerous for the life of people or it may be explosive too and it may spread the diseases also in the society.

3) Disease Control:-The covid19 is the Such disease which is spread with the dust and the wastes of animals and it added by the E-waste the animals eat the small E-waste and with the animal waste the another compound created with their waste and in this way the diseases are spread among the society so The E-waste controls is the weapon for controlling the diseases spread.

4) Water, Air, pollution Control:-Today the pollution is the biggest problem of every country The E-waste probably spoil the water most because whatever it may be after all it goes at water channels or rivers or well or water bodies and pollute the waste, the fumes from the burning of E-waste and heating with the sun also evaporate the poisonous gases or fumes so it pollute the air with decrease the oxygen level in air and finishes the ozone layers which turn the global warming like situation.

5) E-waste and Soil: - Soil pollution is too much dangerous for the agriculture farmers the E-waste is created from plastics with chemicals ceramics as well as the silicon also which is insoluble so when the E-waste comes into contact with the soil or when public throws the E-waste on the public places or it comes on the farmers land with the natural manure then it remains as it is it does not convert into any manures but it convert soil into the unproductive and give farmers more loss.

Importance Impact of E-waste on Environment:-

1) Hazardous Waste Management:-By cause of E-waste the new concept of E-waste management is launched in India Specially the Hazardous Waste management The E-waste is

mostly dangerous and it specially written on the label also as on the price and in the invoice too so it clearly aware the people about the use the its harmless nature for use and health also it can be danger for life it can create the Itching as well as can create the allergy problems it can make vitilago also with the polluted water of E-waste the man can be mad or psycho.

2) Reuse Of plastic and Metals of E-waste:-The E-waste benefit is that it can be reuse with some repairs or using the spare parts or the new things from the E-waste can be made and in this way the E-waste be used for betterment of public life. The Metals from the E-waste also very important sometimes the bronze , silvers and other metal like aluminum may be retrieved from the E-waste which can be reused for making new things it can create the pots and rods and other utensils items from such used metals also.

3) Advancement Opportunity:-The E-waste is more important than the household wastages because E-waste brings the opportunity for new advancement and incarnation as well as the development of new product and in this way the newest opportunity comes for the industries to manufacture the new thing for the society with the fail of old or waste of old. So the E-waste always going on process with the small invention of new advancement or change the things may convert into the Waste and the industrialist get opportunity for manufacturing the new things.

4) Employment for Waste Business:-The city provide lot of employment for Waste employment the western country also send their ships for demolition into the India for scraps and wastes business most of the largest population are engaged into the garbage business in India and it gives them the better wage for it also, recycling work, reuse work, second hand tools making,mound making and recycle chairs making and other employment of handicraft if going on with the E-waste Today.

5) Electric Generation & Road Construction:-The Electricity and Road construction is an old concept of utilizing the E-waste but it is ;most useful the plastic materials burn more times than the coal and it may be used in the electricity generation the E-waste it at lot so it may give work to shredder also and to the construction business because the E-waste content such plastic material which cannot be reused for new thing s so it may be used for road construction which may be more durable than the normal road equipment.

Scope of Impact of E-waste on Environment:-

1) Recycling business Economy:-The Recycling business in India is flourishing day by day as the population increasing the every items increasing from household to every sector of country the plastics are used and mostly it's are electronics items use are increasing a lot so ultimately the E-waste us inevitable and now the recycling business started by the public with the advancement of the increase in E-waste in country .The recycling not only prepare new things but they Separate also hazardous chemical ,metals , materials, and oils from it and then make product using recycle procedure any way with recycling the waste management process takes place automatically.

2) Opportunity for by-Products:-The by-product is product of the E-waste as like the Shoes,slippers,threads,slates,chemicals,oils,she ets etc. are by product not these but lot of products are prepared from the by product management in this way the best use of waste management takes place The bye product business is provide new opportunity for new aspirants and give them the employment also.

3) Dispose Expenses Saved:-The recycling and reuse and Road construction use and electricity generation also saves the expenses of disposing the wastes in India it is ultimate tremendous headache that how to tackle with the problem of E-waste and another the E-waterdispose is another troublesome and expensive so generating the profit expenses comes forth for disposing it and so the all types of businesses relating to the E-waste are more beneficial for saving the disposing that for society betterment.

4) Scrape and Waste control in Company:-The Scape and waste controls in the company can reduce the cost of production and in this way the prices of the product becomes very affordable for public. Actually the companies are more takes efforts for getting more and more profit but neglect the wastes and scrapes and in this way the total cost increases with the waste product so the prices of the product goes up and in this way the selling of that product

make very less ultimately profit also remain less and less.

5) Preserve the Eco-system for next generation:-Preserving everything is another new problems today the culture the olds monuments the process of production the ;natural resources ingredients natural atmosphere the petrol water and water bodies and soils and forestry and animals and species and florafauna as well as natural habitats these all are needed to preserve for next generation for misuse and pollution and damage as well as the harm for it otherwise it may vanish from this earth and next generation will deprive from it.

Conclusion: -Any way the modern world has modern way of life and it would not change the modern age is age of computerization as well as electronics items worlds and Wolds as well as the technology are changing day by day so wastes are inevitable and it could not be stop better way to search the E-waste management techniques tools, planning and policy for handling it for betterment of society.

References:

1) Solid and Liquid waste management by, Rajaram on amezon.
2) Handbook of Research on Microbial tools for Environment waste management
3) Emerging and Approaches for waste management by Ram Naresh Bhargava
4) https://www.ncbi.nlm.nih.gov>pmc Google sites

THE PRINCIPLES OFTHE SUSTAINABLEDEVELOPMENT

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Abstract:

Sustainable Development is a popular and important concept, but one that is open to a variety of interpretations. Since the 1987 many researchers in universities, environmental organizations, think-tanks, national governments and international agencies have offered proposals for measuring sustainable development. A framework and tools the commitment to integrating the economic, social and environmental dimensions of sustainable development into public policy also presents specific challenges at every stage of the policy cycle. Policymakers must become adept at reconciling public and private interests.

There must be enhanced capacity in governments to coordinate policies in different domains. Capacity to engage a diversity of stakeholders will become more and more critical. Governments will require strengthened capacity to analyse and evaluate various policy options, based on economic, social and environmental criteria, as well as to monitor progress and policy impacts. Policymakers must be able to identify where the trade-offs between different dimensions of sustainable development occur, what the root causes are and then design policies that foster synergiesbetween the economic, social and environmental dimensions of sustainable development[2]. Broadly defined, sustainable development is a systems approach to growth and development and to manage natural, produced, and social capital for the welfare of their own and future generations.

Keywords: Meaning, Objectives & Strategy, Goals, Principles of Sustainable Development.

Introduction:

Since the 1987 many researchers in universities, environmental organizations, think-tanks, national governments and international agencies have offered proposals for measuring sustainable development. The wide variety of indicators in existing national and international policy-based sets testifies to the difficulty of the challenge. The concept of sustainable development was popularised as a normative goal by the World Commission on Environment and Development in their 1987 report to the General Assembly of the United Nations Our Common Future. Sustainable development has developed beyond the initial intergenerational framework to focus more on the goal of socially inclusive and environmentally sustainable economic growth.

Policymakers must be able to identify where the trade-offs between different dimensions of sustainable development occur, what the root causes are and then design policies that foster synergies between the economic, social and environmental dimensions of sustainable development. Broadly defined, sustainable development is a systems approach to growth and development and to manage natural, produced, and social capital for the welfare of their own and future generations.

Definition & Meaning of Sustainable Development:

There sustainable development was defined as a development that “meets the needs of the present without compromising the ability of future generations to meet their own needs”. This definition suggests the need to balance two concerns, one having to do with present (intra-generational) needs and the other having to do with future (inter-generational) needs.

In short, Sustainability can be defined as the practice of maintaining processes of productivity indefinitely natural or human made by replacing resources used with resources of equal or greater value without degrading or endangering natural biotic systems. Sustainable development ties together concern for the carrying capacity of natural systems with the social, political, and economic challenges faced by humanity. There is an additional focus on the present generations’ responsibility to regenerate, maintain and improve on earth resources for

use by future generations. The idea of limitation imposed by the state of technology and socially the environment's ability to meet present and future needs.

Objectives &Strategy for sustainable development:

The new approach has conceptualised in the term of sustainable development. Simply put, this means development, which is in harmony with environmental considerations[6]. The requirements listed by the document Our Common Future, of the World Commission on Environment and Development for pursuing sustainable development are;

1. A political system that services effective citizen participation in decision making.
2. An economic system that is able to generate surplus and technical knowledge on a self-reliant on sustainability basis.
3. A social system that provides for solutions for the tensions arising from disharmonious development.
4. A production system that respects the obligation to preserve the ecological base for development.
5. A technical system that can search continuously for new solutions.
6. An international system that fosters sustainable patterns of trade and finance and finally.
7. An administrative system that is flexible and has the capacity for self-correction.

Goals of Sustainability

The sustainable development professional network thinks acts and works globally. In 2012, the United Nations Conference on Sustainable Development met to discuss and develop a set of goals to work towards; they grew out of the Millennium Development Goals (MDG) that claimed success in reducing global poverty while acknowledging there was still much more to do. The SDG eventually came up with a list of 17 items which included amongst other things:

1. The end of poverty and hunger.
2. Better standards of education and healthcare.
3. To achieve gender equality.
4. Sustainable economic growth while promoting jobs and stronger economies.
5. All of the above and more while tackling the effects of climate change, pollution and other environmental factors that can harm and do harm people's health, livelihoods and lives.
6. Sustainability to include health of the land, air and sea.

Finally, it acknowledged the concept of nature having certain rights - that people have stewardship of the world and the importance of putting people at the forefront of solving the above global issues through management of the environment and of consumption. (For example, reducing packaging and discouraging food waste as well as promoting the use of recyclable materials)

Principles of Sustainable Development:

Following are the principles of Sustainable Development[10]:

1. Holistic Development: Considering all the biotic and a biotic material while planning for development. It should have holistic View.
2. Development within the boundary of environment: Equilibrium among various eco-systems can resist only to certain amount of pressure in form of natural resource use, ill atmospheric composition, over exploitation of any components and so on. Thus, prior to going for exploitation of natural resources, do have adequate knowledge about composition and interrelation between and among the constituent factors of environment.
3. Development within socio-cultural and traditional knowledge base: In the era of scientific revolution, the world of social value, norms and traditional knowledge cannot be denied by saying that it became out dated because these are irrational. Now the question is if these were irrational than why the innovators took these as base for innovations? Why so-called scientific innovations have created various hazards?
4. Enhance quality of life: Not only human life but life of other living macro and microorganism because they contribute according to their capacity for balanced growth of environment.
5. Promote collectiveness: In third world countries where the number of working hands are comparatively more, are greatly affected by the automation and use of highly sophisticated!

Equipments devoiced the so much energy to be waste. Thus the development strategies should enumerate the facts and do plan for promotion of work for all.

6. Needs of the future generation: Development should not be at the expense of forthcoming generation. Here the share fairly and care' need to be materialized. All the benefits and costs incurred in resources use and management must be equitably distributed among poor and affluent, concerned and non-concerned and among various subgroups and communities. Therefore, this principle leads us towards socially just and equitable distribution of benefits and costs.

7. Global diversity: Conservation based development needs to include deliberate action to protect and maintain the global diversity keeping in view the sale of extinction of various animal and plant species, immediate action should be taken at the earliest.

8. People's participation and empowering to manage their surrounding and natural resources: Development should encourage people's participation and make them capable to manage their resources.

9. Based on national policy and needs: All developmental efforts should be in line with the National policies and needs.

10. Least energy and judicious use of resources: Development should consume least energy and should promote judicious use of resources.

Most of the guiding principles indicated above have been formulated on the basis of principles for sustainable living discussed in joint publication of IUCH / UNEP / and WWF (1991) Caring for the earth: A strategy for sustainable living, However, there is a need to follow certain code of conduct for achieving sustainable development.

The Three Pillars of Sustainability:

In 2005, the World Summit on Social Development identified three core areas that contribute to the philosophy and social science of sustainable development. These “pillars” in many national standards and certification schemes, form the backbone of tackling the core areas that the world now faces.

Economic Development:

The Economic Perspective, from the point of view of neoclassical economic theory, sustainability can be defined in terms of the maximization of welfare over time. (This is assumed to be human welfare; we will introduce the claims of the non-human world when we consider the ecological perspective.) Most economists simplify further by identifying the maximization of welfare with the maximization of utility derived from consumption. While this may be criticized as an oversimplification, it certainly includes many important elements of human welfare (food, clothing, housing, transportation, health and education services, etc.) and it has the analytical advantage of reducing the problem to a measurable single-dimensional indicator.

A formal economic analysis then raises the question of whether sustainability has any validity as an economic concept. According to standard economic theory, efficient resource allocation should have the effect of maximizing utility from consumption. If we accept the use of time discounting as a method of comparing the economic values of consumption in different time periods, then sustainability appears to mean nothing more than efficient resource allocation – a concept already well established in economics.Markets may be valuable and essential means, but they cannot determine the ends, which must be arrived at by a social decision process informed by different disciplinary viewpoints.

This is the issue that proves the most problematic as most people disagree on political ideology. What is and is not economically sound, and how it will affect businesses and by extension, jobs and employability. It is also about providing incentives for businesses and other organisations to adhere to sustainability guidelines beyond their normal legislative requirements. Also, to encourage and foster incentives for the average person to do their bit where and when they can; one person can rarely achieve much, but taken as a group, effects in some areas are cumulative. The supply and demand market is consumerist in nature and modern life requires a lot of resources every single day; for the sake of the environment, getting what we consume under

control is the paramount issue. Economic development is about giving people what they want without compromising quality of life, especially in the developing world, and reducing the financial burden and "red tape" of doing the right thing.

Social Development:

The Social Perspective, Recognize the social component of development as an essential part of the new paradigm. In doing so, they are validating the importance of a much older perspective. A human development approach emphasizing issues of basic needs and equity is well grounded in the history of economic theory. The HDI combines life expectancy, adult literacy, and school enrolment ratios with per capita GDP in a weighted average to get an index between 0 and 1. The results clearly show that development is a multidimensional process, and that higher GDP does not necessarily mean higher overall welfare.

There are many facets to this pillar. Most importantly is awareness of and legislation protection of the health of people from pollution and other harmful activities of business and other organisations. In the rest of the developed world, there are strong checks and programmes of legislation in place to ensure that people's health and wellness is strongly protected. It is also about maintaining access to basic resources without compromising the quality of life. The biggest hot topic for many people right now is sustainable housing and how we can better build the homes we live in from sustainable material. The final element is education - encouraging people to participate in environmental sustainability and teaching them about the effects of environmental protection as well as warning of the dangers if we cannot achieve our goals.

Environmental Protection:

Unlike The Ecological Perspectives of economists, whose models provide no upper bound on economic growth, physical scientists and ecologists are accustomed to the idea of limits. Natural systems must exist subject to the unyielding laws of thermodynamics, and the science of population ecology has explored the implications of these laws for living organisms. The importance of the ecological perspective is increasingly evident, as more of the critical problems facing humanity arise from failures of ecological resilience. The environmental dimension of the sustainable development is necessary for the continuation of the living life on the earth. Therefore, all countries in the World should follow a particular environmental policy. However, in this matter people should also be informed. Peoples' fulfilling of their responsibilities leads to a good deal of development by which the natural life is affected positively like decreasing of energy consumption and preventing environmental pollution. The thing, which is necessary for peoples' awareness is, to provide them as citizens who are environmentally aware, active and participant about environment beginning from primary school.

A Synthesis of Perspectives:

Let us briefly review some of the main themes developed thus far:

1. The original idea of development was based on a straight-line progression from traditional to modernmass-consumption society. Within this framework, a tension developed between the promotion of economic growth and the equitable provision of basic needs.Development as it has proceeded over the last half-century has remained inequitable, and has had growing negative environmental impacts.
2. A concept of sustainable development must remedy social inequities and environmental damage, while maintaining a sound economic base.
3. The conservation of natural capital is essential for sustainable economic production and intergenerational equity. Market mechanisms do not operate effectively to conserve natural capital, but tend to deplete and degrade it.
4. From an ecological perspective, both population and total resource demand must be limited in scale and the integrity of ecosystems and diversity of species must be maintained.
5. Social equity, the fulfilment of basic health and educational needs, and participatory democracy are crucial elements of development, and are interrelated with environmental sustainability.

Taken together, these principles clearly suggest new guidelines for the development process. They also require a modification of the original goal of economic growth. Economic growth, especially for those are lack of essentials, is clearly needed, but must be subject to global limits and should not be the prime objective for countries already at high levels of consumption. In pursuing these modified development goals, it will be necessary to recognize the limits of the market mechanism.

Need for Policies Integration:

The work of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) emphasizes the need for four normative shifts in policy to promote integration.

1. The basic conditions of social justice and ecological sustainability must become fundamental policy objectives rather than marginal objectives.
2. There must be a shift from a predominantly short-term policy horizon to one that seeks long-term benefits for all.
3. A focus on gross domestic product (GDP) as a measure of progress should be replaced by metrics that encompass the three dimensions of sustainable development.
4. Public policy must recognize that the resources of the planet are not limitless and that resources constraints cannot always be addressed by technology.

Conclusion:

A framework and tools the commitment to integrating the economic, social and environmental dimensions of sustainable development into public policy also presents specific challenges at every stage of the policy cycle. Policymakers must become adept at reconciling public and private interests. There must be enhanced capacity in governments to coordinate policies in different domains. Capacity to engage a diversity of stakeholders will become more and more critical. Governments will require strengthened capacity to analyse and evaluate various policy options, based on economic, social and environmental criteria, as well as to monitor progress and policy impacts. Policy frameworks must now achieve multiple objectives to support the needed shifts in policy stance, reshape market and other incentives, lengthen the time horizons and reduce policy uncertainty so that investments in people and the planet can work in tandem to drive a virtuous cycle of growth that continually invests in, rather than exploits, the basis for shared prosperity within the planetary limits. Policymakers must be able to identify where the trade-offs between different dimensions of sustainable development occur, what the root causes are and then design policies that foster synergies between the economic, social and environmental dimensions of sustainable development. Making these shifts in policy stance operational presents significant challenges to policymakers. They require reformed institutional frameworks, strengthened capacities, high-level political commitment and an inclusive and integrated vision of a sustainable future.

References:

1. Agrawal, A. and Narain, S. (1989): Towards Green Village: A strategy for environmentally sound, Participatory Rural Development, Published by Centre for Science and Environment, New Delhi.pp.342.
2. Bandhu, D., Singh, H. and Maitra, A.K. (1990): Environmental Education and Sustainable Development [ed.], Proceedings of the Third International Conference on environmental Education, Indian Environment Society, New Delhi, pp. 5-9, 2329, 61- 67. .
3. Barroso, J. M. (2007), Beyond GDP: Opening Speech, speech at the International conference on beyond GSP: Measuring progress, true wealth and the well-being of nations, Brussels, 19 November, pp. 6.
4. Base, A.K. (1995): Technology for Sustainable Development, Paper presented in National training on

sustainable Development; organised by NCDC, Varanasi from I-13th April, 1995. Pp. 288.

5. Batanouny, K.H. (1990): Problems of Environmental Education for sustainable Development in the Developing Countries, In the book 'Environmental Education and Sustainable Development' edited by DeshBandhu, Hrjit Singh and A.K. Maitra, published by Indian Environmental Society, New Delhi, pp. 23-29.
6. Caldwell, L.K. (1991): Population, Resources, Energy and Development, International Environmental Policy: Emergence and Dimensions; East-West Press Edition, 1991, New Delhi, pp. 168-210.
7. FAO (1992): Sustainable Development and the Environment: FAO Policies and Actions, FAO publication, Rome pp. 7-8.
8. 8. Jager, J., and others (2007). GEO Resource Book: A Training Manual on Integrated Environmental Assessment and Reporting. Nairobi, United Nations, pp.4.
9. Jalal, K.f. (1990): Environmental education of Sustainable Development: role of ESCAP. In the book Environmental Education and sustainable Development edited by D. Bandhu, H. Singh and A.K. Maitra, published by Indian Environmental Society, New Delhi, pp. 23-29.
10. Jodha, N.S., banakota, M. and Pratap, T. (1990): Strategies for Sustainable Development of Mountain Agriculture: An Overview' Sustainable Mountain Agriculture: Perspectives and Issues [ed.] International Centre for Integrated Mountain Development, Kathmandu~ Oxford and Nph Publishing Co. Pvt. Ltd. New Delhi, pp. 30.

SOCIO-ECONOMIC AND ENVIRONMENTAL ASPECTS OF SUSTAINABLE DEVELOPMENT

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Abstract

Different environmental problems are experienced by the society due to negligence and unplanned development. The socio-economic aspects are closely linked to different environmental problems along with the legal aspects. The sustainable development has a new approach in context of growing industrialization, modernization and rapid development. The concept of sustainable development is often discussed on with reference to growing environmental problems. There are few legal provisions to achieve sustainable development to maintain the balance between different environmental problems and their remedial solutions.

In the present paper the concept of sustainable development has been discussed in context of environmental and social issues, economic considerations with the legislative aspects. The legal provisions affecting the socio-economic status of businesses leading to the environmental protection and nature conservation have been discussed.

Key Words: Concept of Sustainable Development, Environmental protection, Economic Aspects, Social Aspects, Environmental Aspects, and Legal aspects of Sustainable Development,

Introduction:

The development of any nation depends on many factors, environmental and geographical factors are the prime among them. The natural environmental affects the people and their wellbeing in their way of living. With the development of science and technology, man has emerged as the most successful and dominant animal on the earth. Today, we can predict, understand, explore and interpret the natural process where we live. Several environmental problems are experienced at different levels of society due to negligence and unplanned developmental activities. Our interference in the environment has become increasing detrimental to many life forms including ourselves. Sustainable living is the only alternative to control such adverse impacts and protect ourselves. The successful management of resources for development to satisfy our changing needs while maintaining or enhancing the ability of environment and conserving the natural resources is called sustainable development. The sustainable development is a new approach to the growing industrialization, modernization and the process of rapid development

Concept of Sustainable Development:

The term ‘development’ is nothing but a process or set of activities initiated for enhancing the quality of human life. The development is aimed at enhancing economic status and providing social security and is invariability connected with the exploration and exploitation of living and nonliving resources. These processes or activities cause impact on the environment, economy and the social structure1. Therefore, the process of sustainable development should be viewed as interplay between economy and social structure with reference to environment.

The sustainable development is defined by C.H.Ward as ‘The Development which mean the needs of present generation without foreclosing the needs and options of future generations.’ Similar definition is given by Brundtland2,3. He defines it as ‘Sustainable development is development that meets the needs of the present without compromising the needs of future generations to meet their own needs.’

In most of the times the terms sustainable development, sustainable growth and sustainable use are used interchangeably. But, the meaning of these terms is not the same. Sustainable growth is a contradictory term. Nothing physical can grow indefinitely. Sustainable use can be only applied to the renewable resources. Sustainable development refers to the improvement in the quality of human life whilst living within the carrying

capacity of the ecosystems. The sustainable development involves devising a social and economic system, which ensures the real income rise, increase in educational standard, improvement in the health of nation and advancement in the quality of life.

Brief History of Sustainable Development:

There are a few landmarks in the history of sustainable development. Many of them are in the forms of events, publications and episodes. These are more from 1960 onwards. The report on 'limits to growth' prepared by the Club of Rome is the first authentic document. The report touched upon several aspects including demographic pressure, economic growth, industrialization and environmental pollution. It had immense and provocative impact on several decision makers, resource users and developers.

In 1962 Rachel Carson wrote a book 'Silent Spring' in which he urged the people to decide whether they wish continue on the developmental road without any obligations or by rightful manner. It was thought provoking to all the scientists, planners and decision makers. The Organization of African Unity in 1969 stressed onthe need to achieve the highest sustainable quality of life and prefer the conservation practices.

First United Nations Conference on the Human Environment held in Stockholm in 1972 was a second major milestone. It stressed on the healthy and productive environment while focusing on the links between economic development and environmental problems. The World Conservation Strategy initiated and published in 1980 by UNEP (United Nations Environment Program), WWF (World Wide Fund for Nature) and IUCN (International Union for Conservation of Nature) focused on the interdependence of conservation and development. The Brundtland report entitled 'Our Common Future' published in 1987 by the World Commission on Environment and Development gave the most comprehensive definition of sustainable development. The report emphasized that the objective of development should be to ensure the satisfaction of human needs and aspirations of material kind. The dimensions of sustainable development were much discussed with due importance in Earth Summit held in Rio de Janeiro in 1992 and the progress in the field of development and environmental protection was assessed in 1997 in New York. The Johannesburg Conference as Rio+10 held at Johannesburg, South Africa during September 2002 reported the success stories and status report on sustainable development of participating countries. It suggested for priority attention to the conditions which pose severe threats to the sustainable development.

Social Aspects:

Local people and their communities play very important role in sustainable development. Social concerns of these people vary with geographical, environmental and economic conditions and status. The social issues of a region can be social concern of another. Following are the major social dimensions of sustainable development.

1. Workers health and Safety: The developmental process depends upon the production of goods by the workers. Health and safety of workers plays important role in producing quality goods. The workers are major elements in the production processes. Therefore, proper safety measures to insure the health of workers are essential. Workers should have access to adequate training for the augmentation of environmental awareness to ensure their safety while achieving economic welfare.
2. Impact on quality of life: The local community is much influenced or affected by the unplanned development. Their quality of life deteriorates. This needs to be avoided. The impact on local communities should be reduced and quality of life should be improved with the process of development.
3. Benefits to disadvantaged groups: In the social structure, many disable are to survive. The development overlooks these disabled. There are a few social groups which disadvantaged by developmental activities. These groups and disabled individuals are neglected, these should be benefited.

Economic Ascepts:

The allocation of limited resources based on needs of the society decides the economic system of that society. Selling, buying, or the other activities related to goods

or services at local, regional and international level are economic activities. These are closely related to sustainable development. The sustainable economic growth of the country depends on the economic goals, social goals and environmental goals, policies and strategies. Following are major economic dimensions of sustainable development.

1. Creation of new markets: If any new product is developed, no existing market promotes it. The traditionally available network of sailing and purchasing the goods is dominant. The new markets and market strategies should be emerged to promote the environment friendly and renewable resources based products which are concerned with the sustainable development.

2. Creation of new opportunities: The new markets can create new opportunities for sales growth. These new opportunities generate interest in the new products and promote the sustainable growth of the business.

3. Creation of additional value: The marketed products are accepted by the society only if these have some additional value in terms of its quality or utility. Therefore, products of additional value should be produced. The additional value may attract the attention of people and generate interest. This interest will help in improving the economic status of society and the sustainable businesses.

Environmental Aspects:

1. Waste reduction: Production of any material goods needs raw material and part of it is wasted. This waste is generally dumped into the natural environment in fully treated or partially treated or untreated form. This waste is a burden on the environment. The production processes which have least waste production should be preferred so as to reduce the burden of waste. Minimum wastage amounts to maximum material conversion efficiency in the form of raw material to finished or useful material. Besides, it is one way to conserve this material for the future generation, as expected in the concept of sustainable of development.

2. Impact reduction: There are number of materials and wastes dumped into the nature daily. These wastes cause adverse impacts on to the natural environment as well as on the human health. The means and ways that have least impacts should be preferred and the adversed impacts on the human health should be minimized for the sustainability of development.

3. Use of renewable raw materials: Non-renewable material are limited in their stocks. These stocks go on reducing and can exhaust with time. Instead of these, if renewable raw materials are used, supply of these materials will last for indefinite period and scarcity of material will not beexperienced. Therefore, the developmental process will sustain in a long run of time.

4. Elimination of toxic substances: Many toxic wastes get mixed into the environment during various processes and pose threat to the natural ecosystems and human health. Many toxicants are cancerous in nature and have deleterious effects. To the possible extent, these wastes should be detoxified and removed to ensure the cleanliness and healthy ecosystems. Otherwise, with the growth of developmental activities, the toxic substances will get accumulated into the environment making these activities or development non- sustainable.

5. Minimum exploitation of resources: Less use of any resource is an indirect way of resource conservation. There will be least load on the resource stock. Because, the part of resource not used is available for the future. This exploitation is based on actual need and hence leads to less wastage and efficient use. It ensures cleanliness with minimum wastage. The development can sustain for longer period due to availability of this resource.

6. Ecological balance: The developmental activities or processes which have least or no adverse impacts sustain for longer period and help in keeping the ecosystems balanced. Ecological balance is very essential for the human survival as well as for the existence of all life forms on the earth. Ecological balance insures the health of human being.

Legal Aspects:

The concept of sustainable development is balancing concept based of several legal principles. These principles include the Precautionary Principle, Polluter Pay Principle, Principle of Intergeneration equality and Doctrine of Trust Ownership. These principles impose responsibility of

environmental problems on the shoulders polluters. These principles are generalized in the forms of rights and responsibilities in the report of Brudtnland commission. There are several rights and responsibilities on the shoulders of human being for the protection of environment while adopting the developmental strategy4,5,6.

1. Fundamental Rights: Survival in healthy nature is a fundamental right of every organism. This right is protected by the sustainable development. The human being can exercise his rights in healthy environment. Human society has not become immune to the surrounding environmental degradation that deteriorates living standard. Fresh air, fresh water and healthy nature are fundamental rights of every human being. Development benefits the rich community in the human society and violates the human rights of poor people. It can be avoided and a balance can be achieved with sustainable development.

2. Intergeneration equality is achieved: Concept of ownership developed with the technical development in the civil society. This revolution gave rise to increase human greed. The overexploitation is resulting into inequality between generations. Sustainable development achieves intergeneration Equality. The natural resources are conserved and use of environment is made available for the benefit of present and our future generations.

3. Conservation and Sustainability: Conservation and sustainable use is assured in the general principles suggested by Brundtland Commission. Maintenance of ecosystems and ecological processes for the functioning of biosphere help in preserving the biological diversity and give rise to sustainable yield. Conservation and sustainability both go hand in hand.

4. Environmental Standards: The concepts of sustainable development call for maintaining the quality of environment. To measure and ensure the quality of environment, different environmental standards are developed. These standards monitor the environmental situation and help to maintain ecological balance. These standards monitor the changes in the environment to ensure environmental quality and need based resource use.

5. Environmental Assessment: Every business deteriorates more or less the quality of environment by discharging various solid, liquid or gaseous pollutants. Prior environmental impact assessment helps to take adequate measure to minimize such impacts. Periodical environmental impact assessment helps to monitor the situation. The sustainable development includes these assessments.

6. Prior notification and legal process: The sustainable development requires prior information by the governments in a manner as to ensure safety measures to avoid adverse impacts. Prior notification informs timely to all persons members of the society who are likely to get affected by any planned activity and ensures the right to access for administrative as well as judicial proceedings in respect of all matters.

Reference:

1. Joseph, K. and R. Nagendran (2004) Essentials of Environmental Studies, Pearson Education P. Ltd., Delhi.

2.http: // www.bcua.org

3.Brundtland (1987) Our Common Future, international report by the World Commission on Environment and Development (WCED), Washington D.C.

4.Chitnis, V. (2004) Sustainable Development, Ensym, Vol. No. II & III, pp. 32-38.

5.Diwan, S. and A. Rosencranz (2001) Environmental law and policy, Ashish pub. New Delhi.

6.Vashisht, V. (1999) Law and practice of environmental laws in India, Bharat Law House, New Delhi.

"ACHIEVING SUSTAINABLE DEVELOPMENT THROUGH GREEN MARKETING"

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Abstract

This paper attempts to introduce the terms and concept of green marketing the paper tries to explain why green marketing is important in current situation for achievement of sustainable development. The paper also describes recent trends to green marketing and its importance to various business units and to end consumer.

Key words :- Sustainable development, green marketing, Recyclable, Awareness of people.

Introduction :-

Environment issues have become reason of concern for more than ever. Air Pollution, Plastic in Oceans, global warming and e-waste are among the major threats to environment. Making us think about environment sustainability and green marketing.

Green Marketing is a concept which primarily suggests sustainable development. As well all know India being second largest population in the world of nearly 1.4 billion people, it comes to no surprise that 277 million tones of Municipal solid waste (MSW) one produced every year. "According to central pollution Board (CPCB). India currently produces more than 25,000 tones of plastic waste everyday on average. India Ranks second among to 20 Countries having high proportion of reverine plastic emissions nationally as well as globally to resolve such major threats to human life and nature the concept of sustainable development and green marketing becomes very crucial.

Sustainable development as per "Report of the world Commission on Environment and Development (United Nations1987) can be defined as practice of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in present but in the indefinite future. An article on "Sustainable development Introduction" by Anup Shah highlights that the 1992 Rio Earth Summit was attended by 152 world leaders and sustainability was enriched in Agenda 21 plan of action and recommended that all countries should adopt national sustainable strategies based on these concept of sustainable development and its significance in Development of many developed as well as developing nations are have understood the importance of "Green marketing" they have agreed that green marketing is not merely a phrase its on approach which is crucial for earth as well as wellbeing of mankind.

It's only since 1990 than research have started academically to study consumers and Industry attitude towards green marketing. According to "American Marketing Association" green marketing is the marketing of products that are assumed to be environmentally safe thus green includes broad range of function, including product modification, changes to production process, packaging changes as well as changes in Advertisement.Charter (1992), has defined green marketing as aoverall and responsible strategic management function that identifies, estimates, satisfies and fulfils stakeholder needs, for a reasonable reward, that does not adversely affect human or natural environmental well-being.

Pride and Ferrell (1993), Green marketing, also known as ecological marketing and sustainable marketing, it refers to an organization's efforts for designing, promoting,pricing and distributing products that will save the environment. Polanski (1994), has defined green marketing as all activities performed to produced and facilitate any exchanges intended to fulfill human needs and wants, such that the satisfaction of these

needs and wants occurs, with minimal deleterious impact on the natural environment.

Literature Review :-

Alsmadi (2007) examined the consumer behavior of Jordian consumer's revels environment consciousness. But the study shows negative approach towards "Green Products" According to Simons and others (2006), with the implementation of more advanced technology, stricter state enforcement on deceptive claims, government regulations and incentives as well as closer scrutiny from various environmental organizations and the media, many green products have greatly improved and regained consumer confidence in the green products. According to Polonsky (2003) that green marketing is more wide term and covers more than firms marketing claims, firms should be more responsible for implementation of green marketing. According to Bowen (2000), ethical consumerism refers to buyer behavior that reflects a concern with the problems that arise from unethical and unjust global trades, such as child and low-paid labor, infringement of human rights, animal testing, labor union suppressions, inequalities in trading relations with the Third World and pollution of the environment. Oyewole (2001) presented a conceptual link among green 180 Shruti Garg and Vandana Sharma marketing, environmental justice, and industrial ecology and also argued for greater awareness of environmental justice in the practice for green marketing. Prothero& Fitchett, (2000) argued that greater ecological enlightenment can be secured through capitalism by using the characteristics of commodity culture to further progress environmental goals. Kilbourne (1998) discussed the failure of green marketing to move beyond the limitations of the prevailing paradigm and also examined for their effect in the marketing/environment relationship, namely economic, political and technological dimensions of the cultural frame of reference.

Research Methodology :-

Research is Exploratory it focuses on interview reviews, news papers, magzines, websites and other trusted sources.

Sustainable management :

The basic objective of sustainable development in green marketing is proper allocation of resources for future environment without damaging present environment as per Brundtland commission sustainable development is fulfillment of present and future generation to meet their own needs. The concept is very popular in economic literature as per current Scenario.

Features of Green Products :

The products which adopt green technology and causes very less or no harm to environment are called green products. For Conservation of Natural resources and to cope up with rising temperature of Earth adoption of green products becomes very necessary. Following are the features of green products.

1) Naturally grown products.
2) Recyclable, reusable, Biodegradable products.
3) Products containing recycled, non toxic chemical.
4) Environment friendly products.
5) Reusable, refillable containers.
6) Products with eco-friendly and reusable packaging.

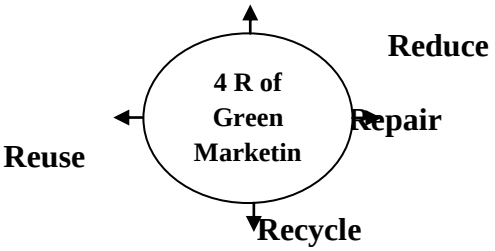
Four P's of green marketing :-

1) **Products:**products that are non toxic, i.e. which do not cause harm to environment and people and these are recyclable. e.g. electric vehicles which are environment friendly.
2) **Price :** price factor plays important role in adoption of green products affordable price of green products can encourage customer to purchase the product. Mass products in Indian market which are imported from capitalized countries are less costly as compared to domestic products. The products that are produced in our country and environment friendly too lack of price factor and fail to attract root level consumer.
3) **Place :** The choice of where and when to make a product available has a important role in attracting customers only few customer are interested and aware of green products so the location must be according to image that company wants to create in the minds

of customer this can be done with in store promotions and attractive advertisements are using recyclable materials to emphasize environmental and other benefits.

4) **Promotion :** Promotion of green products and services place very significant role for creating customer segmentation that will attract towards buying of green products for this purpose companies can design good advertisement which will touch to emotions of people.

Four R principle of green marketing :-



1) **Reduce :-**

It's very important to reduce the use of plastic and carry bags for efficient adoption of green marketing practices in this regard it's is very important to understand that some better alternatives should be made available to customers for storage and carrying purpose.

2) **Reuse :-**

Nowa day the tendency of "use and throw" has been inculcated in common customer due to which plastic waste and e-waste garbage problem has become reason of major concern for many countries including India.

3) **Recycle :-**

Adopting the habit of Recycling and reuse of products containers as well as recycling of old T.V.Sets, Mobile phones and other electronic instruments will help to successful implementation of green marketing products.

4) **Repair :-**

Consumer products like Mobile phones, T.V. Sets which are purchased and used by mass population lacks the practice of repairing used electronic instruments due to high repair cost which has resulted into large e-garbage problem.

World'sTopFive Eco-FriendlyBrands :-

1) **The Body Shop**

This Brand has been advocating for the end of animal testing since 1989.

2) **Ikea**

World famous furniture retailer Ikea has committed of becoming climate positive by 2030 meansThat means Ikea will not just reach net-zero carbon emissions, but it will actually be removing additional carbon dioxide from the atmosphere

3) **Lego**

Likewise, toymaker Lego wants to make all core products from sustainable materials by 2030—and to make all packaging from renewable or recycled materials by 2025. The brand also has a Replay program, which allows customers to donate used bricks to children in need.

4) **Patagonia**

"Company working hard towards building a community of people who love environment. "Patagonia's is working hard to build a product that will last, thus rejecting the fast fashion trends that plague our landfills.

5) **Starbucks**

World famous coffee chain brand Starbucks recently announced its plans to encourage more customers to drink from reusable mugs by 2025. company has working hard for promoting green marketing since the early 2000s, the company also donates millions of dollars to other environmental programs and renewable energy developments. Starbucks also prioritizes sustainable practices in an attempt to decrease power and water waste."

Step to Implement Green Marketing :-

1) Select right initiative.
2) Genuine efforts.
3) Select your message different segment of customer.
4) Prepare eco-friendly design.

5) Use plastic-free products and packaging.
6) Reduce emissions
7) Use of renewable energy.
8) Assume social responsibility.

Suggestions :-

1) Promote eco friendly marketing to environmentally aware customers by building emotional connection with them.
2) Communicate your green message through advertising (digital, T.V., Radio)
3) Promote green aspects at all points of customer contact a website, blogs, e-mail, social media, mobile marketing, coupons words of mouth cold calls, retargeting etc.
4) Educate customers and recommend green improvements to your segments.
5) Big Business entities should by to develop cast and energy saving products which will be to the reach of normal consumers also.

Conclusion

Sustainability is a vast 2022 macro trend Green marketing is efficient method for conservation of environment for future generation because of growing concern of environmental protection there is a need of developing effective business strategies and polices that will focus and encourage towards green marketing for this big business entities can play a big role by investing in research and development programs which will help to overcome with limitations faced by traditional products in this regard government and citizens role also become very crucial as government can make aware more and more people by different advertisement and campaigns, consumer's being responsible citizen should also consider their role towards achieving sustainability by adopting green marketing.

REFERENCES:

1. Charter, M. (1992). Greener Marketing. England: Greenleaf Publishing.
2. Hart, S. L. (1997). Beyond Greening: Strategies for a Sustainable World, Harvard Business review, Vol. 75, No. 5, pp. 66-76.
3. Hasna, A. M. (2007). Dimensions of sustainability. Journal of Engineering for Sustainable Development: Energy, Environment, and Health 2 (1), 47–57.
4. Henion, K. E., & Kinnear, T. C., (1976). Ecological Marketing Volume 1975, Chicago: American Marketing Association.
5. Kotler, P., Kartajaya H., &Setiawan, I. (2010). Marketing 3.0 From Products to Customers to the Human Spirit. USA: John Wiley & Sons, Inc.
6. Kotler, P., Keller, K. L., Koshy, A., &Jha, M. (2009, 13th Edition). Marketing management- A south Asian perspective. India: Pearson Education.

ECO-FICTION

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Abstract

[Ecofiction (also "eco-fiction" or "eco fiction") is the branch of literature that encompasses nature-oriented (non-human) or environment-oriented /human impact on nature works of fiction.[1] While this super genre's roots are seen in classic, pastoral, magical realism, animal metamorphoses, science fiction, and other genres, the term ecofiction did not become popular until the 1970s when various movements created the platform for an explosion of environmental and nature literature, which also inspired ecocriticism.[2] Ecocriticism is the study of literature and the environment from an interdisciplinary point of view, where literature scholars analyze texts that illustrate environmental concerns and exam,ltrktlkyine the various ways literature treats the subject of nature.[3] Environmentalists have claimed that the human relationship with the ecosystem often went unremarked in earlier literature.]

According to Jim Dwyer, author of *Where the Wild Books Are: A Field Guide to Ecofiction*, "My criteria for determining whether a given work is ecofiction closely parallel Lawrence Buell's":

The nonhuman environment is present not merely as a framing device but as a presence that begins to suggest that human history is implicated in natural history.

The human interest is not understood to be the only legitimate interest.

Human accountability to the environment is part of the text's ethical orientation.

Some sense of the environment as a process rather than as a constant or a given is at least implicit in the text.' [4]

Definitions and explanations

"The terms 'environmental fiction,' 'green fiction,' and 'nature-oriented fiction,' might better be considered as categories of ecofiction....[Ecofiction] deals with environmental issues or the relation between humanity and the physical environment, that contrasts traditional and industrial cosmologies, or in which nature or the land has a prominent role…[It is] made up of many styles, primarily modernism, postmodernism, realism, and magical realism, and can be found in many genres, primarily mainstream, westerns, mystery, romance, and speculative fiction. Speculative fiction includes science fiction and fantasy, sometimes mixed with realism, as in the work of Ursula K. Le Guin." - Jim Dwyer [Ibid. Chapter 2.]

"Stories set in fictional landscapes that capture the essence of natural ecosystems....[They] can build around human relationships to these ecosystems or leave out humans altogether. The story itself, however, takes the reader into the natural world and brings it alive...Ideally the landscape and ecosystems--whether fantasy or real--should be as "realistic" as possible and plot constraints should accord with ecological principles." - Mike Vasey [5]

The distinction of true and false ecofiction was made by Diane Ackerman. "Often in fiction nature has loomed as a monstrous character, an adversary dishing out retribution for moral slippage, or as a nightmare region of chaos and horror where fanged beasts crouch ready to attack. But sometimes it beckons as a zone of magic, mysticism, inspiration, and holy conversion.[6] "False ecofiction is based on the fear that something will go wrong, but true ecofiction is based on an integrative view of reality." -Gabriel Navarre [7]

Another perspective is that ecofiction is not divided between true and false, but into three categories: "Works that portray the environmental movement and/or environmental activism, works that depict a conflict over an environmental issue and express the author's beliefs, and works that feature environmental apocalypse." -Patricia D. Netzley [8]

"Ecofiction is an elastic term, capacious enough to accommodate a variety of fictional works that address the relationship between natural settings and the human communities that dwell within them. The term emerged soon after ecology took hold as a popular scientific paradigm and a broad cultural attitude in the 1960s and 1970s." -Jonathan Levin [9]

"Ecofiction forms a literature-based path towards an invigorated understanding of nature's place in human life and is part of a new phase in nature writing that seeks to include a modern consciousness in narratives of place. *The Hopper* believes that in order to refashion our lives to accommodate the knowledge we have of our environmental crisis, we have a lot of cultural heavy lifting to do. To reacquaint ourselves meaningfully with the natural world we have to turn our interpretive, inquisitive, and inspired faculties upon it." Dede Cummings, Green Writers Press

Ashland Creek Press often states that "ecofiction is fiction with a conscience."

Characteristics

Given that "Ecocriticism seems to be inherently interdisciplinary, cross-cultural, syncretic, holistic, and evolutionary in its nature,"[10] it would seem useful to apply these traits to the large field of literature that is ecofiction, especially given its history, reach, and continuity.

Interdisciplinary and holistic: Ecofiction can be seen as an umbrella for, or laterally relative to, many genres and subgenres and works well within the parameters of the main categories of speculative fiction, contemporary fiction, Anthropocene fiction, climate fiction, literary fiction, eco-futurist and solarpunk fictions, magical realism, ecological weird fiction, and more. Further, while ecofiction is "fiction with a conscience," per John Yunker, as shown above, it reveals integrity in the concern for our natural world as well as what can be found on numerous storytelling platforms: mystery, thriller, suspense, romance, dystopian, apocalyptic and post-apocalyptic, Arcadian, futuristic, crime, detective, and so on. Given the upstream and downstream effects of such issues as climate change, fracking, coal mining, animal justice, pollution, deforestation, and so on, this branch of fiction is not inclusive and has no demarcation other than the environmental and nature impacts by which it is defined and explained.

Cross-cultural and syncretic:

Ecofiction is written by authors all over the world. Environmental issues, the desire to protect our natural ecological systems, and the praise of nature is an all-encompassing intention of many authors, which crosses all borders, languages, ethnicities, and belief systems. Many ecofiction novels incorporate LGBT and other egalitarian social issues that mirror sustainable, peaceful, and just environmental futures.

Developing:

Dwyer's field guide has hundreds of examples of ecofiction across time, from the roots and precursors---the earliest cave drawings, pastoral and classic, etc.--up through the 21st century. The continuity goes on. In May 2017, writing in *The New York Times,* Yale scholar WaiCheeDimock reviewed Jeff VanderMeer's novel *Borne* and said, "This coming-of-age story signals that eco-fiction has come of age as well: wilder, more reckless and more breathtaking than previously thought, a wager and a promise that what emerges from the 21st century will be as good as any from the 20th, or the 19th."[11] Two months later, The Association for the Study of Literature and Environment's (ASLE) 17th biennial conference [12] focused on ecofiction as one of its main streams. Ecofiction continues to be alive and relevant, evolving into contemporary study and a way of thinking about new literature.

Ecofiction, true to its evolutionary nature, encapsulates the most recent of our environmental crises: climate change. By the time Dwyer's big field study was published in 2010, already climate change had been engaging authors to write cautionary or disaster tales for a few decades. In his field guide, Dwyer cited such examples of climate change fiction as *The Swarm* and *The Day After Tomorrow*—also noting that "Ecofiction rarely fares well in escapist Hollywood." [Ibid. p. 92.] The first anthropogenic global warming (AGW) novel may have been Arthur

Herzog's *Heat*, published in 1977, though plenty of novels up until then imagined or speculated climate change or events.[13][14] While ecofiction has included AGW fiction since the 1970s, the past decade has also introduced newer specific genres to handle climate change, such as climate fiction, Anthroprocene fiction, and solarpunk. Thus, true to the evolutionary characteristic of ecofiction, from early pastoralism to modern science's understanding of global warming, hundreds of authors have taken up the issue of climate change in the least as a backdrop to their novels or, more heavily, as a moral, didactic cautionary tale centering around this foreboding, current, and very real environmental catastrophe. An environmental fiction database lists hundreds of climate and other novels falling into the ecofiction genre.[15]

History

While the term "ecofiction" is contemporary, as of the 1970s, its precursors are ancient and include many First People's fictionalizing nature in written form, including pictograms, petroglyphs, and creation myths. Classical literature, such as Ovid's *Metamorphoses* and Latin pastoral literature, continued this exaltation of nature as did Medieval European literature, such as Arthurian lore and Shakespeare's tales, followed by Romanticism, traditional pastoralism, and transcendentalism.[16]

Dwyer notes that Kenneth Grahame's *The Wind and The Willows*, as well as many nonfiction authors, such as Ralph Waldo Emerson, Henry David Thoreau, John Burroughs, Margaret Fuller, and John Muir, had "strong influences on modern ecological thought, environmentalism, and ecofiction."

Up through the late 19th century, classics such as Herman Melville's *Moby Dick*, Mark Twain's *The Adventures of Huckleberry Finn*, H.G. Wells' *The Island of Dr. Moreau*, W.H. Hudson's *A Crystal Age*, and Sarah Orne Jewett's *The White Heron and Other Stories* and *The Country of Pointed Firs*, among many others, had eco-themes. In the 20th and 21st centuries, nature-related fiction evolved and continued, including eco-feminist fiction writers such as Charlotte Perkins Gilman and Mary Austin. Four "radical" authors also came on the scene: Jack London, D.H. Lawrence, B. Traven, and Upton Sinclair. Environmental science fiction also became popular from authors like Laurence Manning, George Orwell, William Golding, and Aldous Huxley. Regional environmentalists and authors, such as Zora Neale Hutson, William Faulkner, and John Steinbeck, also wrote about problems in their locales. Conservationists and environmentalists, such as Wallace Stegner and George R. Stewart, also contributed. J.R.R. Tolkien's mythology classics went down into history showing famous and iconic battles of industrialization vs. nature. Postwar ecofiction writers arrived too, such as science fiction authors who were cautionary about the environment: Clifford Simak, Jack Vance, Ray Bradbury, and Kurt Vonnegut, to name a few. Enter Peter Matthiessen and Edward Abbey, which Dwyer says are "arguably the most important and enduring new green voices to emerge in this period." And others, such as Jack Kerouac, Gary Snyder, and Michael McClure, represented "presentations of the nascent environmental consciousness of the Beat movement." [Ibid.]

This brings us up to the 1970s, when, as Dwyer points out, "ecofiction in all genres truly flourished...which might be considered the *década de oro* (golden age)," heralded by John Stadler's anthology *Eco-fiction*, containing science and mainstream ecofiction written between the 1920s and 1960s. [Ibid.]

Eco-fiction, the anthology, starts with this premise: "The earth is an eco-system. It possesses a collective memory. Everything that happens, no matter how insignificant it may seem, affects in some way at some time the existence of everything else within that system. Eco-fiction raises important questions about man's place in the system: Will man continue to ignore the warnings of the environment and destroy his source of life? Will he follow the herd into the slaughterhouse?" The anthology included the authors Ray Bradbury, John Steinbeck, Edgar Allan Poe, A. E. Coppard, James Agee, Robert M. Coates, Daphne du Maurier, Robley Wilson Jr., E. B. White, J. F. Powers, Kurt Vonnegut Jr., Sarah Orne Jewett, Frank Herbert, H. H. Munro, J. G. Ballard, Steven Scharder, Isaac Asimov, and

William Saroyan.[17] Dwyer stated that the title of Stadler's *Eco-fiction* was his first knowledge of the term ecofiction. [Ibid.]

Jonathan Levin goes on to explain, "Two key events helped spark this new environmental awareness [leading to ecofiction]: the controversy surrounding proposed dams on the Colorado River that led ultimately to the construction of the Glen Canyon Dam (begun in the mid-1950s and completed about ten years later), and the 1962 publication of *Silent Spring*, Rachel Carson's exposé of the environmental impact of toxic pesticides like DDT. Both generated widespread media coverage, bringing complex and urgent environmental issues and the ecological vocabularies that helped explain them into the American lexicon."[18]

Social impact

Ecofiction is often said to be an agent for social change. For example, in 2016, the World Economic Forum's RosamundHutt[19] listed "9 novels that changed the world." Among these were two novels that may be considered ecofiction, including John Steinbeck's *The Grapes of Wrath* (about the dust bowl, which was caused by farmers failing to use smart ecological principles) and Upton Sinclair's *The Jungle* (about Chicago's meat-packing industry). Both novels reached far and wide, and are considered to be among the classics of social change novels.

[Researchers have recently begun to empirically examine the influence of environmentally engaged literature on its readers. For example, scholars have found that literary fiction can make readers more concerned about animal welfare[20] and climate change[21][22] and raise awareness of environmental injustice.][23]

Examples

- How Beautiful We Were, ImboloMbue
- The Bear, Andrew Krivak
- The Butterfly Effect, RajatChaudhuri
- Borne, Jeff VanderMeer
- Memory of Water, EmmiItäranta
- Bangkok Wakes to Rain, by PitchayaSudbanthad[24]
- Nature's Confession by JL Morin[25]
- Rokit, LoranneVella
- The Water Knife, Paolo Bacigalupi
- The Word for World is Forest, Ursula K. Le Guin
- Flight Behavior, Barbara Kingsolver
- American War, Omar El Akkad
- The Jungle, Upton Sinclair
- Oil on Water by HelonHabila[26]
- The Monkey Wrench Gang, Edward Abbey
- Barkskins, Annie Proulx
- Float, JoeAnn Hart and My Last Continent, Midge Raymond
- The Man with Compound Eyes, Wu Ming-Yi
- Parable of the Sower, Octavia Butler
- The Overstory, Richard Powers
- Side Chick Nation, Aya de León
- Mars Trilogy by Kim Stanley Robinson

References

1. ^ Murphy, Patrick D. (2000). Further Afield in the Study of Nature-Oriented Literature. Charlottesville: University Press of Virginia. p. 1.
2. ^ Dwyer, Jim (2010). Where the Wild Books are: A Field Guide to Ecofiction. University of Nevada Press.
3. ^ "What is ecocriticism? – Environmental Humanities Center". Retrieved 2020-02-26.
4. ^ Dwyer, Jim. "This Way to Sustainability Conference". Chico State. Chico State. Archived from the original on 3 January 2017. Retrieved 1 October 2016.
5. ^ Vasey, Mike (February 20, 1996). Bioregional Studies - Correspondence with Jim Dwyer.
6. ^ Ackerman, Diane (2002). In Our Nature, Stories of Wilderness. Athens: University of Georgia Press. p. Preface.
7. ^ Navarre, Gabriel (1980). Earthworks: Ten Years on the Environmental Front.

San Francisco: Friends of Earth. pp. 218–219.
8. ^ Netzley, Patricia (1991). Environmental Literature: An Encyclopedia of Works, Authors, and Themes. Santa Barbara, CA: ABC-Clio. p. 78.
9. ^ Levin, Jonathan (July 2011). The Cambridge History of the American Novel. Cambridge University Press. ISBN 9780511782046.
10. ^ Dwyer, Jim (2010). Where the Wild Books are: A Field Guide to Ecofiction. University of Nevada Press. p. 2. ISBN 9780874178111.
11. ^ Dimock, WaiChee (May 5, 2017). "There's No Escape From Contamination Above the Toxic Sea". The New York Times.
12. ^ "Rust/Resistance: Works of Recovery". ASLE. ASLE. Retrieved 24 June 2017.
13. ^ Mandel-Herzog, Leslie (2014-07-21). "The Works of Arthur Herzog and a Talk with his Widow Leslie". Dragonfly. Retrieved 21 July 2014.
14. ^ Bould, Mark (March 30, 2009). The Routledge Companion to Science Fiction. Routledge. ISBN 9781135228354.
15. ^ Woodbury, Mary (2014-07-18). "Dragonfly Eco-fiction Database". Eco-fiction.
16. ^ Dwyer, Jim (2010). Where the Wild Books are: A Field Guide to Ecofiction. University of Nevada Press. pp. Chapter 2.
17. ^ Stadler, John (August 3, 1978). Eco-fiction. Washington Square Press. ISBN 978-0671824785.
18. ^ Levin, Jonathan (July 2011). The Cambridge History of the American Novel. Cambridge University Press. ISBN 9780511782046.
19. ^ Hutt, Rosamund. "9 novels that changed the world". World Economic Forum. Retrieved 16 January 2019.
20. ^ Małecki, Wojciech; Pawłowski, Bogusław; Sorokowski, Piotr (2016). "Literary Fiction Influences Attitudes Toward Animal Welfare". PLOS ONE. 11 (12): e0168695. Bibcode:2016PLoSO..11686 95M. doi:10.1371/journal.pone.016869 5. PMC 5179074. PMID 28006033.
21. ^ Schneider-Mayerson, Matthew (November 2018). "The Influence of Climate Fiction: An Empirical Survey of Readers". Environmental Humanities. 10 (2). doi:10.1215/22011 919-7156848.
22. ^ Schneider-Mayerson, Matthew; Gustafson, Abel; Leiserowitz, Anthony; Goldberg, Matthew H.; Rosenthal, Seth A.; Ballew, Matthew (2020-09-15). "Environmental Literature as Persuasion: An Experimental Test of the Effects of Reading Climate Fiction". Environmental Communication: 1–16. doi:10.1080/17524032.2020.181437 7. ISSN 1752-4032. S2CID 224996198.
23. ^ Schneider-Mayerson, Matthew (2020-05-01). ""Just as in the Book"? The Influence of Literature on Readers' Awareness of Climate Injustice and Perception of Climate Migrants". Interdisciplinary Studies in Literature and Environment. 27 (2): 337–364. doi:10.1093/isle/isaa020. ISSN 10 76-0962.
24. ^ Schaub, Michael (20 February 2019). "Stories Converge In A Flooded 'Bangkok'". NPR. Retrieved 2021-04-17.
25. ^ "Nature's Confession". Harvard Square Editions. Retrieved 2021-04-17.
26. ^ "Oil on Water by HelonHabila | Book review". the Guardian. 2010-08-28. Retrieved 2021-04-

EFFECT OF SUB LETHAL CONCENTRATION OF MALATHION ON LIPID CONTENT OF MUSCLE OF *CHANNA PUNCTATUS*

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ABSTRACT:

Pesticides have an innate capacity to cause damage to biological system. Considering above fact the present study deals with the effect of malathion for long duration (7days to 28days) on Chana Punctatus. The muscle showed reduction in Lipid content during sublethal treatment.

KEYWORDS: *Chana Punctatus*, Malathion, Muscle, Biochemicals.

INTRODUCTION :

Malathion is commonly used organophosphorous pesticide. While most of the malathion will stay in the areas where it is applied, some can move to areas away from where it was applied by rain, fog and wind Once malathion is introduced into the environment, it may cause serious intimidation to aquatic organisms and is notorious to cause severe metabolic disturbances in non target species like fish and fresh water mussels (USEPA, 2005).

Chana Punctatus is common fresh water fish abundantly present in local river Godavari Dist. Nanded. It isone of the major source of food of poor population in local area. The present study was designed to study impact of sublethal concentration of 0.8 ppm of malathion on muscle lipid in fresh water fish Chana Punctatus during exposure period of 7,14,21 and 28 Days.

MATERIAL AND METHODS

For present study, commercial grade malathion (50% manufactured by Coromandal fertilizer limited, Coromandal house, pesticide division, Ranipet, Veiare (TN), India) was procured from the local market. Healthy specimens of *Chana Punctatus* were collected from local river Godavari Dist. Nanded. Their average length and wet weight (20 + 1.7cm and weight 60 + 0.5gm) respectively. Fishes were treated with 0.1 % Km No_4 solution for 2 min. to avoid any dermal infection. The fish stock was then maintained in 100 liter glass aquaria for 14 days to acclimatize under laboratory condition. The fishes were fed with pieces of live earth warm on alternate days. A stock solution was prepared in acetone and mixed in water to obtain required dilutions. The LC50 value for 96 hours of malathion was determined by procedure of Finney (1971).The LC50 of malathion for 96 hours for Chana Punctatus was 2 mg/liter. Fishes were exposed to sub lethal concentration (0.8 ppm) of malathion, simultaneously control group was also maintained. lipid content was estimated by Bligh & dyer method (Bligh & dyer, 1959).

RESULTS :

In the present investigation the Lipid content at control 93.28 compare with experiment in 7, 14, 21 and 28 days was 84.02, 60.06, 56.28 and 53.54 mg/gm in muscle. Different concentration of organophosphates malithion at 0.8 ppm the lipid content in muscle of *Chana Punctatus* Changes in lipid of muscle of *Chana Punctatusis* presented in Table 1. The lipid level of muscle fluctuated during different intervals of treatment.

DISCUSSION:

In present study, the depletion in protein content in body muscle during 28 days. Lomte and Sabiha Alam (1984) showed effect of malathion on the biochemical components of theproso branch, Belamiabengalnsis and reported that the decrease in glycogen, protein and lipid under pesticidal stress. Decrease in tissue lipid and proteins might be partly due to their utilization in cell repair and tissue organization with the formation of lipoproteins, which are important cellular constituents of cell membranes, and cell organelles present in the cytoplasm (Harper, 1983). similar result were proposed by many author Varadraj, et al.,

(1991) has reported sublethal effects of thiodon on protein metabolism in fresh water crab, *Paratelphusa hydromous.*

Table1. Lipid content (mg/gm) in muscle of *Chana Punctatus*

Concentration (ppm)	Duration in days 7	14	21	28
control	93.28 ± 0.3	92.00 ± 0.2	93.00 ± 0.3	93.00 ± 0.3
Experimental	84.02 ± 0.4	60.06 ± 0.5	56.28 ± 0.2	53.54 ±0.3

(Values are mean SD of six replicates, * P<0.05, * P <0.01, ** P>0.01, significant when student's test was applied between control and experimental groups)

CONCLUSION:

In the present investigation the effect of organophosphate malathion of the lipid content in muscle of *Chana Punctatus* changes is found the lipid content is decreases during the study period.

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REFERENCES:

1. Bligh & dyer, (1959) Can J. Bichem & Physiol,37-911
2. Harper, A.H. (1983) : Review of Biochemistry 20th ed. Lange medical publications co, California, 1012.
3. Lomte, V.S. and SabihaAlam (1984) : Changes in the biochemical components of prosobranch, Belmiabengalensis on exposure to malathion, Proc. Att. Indian. Ymp. 69-72.
4. USEPA (2005) : United states environmental protection agency.
5. Varadraj, et al., (1991) sublethal effects of thiodon on protein metabolism in fresh water crab, *Paratelphusa hydromous.*Indian.Zoologist 14(1-2):189 – 191

ENVIRONMENTAL ISSUES AND SOLUTION

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Abstract

Many environment or nature lover are expressing deep concern in climate, planet, and forest. They seriously want to solve issues related to environment and solving problems as possible as. But it's not only their responsibility to solve environmental problem everyone have to be concern related to itsotherwise it will be hectic to all living and non-living things. Government also have to take some responsibility. Most of the issues are only because of human behaviour or human activities so we should minimise bad behaviour towards nature.

Introduction

All living and non-living things in our surrounding is our environment. The life of all living things is depend on environment. It means environment gives nourishment to humans, animals and birds for survival.

In search of development and progress we are killing our natural environment. Environment support to our growth but we are carelessly replacing natural environment into artificial. Instead of plantation and greenery all these natural objects existence over and building, street, vehicles overcome. Because of gases, and pollution our environment is in danger.

With the help of environment our survival is possible such as water we drink, air we frequently breathe to live, food we eat for nourishment all it is part of environment. We humans have destroyed natural cycle of natural environment. Our healthy environment imbalance because of humans.

Environmental Issues and Solution:

Our natural environment is mainly affected by human activities. These include pollution, overpopulation, deforestation, global warming, waste disposal, excess use of technology, climate change, energy, ozone layer depletion, biodiversity and land use, excess use of chemicals, toxics and heavy metals, natural resource depletion, ocean acidification, nitrogen cycle, acid rain, overfishing, human health issues etc. these all are issues in environment which we have resolve as possible as. If we cannot solve this then bad effects on environment such as natural disaster, changes in environment which creating problem for survival of human, animals and plants.

There are 5 major types of environmental issues:-

1. Pollution
2. Deforestation
3. Over Population
4. Global Warming
5. Waste disposal

1. Pollution

Different kinds of pollution is available in the world. Such as air pollution, water pollution, land pollution, soil pollution, light pollution, noise pollution, plastic pollution, thermal pollution, visual pollution, radioactive pollution etc.

The3 major types of Pollution are Air Pollution, Water Pollution,and Land Pollution.

i) Air Pollution

Air which badly effect on human health, plant, animals and all over environment which mainly caused particles, harmful gasses, smoke, dust this physical, biological or chemical changes in the air it is known as **Air pollution**.

It is mandatory to all living things to take breathe for survival with the help of air. But if air is dirty it will be difficult for us to take breathe. Household burning devices, motor vehicles, industrial facilities and forest fires are common sources of air pollution.

We have to reduce this air pollution which we can do with such an easy things such as we can reduce using of motor vehicles, reduce forest fires and smoking, avoid using gaseous

products, avoid using plastic products, recycle and reuse.

ii) Water Pollution

One more essential things after air which is water. But here also pollution is in big scale which make water unusable for drinking, cooking, cleaning, swimming and more activities. Chemical, parasites, waste, bacteria, trash and plastic also other pollutants make water dirty in rivers, lakes, seas, oceans, aquifer and reservoirs this is **Water Pollution.**

For survival water is needful for all living and non-living things therefore we have to reduce plastic use, save water, reuse items, don't dispose oil into sink, cleaning chemicals, garbage disposal, avoid pesticides, conserve soil, clean up ocean and river. With the help of these things we can control over water pollution.

iii) Land Pollution

Land means earth's surface, soil. Directly or indirectly degradation of land is **Land Pollution.**Increasing number of plots, decreasing forest is main caused of land pollution.

Because of stronger reaction on air pollution and water pollution we neglect land pollution and its negative effects, but the land is being polluted and abused constantly we are unable to calculate damages incurred.

In land pollution includes soil pollution, degradation of land, groundwater poisoning, climate change, caused air pollution also bad effect on wild life, tourism, humans, plants etc.

We have to see this problem seriouslyand reduce land emissions, recycle and reuse, reforestation, afforestation with the help of this things we can reduce land pollution.

2. Deforestation

Meaning:-

Purposeful clearing or permanent removal of forested land to make space for agriculture, urbanization, mining activities,and animal grazing, to obtain wood for fuel, manufacturing and construction that all means conversion of forest into land for any purpose is called**Deforestation.**

Effect on Environment:-

Deforestation has been negatively affecting natural ecosystem and climate and human nature caused this global deforestation. It is the largest issue in global land use. Forests are an important resource but humans have destroyed forested land. Deforestation not only eliminates vegetation that is important for removing carbon dioxide from the air, but clearing forests also produces greenhouse gas emissions. It puts human health and health of our planet at risk.

A growing global population and increased food consumption has led to many forests being converted into farms. It is also being driven by logging, human migration and population increases, mining gas and oil industries, transport and infrastructure projects and expanding towns and cities. The loss of trees and other vegetation can cause climate change, soil erosion, desertification, increase in global warming, acidic oceans, flooding, fewer crops, increased greenhouse gases in the atmosphere and a host problems for indigenous people.

Solution:-

Urgent action is needed for forest loss to human beings. Forests can be restored through replanting trees in cleared areas or allowing the forest ecosystem to regenerate over time. To follow government regulation, reduce consumption of paper, ban clear cutting forests, reforestation and afforestation, reduce consumption of deforestation prone products, purchase eco-friendlyproducts, plant tree, recycle and reuse the products it will help to reduce it.

One of greatest resources of our planets is trees. They absorb carbon and produce the oxygen we breathe also purify air, moderate the weather, and reduce flooding. Still we neglect all their benefit and chop them down. Therefore to make compulsory replanting and reforestation, plant tree also awareness is necessary.

3. Over Population:-

Meaning:-

Undesirable condition where the number of existing human population exceeds the carrying capacity of Earth it is **Overpopulation**. In overpopulated environment the numbers of people might be

more than the available essential materials for survival such as transport, water, shelter, food.

Causes, Impact on environment:-

Increasing birth rate and decline mortality is main caused of overpopulation. Human population growth impacts the Earth system in a variety of ways, including increasing the extraction of resources from the environment. These resources includes oil, gas, coal, minerals, trees, water, wildlife and oceans.

When population expanding such a rapid race it will become overcrowded. Its density increasing, global warming, land decrease, water decrease, and pollution all these problem will overcome. Because of food shortages, migration, depleting natural resources, droughts this things will responsible for war in worldwide. It affects all of us as scarcity of food will increase, population will increase and global warming becomes more of a problem. Growing population brings changes in social values and beliefs, cultural behaviour, traditions and customs of the society.

Solution:-

1. One child legislation
2. Better education
3. Adoption
4. Empower women
5. Promote family planning and spreading awareness

At present the is still enough space on Earth for living things like human, animals and plants but this have to be maintained because if overpopulation will grow in rapid then problems we have to face for it. To reduce growth rate it is compulsory to make one child legislation which helps to control population.Restrict child marriage and raise the legal age of marriage. Excessive population has various adverse effects on natural resources. More people means more consumption automatically its effect on exploitation. Over population is not a universal problem it is specific to nations like India, China, Africa and some Latin countries whose economies have not achieved full potential and development.

Free education given to women also they should be economically and socially strong for taking decisions. Educated women are health conscious and avoid frequent pregnancies and this help in lowering birth rate.

Some parents do not have any child. They are desperate to costly medical treatment. They should adopt orphan children it will beneficial to orphan children and couples. Government should also provide incentives for adopting child.

People need to be told and made to understand the consequences of having too many children. Government and non-government institutions can carry awareness programs or campaign informing that how they unable to provide good nutrition, education or medical facilities to their children if they have too many. Illiteracy is also reason of population.

4. Global Warming:-

Meaning:-

Melting ice and reduce sea level in worldwide and rising temperature on Earth also surface temperature increasing rapidly caused by increasing level of carbon dioxide, nitrous oxides, water vapour, pollutants, gases etc. is called **Global Warming.**Climate change, changes in air temperature, winds, oceans, this refers to global warming. Human activity has influenced to change climate.

Causes:-

Deforestation, over population, industrial development, using automobiles, greenhouse effect, petroleum refinery, water vapour, volcanoes. We saw already deforestation and over population how cause for global warming. A higher population leads to increasing product demand as well as increased levels of consumption and output.This correlates to increasing activity including industrialization, which eventually results in higher quantities of greenhouse gases.

Our personal vehicles are a major cause of global warming. Cars and trucks emit twenty percent of all greenhouse gases. Climate is changing because of greenhouse effect. Some gases in the earth's atmosphere act a bit like a glass in greenhouses, trapping the sun's heat and stopping it from leaking back into space and causing global warming.

The petroleum oil refining industry us the third largest stationery emitter of greenhouse gases in the world, contributing 6% of all industrial greenhouse gas emission.

Volcanoes release carbon dioxide and other greenhouse gases when they erupt which can lead to climate warming if the input of carbon dioxide to the atmosphere is sufficiently large. As greenhouse gases like carbon dioxide and methane increase, Earth's temperature rises in response.

Solution:-

Save energy at home, walking, cycling, using public transport, to eat more vegetables, renewable energy, increase in wind and solar power, use biogas or biofuels from waste, to protect forest, plant trees, reduce water waste, reuse and recycle products, education and awareness, use only organic products, avoid plastic, don't use product which made from endangered animalsetc. are that things which help to reduce global warming.

We must begin with the reduction of greenhouse gas. Furthermore, they need to monitor the consumption of gasoline. Switch to a hybrid car and reduce the release of carbon dioxide. We don't have to use electrical appliances if we can do it by our hand.

5. Waste disposal

Meaning:-

The collection, processing, and recycling or deposition of the waste materials of human society is **Waste Disposal.**Waste is classified by source and composition. Broadly speaking, waste materials are either liquid or solid in form and their components may be either hazardous or inert in their effects on health and the environment. The term waste is typically applied to solid waste, sewage, hazardous waste, and electronic waste.

Waste disposal means removing, discarding, recycling or destroying unwanted materials caked waste that is produced from agriculture, domestic usage or industrial products. Following the correct methods for waste disposal will ensure lesser pollution and hazards for the environment.

Method of waste disposal

1. Landfill
2. Incineration
3. Biogas Generation
4. Composting
5. Waste compaction
6. Vermicomposting

Conclusion:-

Our natural environment makes human life possible, and our cultural environment helps define who we are. It is therefore essential that our population and economic growth are environmentally sustainable. Environment helps us understand our relationship with the environment. It informs our attempts to solve and prevent problem. Identifying a problem is the first step in solving it. Solving environmental problems can move us towards health, longevity, peace and prosperity. Environment can help us find balanced solutions to environmental challenges.

References:-

1. https://en.wikipedia.org/wiki/Environmetal_issues
2. https://blog.arcadia.com/15-proven-ways-can-reduce-water-pollution/
3. https://byjus.com/chemistry/land-pollution/
4. https://education.nationalgeographic.org/resource/deforestation/
5. https://www.britannica.com/science/global-warming
6. https://www.sciencedirect.com/topics/earth-and-planetary-sciences/waste-disposal

ENVIRONMENT GEORGE R. R. MARTIN *A GAME OF THRONES*

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ABSTRACT

Famous Literary figure of every era has portrayed the social issues of that period. Literature can play the role of disseminator and reformer whenever the society faces problems literary figures of that period gives voice to those problems through their work. Possible horrifying outcomes of that particular problems are reflected by the literary persons of that period using various literary forms like novels, dramas and poems. We can use this domain for portraying ideas which are not otherwise possible in realistic way. Literature is used to spread knowledge among masses. Literature is used to propagate particular philosophy or scientific idea. In an ancient period literature was the sole medium for educating people. Religion reached every household by means of books and art. Writers in various period tried to voice the problems of society in their work and played the role of social reformer. George R. r. Martin's fantasy series is also playing the same role. He wants to warn people about the coming danger of climate change and its possible outcomes which are not noticed by politicians of the day. Issues of global warming and climate change can be life threatening for entire human race but we are so much indulged in our less important things that we are ignoring the threat to the entire humanity.

Key Words Fantasy, Horror, Climate Change , Environment

Literature is mirror to societyand society is influenced by literature. Every literary work is influenced by contemporary society. Literature in ancient period featured deities and nature because society at the time was nature worshipper and religious. Literature of renaissance period was influenced by reawakened learning in the puritan period literature was characterized by respect for rule and religious dominance. In the neoclassical age to much satirical literature produced by JohnDryden, Alexander Pope and other Masters. Human scientific expedition are mocked by Jonathan Swift in his Novel Gulliver's Travels. Romantic period literature is characterized by the happening in the 19th century events as French Revolution. 20thcentury literature is characterized by the new scientific discovery by Sigmund Freud, Carl Jung, and CharlesDarwin. Modern literature is characterized by horrific experiences of war, postmodern literature has depicted futility of human existence Albert Camus, Samuel Beckett have depicted problem with human existence. George R.R. Martin's *Asong of fire* is a product of postmodernism in his epic fantasy series environment crisis is evident.

Global warming, climate change are buzzing words in 21st century we are experiencing the horrific experience brought about by environment change fantasy series can be taken as an allegory of climate change. Since the publication of George R.R.Martin's books in *A Game of Thrones*and airing of HBO show *Game of Thrones* readers and audience are in search of Marin's motive behind writing this fantasy series.

Fantasy genre provides escape from the real world, where reads can bear difficulties of real world. Fantasy authors create their own world, where dragons and strange creatures cohabitate with humans on the earth. The themes he explores in the fantasy genre are good vs. evil, tradition vs. change,and individualvs. society the heroic quest for knowledge or man vs. nature. Whenever the writer wants to express his views which are contradictory to the prevalent society, the writer use such genre to manifest his philosophy. Martin has created his imaginary world the Westeros and infused it with earthly characteristic with supernatural elements like dragons, direwolves, white walkers and magic.

George R.R. Martin in an interview from time to time has remarked that his main

aim behind writing this story is development of his characters.George R.R.Martin is fond of killing his important characters there are mind change of people like James Lannister, like realistic novel he focuses on depiction of real life event as it happens in our real world. Martin wants his novels to be realistic so that he can give his message to society in a coherent manner. There are too many supernatural elements in the series *A Game of Thrones* there are dragons, direwolves, and white walkers.

In the beginning of the story we are told that winter is coming but no one knows when it will. All the main character in the story are prepared for the protection of their land from the consequences of winter season. Seasons in *A Game of Thrones* are too lengthy presently the continent Westeros is enjoying a decade long summer and it is feared that winter maybe longer than that there is frequent musing about the coming winter. Winter in literature is associated with death it means that death is approaching the humanity all of us should try to protect our land from the consequences of winter. While writing a climate change allegory he has assumed certain characters. Politicians today are more interested insecuring their power than paying attention to more important issue like climate change. Politicians of the present world are involved in petty issues like jobs, inflation and others but they are ignoring more important threats to humanity the white walker in the series carry winter with them they are snow cladded wherever they go the carry winter with them. There are only few people who have sworn to protect environment these people are outcasts, forsaken bastards like Jon Snow and his uncle Ben Stark. The title of the series itself means sword it is a song about battle for power. We can win this battle if we have fire remaining with us. If we waste all our power in useless things then we will miss the important aspect of this world. Animals in the series *A Game of Thrones*is supposed to extinct but we are introduced to three dragons it is stated in the book A Game of Thrones,DaenerysTargaryen gives birth to these three dragons in the funeral pyre of her husband Khal Drogo. Since Daenerys is true blood of the dragon family dragon eggs were given to her as her wedding gift and she becomes mother of three dragons.Which she uses to conquer the world. She becomes absolute monarch and try to capture iron throne with the help of dragons.When Daenerys, in later book, is stabbed by Jon snow the dragon burns the*Iron Throne* which is made of swords of defeated rulers.

People of the Westeros are more interested in maintaining their racial Superiority by marrying their own sister and producing babies. Queen Cercei is married to the king Robert Baratheon but she is in incestuous relationship with her brother Jaime Lannister.It is suspected by the starks that prince Joffrey is son of Jaime Lannister queen Cercei.The Starks of Winterfell are more interested in securing their family by marrying their daughters with King Robert Baratheon's sons. The Starks family is in quest of the murderers of king's earlier hand Jon Arryn they are in contemplation of coming winter and their family's safety.

During a 2004 interview with Al Jazeera *A Game of Thrones* creator George RR Martin let on that" *A Game of Thrones* is really about people being so consumed by their petty struggle for power they are blind to the much greater and more dangerous threat. Martin started game of thrones in 1991 long before anybody was talking about climate change but had created the perfect context and analogy for climate change in this case global cooling or long potentially endless winter but the inhabitant and leaders of the Westeros are fighting their individual battle over power and status and wealth and they are ignoring the threat of winter is coming which has the potential to destroy all of them and destroy their world. According to book lovers and HBO audience the story of game of thrones is climate change parable.

Although his books are not direct parallel to modern politics. Martin did tell New York Times that the game of thrones character most like Trump is Joffrey they have the same level of emotional maturity and likes to remind everyone that he is King.And he thinks that gives him the ability to do anything but we are not ruled by the whims of kings as Westeros. We are constitutional republic politicians think that power gives them the autonomy to do

anything the story of Game of Thrones is blend of mediaeval Britain supernatural monster and pornography the story deals with deeper problem of humanity the issue and danger of climate change white walkers represent the danger of the change in climate that could end the world. Writer uses examples, imagery to convey the grim reality of weather, changes in outside atmosphere and the upcoming threat to humanity.

The writer while writing allegorically and consistently displays the inherent human existential fear of death which could result to be the reason due to which they will unite. The fear of the night kings army of murderous corpses couldbe interpreted as an example of existential fear of death which the reader hope it would unite the character. The story tells us that people residing to the south of theWesteros could see upcoming danger.As smuggler turn knight DevosSeaworth poignantly uncovers to future queen Daenerys if 'we don't put aside our enmities and band together we will die and it does not matter whose skeleton seat on the iron throne.'

The army of the dead or the army of the white walkers and the winter that they are bringing with themevokepostmodern society'sexistential fear.The inhabitant of the Westeros are clearly shocked by the magical capacity of dead objects to move and to wage war on the world of the living being beyond the wall. Never ending human competition for power must be set aside in a combine and joint efforts to abolish the threat from the army of the dead. The people of the Westeros are fighting their individual battles for power and status. These fighting are so distracting them that they are ignoring the threat of winter is coming which has the potential to destroy all of them, to destroy their world. We are fighting over issues foreign like policy, domestic policy, civil rights, social responsibility and social justice all of these things are important but while we are tearing ourselves apart over these and expanding so much energy there exists this threat of climate change and it really has the potential to destroy our world.We are ignoring that while we worry about the next election and issue that people are concern about like jobs. All of these things are important issues but none of them are important if, like, we are dead and our city is under the ocean so really climate change should be the number one priority for politician who is capable of looking past the next election. We waste too much energy on thought and debate in the media discussing small things.

In the interview in 2019 in the online edition of the New York Times Martin states that he had no idea to incorporate the idea of climate change allegory but he included it to make people serious on this important issue rather than their usual issues like domestic policy, foreign policy social justice and economic development. He developed further the already existing sub-genre of fantasy named epic fantasy for climate change. The incoming distractive biodiversity threatening to end humankind completely. The destructive values that appear in the world that are capable of producing real life dragons used to in the game of thrones. Humans can fight amongst themselves using the largest destructive force as we saw in the World War I and World War II.Decision makers will ignore the imminent and problem and danger being, engaged in fighting and power struggle. Small number of environment activist and scientist warning the society about the coming threat.George R.R. Martin had admitted that like Tolkien, 'I don't write allegory at least not intentionally obviously you live in the world and you are affected by the world around you so something sink in on some level.' The environmentalist and zealous reader of fantasy Genre concludes that according to the length width and height of the wall entirely made of ice should it melt which is threatening to in the last third of the book The water will exceed 9 billion cubic meter which should be enough to flood entire planet. This has reference to our problem of global warming if the ice in polar region melts our dear earth will be under water and that could end this civilization.

References :

1. http://america.aljazeera.com/watch/shows/talk-to-al-jazeera/articles/2014/11/13/george-rr-martintalkstodavidshuster.html

2. https://www.nytimes.com/2018/10/15/t-magazine/george-rr-martin-got-interview.html
3. Select Bibilography
4. Albert,EdwardHistory of English Literature Oxford University Press, 2017
5. https://www.masterclass.com/articles/what-is-the-fantasy-genre-history-of-fantasy-and-subgenres-and-types-of-fantasy-in-literature
6. Herring,Lesley Virginia (2005) The existential and postmodern Individual master's thesis Texas A& M University.Texas A& M University.
7. https://www.januarymagazine.com/profiles/grrmartin.html
8. George R.R.Martin A Game of Thrones, Bantam Spectra/US, 1996
9. Elio Garcia, and Linda Antonsson. *The World of Ice and Fire: The Untold History of Westeros and the Game of Thrones*. New York: Bantam Books, 2014.
10. Barron, Neil. Ed. *Fantasy Literature: A Reader's Guide.* New York: Garland: 1990
11. George R. R. Martin and the fantasy form
12. https://www.januarymagazine.com/profiles/grrmartin.html

DIVERSITY OF ANT SPECIES IN AND AROUND KARANJA LAD CITY

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Abstract

Ants are most dominant components of terrestrial ecosystem because of universal distribution, thus constitute greater part of biomass. Ants in India, occupy a variety of habitats such as leaf litter, trees, soil and dead logs, while tramp species prefer human-modified habitats. Myrmicinae forms the bulk of Indian ant diversity (45%) with genera Pheidole and Crematogaster having the most species. Fifteen species of ants were identified in the study area of the Karanja Lad city and allied region. All the collected ants were identified into three subfamilies. There were 11 species in 3 genera of subfamily Myrmicinae, 3 species in 2 genera of subfamily Formicinae, 1 species in one genera of Ponerinae, These 15 species of ants where identified upto the genus level.

Key Words :- Ants, 70 % Ethyl alcohol, Stereo microscope

Introduction

Ants are most dominant components of terrestrial ecosystem because of universal distribution, thus constitute greater part of biomass. Ants contribute a conspicuous component of terrestrial biodiversity and are the most divergent group among all social insects. These act as ecosystem engineers. They play very important role in the ecosystem by improving the soil and assisting in the decomposition process. (Watanasit, *et al*.,2000). Ants belong to the family Formicidae, included in superfamily Vesoidea of order Hymenoptera placed under class Insecta of phylum Arthropoda. Ants are virtually omnipresent and usually notable in almost all terrestrial habitats, which makes them one of the most universally recognizable insect groups, besides being widely studied (Holldobler & Wilson 1990, Bolton 1997). The Indian subcontinent is well known for its high biodiversity, varied environments and habitats, and interesting geological history. However, much work remains to document and catalogue the species of India and their geographic distributions, especially for diverse invertebrate groups. (Hemender Bharti).

Globally, there are about 12,571 extant ant species. As per the recent classification, all ants are grouped into 21 subfamilies (Bolton, 2003). Recently, the subfamily Martialinae has been added to the family Formicidae (Rabeling, *et al.*, 2008). All the ants species fall into the single family Formicidae. This family is included in the superfamily Vesipedae of the order Hymenoptera, which is placed in the class Insecta. The Myrmicinae is the largest subfamily of the Formicidae, with 138 genera, followed by Formicinae that have 39 genera and Ponerinae which have 25 genera.

The body of ant is divided into three regions- head, thorax and abdomen. The head region consists of large, medium and blister like compound eyes. A pair of segmented antenna having 6-12 segments. The anterior most part of the antenna has 2-3 club shaped structures. Other part of head region includes maxillary palp, teeth on mandibles and clypeus. The position of antenna, tubercles and spine on head, pre-opticle teeth, sensory hairs on different parts of body, fringe of hair on the basal antennal region. All these structures are variable in different species of ants. The thorasic region consists of three pairs of walking legs with or without sensory hairs. On the legs at ventral apex of tibia there is a spur that may be pectinated or non-pectinated. The thorasic region and gastral segment of abdominal region are interconnected by a structure called petiole. The thorasic region is formed from pro-mesonotum, meso-notum, and sub-mesonotum and propodium. In some species there may be presence of one or more than one pairs of spines. In some species there may be second petiole called post petiole. There are petiolar process (S). The abdominal regions in ants are segmented having 3-4 segments. These are called gastral segments. Whole gastral segmental region is called as pygidium. There is an acidopore at the terminal end of Pygidium. Pygidium may be unarmed

or armed with bristles like or a peg like structure. There may or may not be a rudimentary sting at the terminal region of pygidium. All these various structures are possible to observe under the dissecting microscope or binocular compound microscope. The classification of ants is based on variation in these morphological features of ants (Chavhan *et al* 2018).

Revive of Literature

Gunawardene, N.R., A.E. Daniels 2007. A brief overview of the western ghat-sri links biodiversity hotspot.

Watanasit, S. And Nickel, T.O, 2000. Diversity of ants from Ton Nga chang wildlife sanctuary, Songkhla, Thailand.

Anderson A. N. (2000). A global ecology of rainforest ants: functional groups in related to environmental stress and disturbance. In: Ants stand are method for measuring and monitoring biodiversity.

Bolton B.,2003. Synopsis and classification of Formicidae. Memoirs of the American entomological institute, 71:1-370.

Pawar , S.S. and chavhan A. ,2011. Distribution and Diversity of ant species in and around Amravati city of Maharashtra , India.

Bharti H, Guénard B, Bharti M, Evan P. 2016, Economo. An updated checklist of the ants of India with their specific distributions in Indian states (Hymenoptera, Formicidae). Zoo Keys.

Pfeiffer 2011. Ants as bioindicators of ecosystem health in Shivalik Mountains of Himalayas: assessment of species diversity and invasive species' Asian Myrmecology.

MATERIAL AND METHOD

Study Site and Habitat: The ant samples were collected from various localities in and around Karanja (Lad) city, within 15 km of the city centre. Three ecological habitats, forest, grassland and human were chosen for sampling. The forest included Forest forest garden of Karanja lad, Field nearby Poha village road. The grasslands included region of Rishi Lake in the wilderness zone with tree plantations. The human habitats cover civil area with pronounced human influence such as Kanchan Vihar, Babre Colony and S.S.S.K.R.Innani Mahavidyalaya Campus.

Experiment: We employed all out search method for the collection of ants. Ant were hand collected using a brush and forceps during daytime from 11 AM to 4 PM and preserved in 70 % ethyl alcohol at the Department of Zoology, S.S.S.K.R.Innani Mahavidyalaya Karanja Lad , with careful notes of their locality, habitat and relative visual abundance. Ant species were listed and each species was counted to calculate and compared the composition, richness, species diversity indices, indices of dominance, including similarity indices among the three different habitats.

Ants identification: The collected ants were identified up to the genus level by using Stemi DV4 stereo microscope based on literature (Boltan 2003 ; Keeps 1999).

Data Analyses:

Ant species listed and the complete count of the number of species presented in each habitat were done for species composition and species structure indices. The results were used to indicate the ant species diversity in forest, grassland and human habitats.

Result and Observation

Fifteen species of ants were identified in the study area of the Karanja Lad city and allied region. All the collected ants were identified into three subfamilies. There were 11 species in 3 genera of subfamily Myrmicinae, 3 species in 2 genera of subfamily Formicinae, 1 species in one genera of Ponerinae, These 15 species of ants where identified upto the genus level. The details are listed in Table 1.

Of these 15 ants species, 13 species were collected from the forest, 11 from human habitats and 6 species from grassland. Of these 15 species of ants 6 species where common in all the three habitats, (Table 2). The species diversity indices among the three habitats were slightly different.

Table No.1

Subfamily	Genus	Species found
Formicinae	*Camponotus* *Oecophylla*	*taylori (Forel)* *Wasmanni* *smaragdina*
Myrmicinae	*Crematogaster*	*diffusa* *brunnea* *ebenina* *aberrans* *rothneyi* *rogenhoferi*
	Pheidole	*hoogwerfi* *striativentris* *lamellinoda*
	Aphaenogaster	*rotheyi* *schurri*
Ponerinae	*Leptogenys*	*dentilobis*

Table No 2

Ant Species Found	Forest (F)	Grassland (G)	Human Habitat (H)
Camponotus taylori	+	+	+
Camponotus wasmanni	+	-	-
Oecophylla smaragdina	+	-	-
Aphaenogaster rotheyi	+	-	+
Aphaenogaster schurri	+	+	+
Pheidole hoogwerf	+	+	+
Pheidole striativentris	+	-	-
Pheidole lamellinoda	+	-	+
Crematogaster diffusa	+	+	+
Crematogaster brunnea.	+	+	+
Crematogaster ebenina	+	-	+
Crematogaster aberrans	+	-	+
Crematogaster rothneyi	+	+	-
Crematogaster rogenhoferi	+	-	+
Leptogenys dentilobis	+	-	+

Discusssion:

In the present study 15 species of ants in 6 genera representing 3 subfamilies namely Myrmicinae, Formicinae, Ponerinae .Out of these Myrmicinae is the most abundant. This subfamilies is widly distributed in all geographical regions. Of these 15 ants species, 13 species were collected from the forest, 11 from human habitats and 6 species from grassland. Of these 15 species of ants 6 species where common in all the three habitats. The species diversity indices among the three habitats were slightly different.

Few ant genera as *Crematogaster* with most abundant record of seven species and genera *Aphaenogaster*, *Myrmicaria* and *Monomorium* of Myrmicinae, *Camponotus* and *Polyrchis* of Formicinae and *Leptogenys* of Ponerinae are mostly found everywhere, commonly found in all the habitats and most

localities. Weaver ants nest are formed basically of living leaves and stems bound together with larval silk (Keeps 1999). Least of Weaver ants nests hanging on the trees in Forest in summer season, because of being an aggressive predator and territory defence, they sometimes drop down from their nests and tree branches onto the ground for foraging and defence(Paware 2011).

The study of species diversity indices compared among the three types of habitats such as forest ,grassland and human habitation indicates that the difference in habitat influence the kinds of ant species inhibiting in these habitats. The similarity indices, tools for comparing the similarity between two community samples, vary from 40% to 60% among those habitats sites.

Conclusion

From the present study it can be concluded that diversity of ants is different in these two habitats in terms of species richness, abundance and composition. Ants can be effectively used in indictor studies because they immediately respond to any alteration in the surrounding environment. The number of certain ant species in disturbed habitat were considerably increased because they get ideal conditions over their such as nesting sites, food availability, open grounds for foraging etc. Detailed studies of disturbed habitats are urgently needed according to extent of disturbance, type of disturbance, physicochemical properties of soil, climatic factors, exotic flora and fauna etc.

Reference

1. Anderson A. N. (2000). A global ecology of rainforest ants: functional groups in related to environmental stress and disturbance. In: Ants stand are method for measuring and monitoring biodiversity.
2. Bharti H, Guénard B, Bharti M, Evan P. Economo. An updated checklist of the ants of India with their specific distributions in Indian states (Hymenoptera, Formicidae). ZooKeys. 2016; 551:1-83.
3. Bolton B.,2003. Synopsis and classification of Formicidae. Memoirs of the american entomo logical institute, 71:1-370.
4. Chavan S.,Gulrez S. and Jondhale S. (2018). Diversity and distribution of ant (hymenoptera: formicidae) from Nanded region, Maharastra,India:3;3; 47-51
5. Gunawardene, N.R., A.E. Daniels 2007. A brief overview of the western ghat-sri links biodiversity hotspot.
6. Holldobler B, Wilson EO. The Ants. Harvard University Press. Cambridge, U. S.A, 1990.
7. Keeps.C.J., 1999. Ecological methodology, Addison Educational publishers.
8. Pawar , S.S. and chavhan A. ,(2011). Distribution and Diversity of ant species in and around Amravati city of Maharashtra , India.
9. Pfeiffer (2011). Ants as bio indicators of ecosystem health in Shivalik Mountains of Himalayas: assessment of species diversity and invasive species' Asian Myrmecology; 8:1-15.
10. Rabeling C.,J. M.Brown and M. Verhaagh,(2008). "Newly discovered sister lineage sheds light on early ant evolution". PNAS 105 (39): 14913. Do i:10.1073/pnas.0806187105.PMID 18794530. Ant Blog.Co.uk.
11. Watanasit, S. And Nickel, T.O, (2000). Diversity of ants from Ton Nga chang wildlife sanctuary, Songkhla, Thailand.

WATER POLLUTION TYPES, SOURCES, ECONOMIC EFFECTS AND PREVENSION

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ABSTRACT:

Water covers almost 70% of the world's surface, of that, only 2.5% is fresh and just 1% of that is available for use. As India grows and urbanizes, its water bodies are getting toxic. It's estimated that around 70% of surface water in India is unfit for consumption. Water pollution is the contamination of water bodies, usually as a result of human activities, so that it negatively affects its uses. Water bodies include lakes, rivers, oceans, aquifers, reservoirs and groundwater. Water pollution results when Contaminant are introduced into these water bodies. Water pollution can be attributed to one of four sources: sewage discharges, industrial activities, agricultural activities, and urban runoff including storm water.

The Water (Prevention and Control of Pollution) Act was enacted in 1974 to provide for the prevention and control of water pollution, and for the maintaining or restoring of wholesomeness of water in the country. The Act was amended in 1988. The Water (Prevention and Control of Pollution) Cess Act was enacted in 1977, to provide for the levy and collection of a cess on water consumed by persons operating and carrying on certain types of industrial activities. This cess is collected with a view to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act, 1974. The Act was last amended in 2003.

More than 80 percent of the world's wastewater flows back into the environment without being treated or reused, according to the United Nations; in some least-developed countries, the figure tops 95 percent. The polluting of water bodies is referred to as water pollution. Water pollution occurs when industrial and agricultural effluents contaminate water bodies such as rivers, lakes, oceans, groundwater, and aquifers. When water becomes contaminated, it has a negative impact on all life forms that rely on it, whether directly or indirectly. Contamination of water will have long-term consequences.

The goal of this article is to review and synthesize such quality criteria and design guidelines to inform

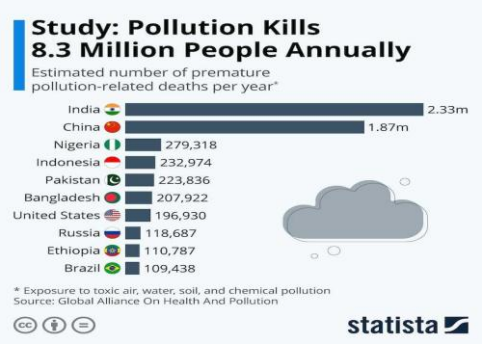
KEY- WORDS: Water pollution, Contamination, Sources, pH, *Wastewater.*

INTRODUCTION:

Water is one of the most important natural resources on the planet, and it has existed for millennia. In reality, the same water we drink has been around in some form or another since the dinosaur era. More than two-thirds of the earth's surface is covered with water. This equates to1 octillion liters (1,260,000,000,000,000,000,000,000 liters) of water dispersed over the oceans, rivers, lakes, and streams. Although this is a large amount of water, only about 0.3 % of it is suitable for human consumption. That number has decreased as commercialization and industrialization have developed. Furthermore, water contamination has been caused by inefficient and obsolete techniques, a lack of understanding, and a variety of other factors.

Water pollution is the **contamination of water sources by substances which make the water unusable for drinking, cooking, cleaning, swimming, and other activities**. Pollutants include chemicals, trash, bacteria, and parasites. All forms of pollution eventually make their way to water. Water pollution can be defined as the contamination of a stream, river, lake, ocean or any other stretch of water, depleting water quality and making it toxic for the environment and humans.

WHO produces international norms on water quality and human health in the form of guidelines that are used as the basis for regulation and standard setting, in developing and developed countries worldwide.



Source: https://www.google.co.in/imgres

RESEARCH METHODALOGY:

Primary and secondary data collection tools are used for the study. In the primary data collection direct observation has been used.

Various web sites have been observed and studied and in the secondary data collection various study material and research works which have been done on water pollution have been studied. Important and related data has been gathered and used for this research work.

RESEARCH OBJECTIVES:

- To Study Designated Best Use Water Quality Criteria.
- To revise types of water pollution.
- To learn Sources of Water Pollution.
- To find out the effects of Water Pollution.
- To gain knowledge about Water Pollution Prevension.

- **Designated Best Use Water Quality Criteria**

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection.	A	Total Coli forms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (Organised)	B	Total Coli forms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coli forms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l

(Sources: https://moef.gov.in/en/water-pollution/)

- **TYPES OF WATER POLLUTION:**

Water bodies can be polluted by a wide variety of substances, including pathogenic microorganisms, putrescible organic waste, plant nutrients, toxic chemicals, sediments, heat, petroleum (oil), and radioactive substances. Several types of water pollutants are considered below.

- Organic pollution : due to microorganisms - bacteria and viruses - present in the water, generated by excrement, animal and vegetable waste
- Chemical pollution: generated by the nitrates and phosphates of pesticides, human and animal drugs, household products, heavy metals, acids and hydrocarbons used in industries
- Surface water pollution
- Ground water pollution.

- **THE SOURCES OF WATER POLLUTION:**

Unsurprisingly, human activity is primarily responsible for water pollution, even if natural phenomenon - such as landslides and floods - can also contribute to degrade the water quality. The following are some of the most frequent water pollutants:

- Industrial effluents
- Domestic waste
- Insecticides and pesticides are both used to kill insects.
- Fertilizers and Detergents
- Most marine pollution comes from land sources.
- Water pollution is sometimes created by nature.
- Agriculture is one of the primary sources of water pollution.
- Nutrient pollution is a very critical environmental concern.
- According to a study, almost 500 million tons of manure are generated from animal feeding operations every year
- *Antibiotics and Hormones* fed to livestock, and afterward, excreted into the environment.
- *Heavy Metals* remain in soil fertilizer, which reaches water sources.

- Salts can reach the waterways and make drinking water unsafe.
- Industrial procedures often discharge waste into freshwater sources.
- *Fossil Fuel Burning* generates ash, including toxic chemicals that mix with water vapor and create acid rain that eventually turns into water sources.
- Wastewater Treatment sewage released into local waters is not always clear of bacteria, viruses, metals, sediment, and other pollutants.
- Mining activities such as crushing rock and extracting minerals release dangerous chemicals and toxins that can mix with water.
- *Underground Storage Leakage*
- *Sewerage Leakage*
- *Vehicle Emissions*
- *Landfill Leakage*
- *Waste Leakage*
- *Radioactive Pollutants*
- *Global Warming*
- *Deforestation*
- *Maritime Traffic*
- One of the major causes of pollution in the river has been identified as plastic contamination.
- Agriculture Waste
- Ocean Acidification
- The increase in carbon dioxide changes the chemical makeup of the water.

❖ **EFFECTS ON THE ECONOMY :**

The most devastating economic fallout from water pollution, let's examine these in more detail.

- Pollution increases water treatment prices. This is due to the additional energy costs and chemicals to filter and clean the water.
- Almost $1 billion in revenue is lost in tourism each year to water pollution.
- The shellfish industry on America's West Coast is threatened by pollution and ocean acidification. Highly-acid water corrodes the carbon-based shells of shellfish.
- Water pollution also negatively impacts real estate values. The EPA found that waterfront property values drop as much as 25% if the water is polluted compared to properties with clean water.
- Water pollution truly harms biodiversity and aquatic ecosystems. The toxic chemicals can change the color of water and increase the amount of minerals - also known as eutrophication - which has a bad impact on life in water.
- Water pollution has very negative effects on public health. A lot of diseases result from drinking or being in contact with contaminated water, such as diarrhea, cholera, typhoid, dysentery or skin infections.
- Death of animals
- Loss of entire species
- Ecological effects on communities
- Destruction of aquatic ecosystems
- Disruption of food chains
- Food poisoning

❖ **WATER POLLUTION PREVENTION:**

Despite these discouraging facts, there are viable and proven means to combat our nation's water pollution.

- First, the government should update the Clean Water Act and other local and state laws to reflect current conditions. The Act had two significant benefits: The government could also impose Pigouvian taxes on those who pollute.
- The government could increase funding for studies of water pollution solutions. For example, bioremediation has shown great promise at low cost. It employs microorganisms or microbial plants and their enzymes to naturally degrade contaminants in the environment.
- We can all contribute to solving the water pollution problem.
- Another solution is for farmers to repurpose manure into biofuels. Modern industrial farming techniques use concentrated animal feeding operations that generate more than 300 million tons of waste annually.
- Wastewater treatment consists of removing pollutants from wastewater through a physical, chemical or biological process. The more efficient these processes are, the cleaner the water becomes.

- Globally, agriculture accounts for 70% of water resources, so it is essential to have climate-friendly crops, efficient irrigation that reduces the need for water and energy-efficient food production. Green agriculture is also crucial to limit the chemicals that enter the water.
- Storm water management is the effort to reduce runoff of rainwater or melted snow into streets, lawns and other sites and the improvement of water quality.
- Air pollution has a direct impact on water contamination as 25% of human induced CO2 emissions are absorbed by oceans.
- 80% of plastic in our oceans is from land sources. In order to reduce the amount of plastic entering our ocean, we need to both reduce our use of plastic globally, and to improve plastic waste management.
- Without water conservation, we won't go very far. It is central in making sure the world has better access to clean water. It means being aware that water is a scarce resource, taking care of it accordingly, and managing it responsibly.

SUGGESTIONS:

- **Public Awareness:** Seminars, workshops, and conferences, as well as a variety of other activities, are held to educate the public and improve community transmission.
- **Industrial Effluent Monitoring**: The Grossly Polluting Industries are regularly monitored. Environmental compliances are checked in industries that follow the stated norm. Without the use of intermediaries, the reports are submitted directly to the central pollution control board.
- The greatest strategy to avoid large-scale water contamination is to strive to mitigate its negative consequences. We may make a number of minor changes to safeguard ourselves from a frightening future in which water is scarce.
- **Save Wate**r: Our primary goal is to conserve water. Water waste is a big problem around the world, and we are only now becoming aware of it. Small modifications that you may make at home can make a big effect.
- **Better treatment of sewag**e: As a result, processing waste materials before disposing of them in a water body aids in the reduction of large-scale water pollution. By lowering the hazardous content of the wastewater, agriculture and other businesses may reuse it.
- **Use environmentally friendly products:** We can limit the quantity of water pollution created by a household by using soluble items that do not become pollutants.

CONCLUSIONS:

Water pollution is very harmful to the environment, particularly to animals and the life present in the water. The effects can be catastrophic, depending on where pollutants, their concentrations, and the type of chemical or other substances are involved. The fact that water pollution contributes to the ecological problems of aquatic ecosystems and humans' health problems is well documented. Crops, animals, and our oceans are also affected at all levels by water contamination, and of course, we must also be concerned about the unhealthy substances that reach drinking water.

Pollution of the water supply has become a global issue. Because of the uncontrolled and uneven development of linked sectors like industries and agriculture, the perennial threat of a water crisis is intensifying. According to NITI Aayog studies, 21 major Indian cities, including Delhi, may run out of groundwater totally. Water contamination has a significant impact on aquatic life. It has an effect on their metabolism and behavior, as well as causing illness and death. Dioxin is a toxin that can cause a variety of issues, ranging from infertility to uncontrolled cell proliferation and cancer. Bioaccumulation of this chemical has been found in fish, chicken, and beef. Before reaching the human body, chemicals like these go up the food chain.

Control of water pollution requires appropriate infrastructure and management plans as well as legislation. Technology solutions can include improving sanitation, sewage treatment, industrial wastewater

treatment, agricultural wastewater treatment, erosion control, sediment control and control of urban runoff (including stormwater management). Effective control of urban runoff includes reducing speed and quantity of flow.

REFERENCES:

1. https://solarimpulse.com/water-pollution-
2. https://www.thebalance.com/water-pollution-effects-causes-and-solutions-4775830#toc-causes-of-water-pollution
3. https://www.geeksforgeeks.org/what-is-water-pollution-sources-causes-prevention/
4. https://moef.gov.in/en/water-pollution/
5. https://celb.org/how-water-pollution-affects-the-environment-effects-of-water-pollution/
6. https://www.linquip.com/blog/main-causes-water-pollution/
7. https://cpcb.nic.in/nwmp-data-2021/
8. https://en.wikipedia.org/wiki/Water_pollution
9. https://www.nrdc.org/stories/water-pollution-everything-you-need-know
10. https://www.ecologycenter.us/wastewater-treatment/5-different-sources-of-water-pollution-and-how-to-stop-them.htm

POLLUTION: SOURCES, EFFECTS AND CONTROL

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Abstract:

We undoubtedly hear the word "pollution" every day at school, college, and the office. Newspapers, internet journals, and other types of media also use the word. What is it, then, and why is it considered harmful? When pollutants poison the natural environment, it results in changes that have a negative impact on our everyday lives. The primary constituents or parts of pollution are pollutants, which are typically waste products in a variety of forms. Our ecosystem and the balance of the environment are both disturbed by pollution. Our lives have developed and modernized to the point where pollution is at an all-time high, contributing to both global warming and human illness. According to the polluter-pays principle, whomever causes pollution should be held accountable for the harm they cause. It has to do with financial responsibility.Any company or person is in charge of handling and caring for the garbage they produce, and they should be held liable for any harm it may cause. Imagine a factory that generates a variety of wastes that may harm the earth, water, and air. The factory is encouraged to treat the trash before releasing it thanks to the polluter pays principle. The factory is responsible for making up for any environmental harm brought on by its trash, including any deaths, health problems, property losses, and environmental harm

1. Introduction:

The poisoning of water bodies by hazardous chemicals is one of the main causes of water pollution. As can be seen from the aforementioned example, discarded plastic bottles, cans, and other garbage damage aquatic bodies. These lead to water contamination, which hurts the entire environment in addition to people. These pollutants release toxins that move up the food chain and finally reach humans. In most instances, the result is harmful only to the local population and species, but it can also have an effect on a larger scale. The oceans receive over 6 billion pounds of trash each year. Other types of undesired materials are discharged into different water bodies in addition to industrial effluents and untreated sewage.These can include everything from oil spills to nuclear waste, the latter of which can make large areas inhabitable.

2. Water pollution:

The polluting of water bodies is referred to as water pollution. Water pollution occurs when industrial and agricultural effluents contaminate water bodies such as rivers, lakes, oceans, groundwater, and aquifers. All lifeforms that depend on water, whether directly or indirectly, suffer when it is polluted. Years may pass before you notice the impacts of tainted water.

2.1. Sources of Water Pollution

Urbanization, deforestation, industrial effluents, social and religious practices, use of detergents and fertilizers, and agricultural run-offs-use of insecticides and pesticides-are the main causes of water pollution in India.

2.2. Effects of Water Pollution

The type of contaminants present and their concentration determine the impact of water pollution. In determining the amounts of pollution, the location of water bodies is also crucial. Urban areas' surrounding water bodies are very polluted. This is the outcome of industrial and commercial facilities discharging trash and hazardous materials. Aquatic life is significantly impacted by water pollution. It alters their behaviour and metabolism, which results in disease and eventual death. Dioxin is a toxin that affects many processes, including reproduction, unchecked cell development, and cancer. Fish, chicken, and meat all bioaccumulate this compound. Before reaching the human body, toxic chemicals move up the food chain.The food chain may be significantly impacted by water contamination. The food chain is thrown off. Lead and cadmium are two toxic substances that can continue to cause problems at higher concentrations after they enter the food chain through animals (fish eaten by humans or other animals). Humans are impacted by pollution and are at risk of catching diseases like hepatitis from faeces in water sources. An outbreak of infectious diseases like cholera and others can always be brought on by improper drinking water treatment and unfit water. Because of water pollution, the ecology may be severely impacted, altered, or disorganised.

2.3. Control Measures of Water Pollution

There are numerous ways to reduce water contamination on a broader scale. Treatment of sewage waste prior to release is preferable to discharging it into aquatic bodies. By doing this, the water body itself can breakdown and render harmless any compounds that are still there, reducing their initial toxicity. Water that has undergone secondary treatment may be used in sanitary systems and agricultural fields. The Water Hyacinth is a very unique plant that can take up harmful compounds like cadmium and other such substances that are dissolved in water. The negative impacts will be greatly diminished by establishing these in areas vulnerable to these types of pollution.Precipitation, ion exchange, reverse osmosis, and coagulation are a few chemical techniques that aid in the management of water pollution. Reusing, reducing, and recycling whenever possible will go a long way toward addressing the consequences of water pollution on an individual basis.

3. Land pollution:

The degradation of the earth's land surfaces, both above and below the surface, is referred to as land pollution. The build-up of waste materials—both solid and liquid—that contaminate soil and groundwater—is the reason. Municipal solid waste (MSW), which encompasses both hazardous and non-hazardous waste, is a common term for these waste items. The permeability of the soil formations beneath the garbage can raise or decrease the risk of land pollution when waste is dumped onto a piece of land. There is a direct correlation between soil permeability and the likelihood of land pollution.Land pollution has been greatly reduced because to the use of the natural shale and clay in the area. For the TDS Austin dump to comply with strict environmental protection laws, both natural and artificial barriers are used. The leachate collection system, thick re-compacted clay sidewall liners, and performance-based liner system are all included in the landfill construction. The EPA and TCEQ's current performance-based landfill liner system requirements are easily met by the liner system.

3.1. Causes of land pollution:

3.1.1. Litter

Unfortunately, incorrect garbage disposal, or littering, happens frequently. According to a research by Litter in America, the cost of cleaning up litter in the United States exceeds $11.5 billion annually. Every food wrapper or cigarette stub that is thrown out a window contributes in some tiny way to this enormous problem. Keep America Beautiful claims that 76% of the litter observed on roads comes from drivers and pedestrians. But not all litter is deliberate. Unsecured objects that fall out of trash cans or the backs of cars also contribute significantly to litter.Land contamination is further exacerbated by illegal dumping. In lieu of authorised dumping facilities, waste is frequently dumped illegally in locations including forests, open fields, and ditches. Asbestos, automobiles, and recyclable or reusable rubbish are examples of materials that are frequently illegally discarded. Whether it is done on purpose or not, all litter pollutes the environment by breaking down and releasing chemicals and tiny particles. To find out more about the harm caused by littering and how to stop it in your neighbourhood, see our blog on the subject.

3.1.2. Urbanization and Construction

Urbanization alone does not constitute littering, but a dense population that produces rubbish and leaves behind litter will certainly result in land pollution. Construction work is being done to accommodate this growing population, which generates a lot of waste materials including bricks, metal, plastic, wood, and other building materials. These materials add to the area's land pollution when they are not disposed of appropriately. Work with partners who provide full builder solutions to establish cost-effective construction recycling and trash disposal strategies in order to lessen the environmental impact of construction sites.

3.1.3. Agriculture

The basis of both daily life and the economy as a whole is agriculture. However, it can also have a significant impact on the environment. Agricultural pollution is when a significant amount of contamination produced as a by-product of raising animals and cultivating food crops is released into the environment.

3.2. Effects of Land Pollution

Almost every aspect of the living world is impacted by land contamination, including:water that is unsafe to consume.Polluted soil results in the loss of agriculturally productive land.Climate change brings forth a plethora of terrible issues, such as flash floods and erratic rains. The extinction and endangerment of natural species. Habitat shifting is the process through which some animals must leave their homes in order to survive. An increase in flames as a result of dry conditions in contaminated areas increased air pollution, which is a result of garbage burning. Increased soil contaminants can affect one's health by getting into the body through the food chain.

3.3. How to Prevent Land Pollution

Given the severe implications of land pollution, it is imperative to take preventative actions to lessen its effects in the future. Lessening the Use of Chemicals and Pesticides in Agriculture. Finding alternatives will aid in minimising the impact on the environment because the use of pesticides and other chemicals in farming and agriculture significantly contributes to land pollution. By switching from bio-fertilizers to manure, farmers, for example, can use natural ingredients. Supporting local, environmentally conscious farmers at your neighbourhood farmer's market or grocery shop can encourage them to adopt more environmentally friendly farming methods. Contributing to or helping out in an urban garden in your neighbourhood is an additional choice.

3.3.1. Reforestation

Reforestation entails planting new trees in a location. For example, this may be required in places that have recently had wildfires or where trees have been felled and processed. By helping to bond the soil, this process shields it from land contamination, reduces soil erosion, and reduces flooding.

3.3.2. Solid Waste Treatments

When solid waste is not correctly handled, the amount of toxins and dangerous compounds in the soil might grow. Land pollution can be decreased with the aid of chemical treatment techniques used in a controlled setting. This method of treating solid waste also involves neutralisation. Before being placed into landfills, trash undergoes this treatment to change its pH level.

3.4. Reduce, Reuse and Recycle

There are numerous things we can do personally to lessen our contribution to land contamination. Reusing or recycling products is one of the simplest ways to accomplish this and prevent the creation of waste from materials or objects that still have useful lives. It has never been simpler to recycle thanks to rising recycling awareness and an increase in recycling bins in many cities. Composting is another approach to lessen land pollution. Food scraps and yard waste together currently account up more than 30% of what we toss away but might be composted, according to the United States Environmental Protection Agency.Environmental waste is avoided by reducing and reusing waste goods. Read our blog post on how to be an environmental steward in your neighbourhood if you want to make a difference on a local level.

4. Discussion and concluding remarks

Environmental pollution is defined as the wasteful discharge of waste into the planet's natural resource reservoirs, such as the air or water, which has continued nonstop and caused both temporary or permanent harm to living organisms and their surroundings. Environmental contamination has an adverse influence on the ideal environmental systems by revealing the contaminated physical and biological aspects of the planet. Pollutants may cause significant or minor destructions, with the big devastation being measurable and its efficacy being tracked. However, the little degradation only becomes apparent after a very long time as a very slight disruption to the fragile stable natural food web pyramid offset.Fish and other aquatic life may be harmed as a result of deoxygenation caused by the biodegradation of organic materials, which takes oxygen out of the water. Eutrophication is the term used to describe high nitrogen levels in water. As a result of this process, the density of algae and other plants increases, which can decrease light penetration into the water and result in deoxygenation when the plants decompose. The steady build-up of substances in living things' bodies is known as bioaccumulation. Bio amplification is the

process of increasing accumulation up a food chain. Human health will suffer if bioaccumulated toxins are consumed in food sources like fish. Through consumption of water and food, inhalation through breathing, and skin absorption, humans are exposed to contaminants.Preventing pollution refers to stopping or reducing waste generation before it is released into the environment. Measures are taken to limit the harm that pollutants can cause. Principles like the polluter pays principle, the precautionary principle, and the duty of care concept, as well as pertinent legislation and policies, all assist pollution reduction.

References:

1. http://www.ccohs.ca/oshanswers/phys_agents/ionizing.html
2. http://www.legislation.gov.uk/ukpga/1990/43/contents
3. http://www2.epa.gov/laws-regulations/summary-clean-water-act
4. http://www.bbc.co.uk/schools/gcsebitesize/science/21c_pre_2011/atmosphere/chemicalsairrev2.shtml

SYNTHESIS OFSOMECURCUMINSUBSTITUTED 4H-PYRANBY USINGDOPED POLYANILINEASNANO-CATALYST

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ABSTRACT:

4H-Pyrans and benzpyran are synthesized through one-pot Knoevenagel-Michael cyclo-condensation reaction. Multicomponent reaction (MCR) are considered as one of the most important synthetic methodology which consists three or more reactants attached together in a one-pot reaction to form targeted products.That makes MCRs really novel, green and eco-friendly reaction system.This study aimed at investigating the synthesisof curcumin based 4H-pyran from(1)aromatic aldehyde (2)malononitrile and (3) curcumin by using nanostructure Cobalt Chloride Doped Polyaniline composite (PANI-Co) as catalyst was carried out. The effective method for the synthesis of 4-H pyran derivatives of biologically important compounds has been coined. We synthesized the different 4-H pyran derivatives which give up to moderate to good yield.

KEYWORDS: Pyran,curcumin ,polyaniline,nano-catalyst.

INTRODUCTION:

Six-membered oxygen- containing heterocycles are wide-ranging through both the areas of naturally being and completely synthetic molecules. Numerous naturally occurring compounds containing pyrans and benzopyrans display interesting biological activity which has in part motivated substantial attention from the chemical community at the degrees of structure and reactivity, and synthesis and properties [1].

4H-Pyran derivatives have been considered as a main unit in maximum oxygen-containing heterocyclic compounds. 4H-Pyrans are synthesized through one-pot Knoevenagel-Michael cyclo-condensation reaction. In addition, they've been attracted a substantial interest related to their biological and pharmaceutical properties similar as antibacterial, antitumor, antitubercular, pigments and antiviral activities [2]. Multicomponent reactions (MCR) are considered together most important synthetic methodology which consists three or more reactants attached together in a one- pot reaction to form targetedproducts.The characteristic advantage of MCR's is that the targeted products contain nearly all portions of substrates, generating generally no by-products. That makes MCRs really novel, green andeco-friendly reaction system. Targeted products can be gained in one- pot with truly less steps. Thus, MCRs have been attracted significant attention in numerous research fields, similar as discovery of vital compounds in medicinal chemistry, combinatorial chemistry and medicinal discovery [3,4].The heterogenous catalytic reactions have played important role in developing organic synthesis. Because of their, functional simplicity, environmental compatibility, reusability,non-toxicity, profitable and easyremoval from reaction mixture [5.6], so we've presented the following catalytic system Graphitic Cobalt Chloride Doped Polyaniline (PANI-Co) in the synthesis of some important 4H-pyran.

LITERATURE REVIEW:

The 4-H Pyran compounds are of biological interest synthesized from the aldehyde and its derivatives, malononitrile and various nucleophiles including 1,3-dicarbonyl,indole,secondary amines,cynides compounds using various catalysts. These reactions were extensively well studied and reported in the literature. Thus, numerous researchers have been developed many protocols for 4H-Pyrans synthesis by reacting aldehydes, malononitrile and 1,3-dicarbonyl compounds using various catalysts such as SnCl2/ SiO2, MgO, potassium phthalimide,

silica nanoparticles and silica bonded N-propylpiperazine sodium n-propionate [7].

The generalschematic representation ofsynthesis ofcurcumin based 4H-pyran from (a)substituted aldehyde (b) malononitrile and (c) curcumin by using nanostructure Cobalt Chloride doped Polyaniline composite (PANI-Co) as Catalyst is given in **Fig.1**The synthesis was found to be the convenientmethod for the synthesis of the number of 4H-pyran derivatives which was characterized and found tohavetheextensiveuseinthemedicinalchemistry .

Fig.1The generalschematic representation ofsynthesis ofcurcumin substituted 4H-pyran.

There are four curcumin substituted 4-H pyran derivatives have been synthesized from the (1) curcumin (2) malinonitrile and (3) substituted aldehyde byusing Cobalt Chloride Doped Polyaniline composite (PANI-Co) as catalyst and theywerefoundto havegoodyield ofthe product.

EXPERIMENTAL DETAILS:

Material

All chemicals supplied by the Merck (Extra pure) Chemical Companies and used were without further purification. IR spectra were recorded on a Perkin-Elmer 1640 FT-IR instrument. Unlessotherwisespecified, $CDCl_3$ was used as solvent.The organic solvents such as acetone,ethanol, ethyl acetate etc. used were of AR grade.

a. Preparation Of Polyaniline (PANI) :

The polyaniline was synthesized by the chemical oxidization method at low temperature (0 to 50^0 C). Ammonium Persulphate and Hydrochloric acid used as a oxidizing agent as received without further purification. 15 ml Aniline was first dissolve in 2 M 100 ml Hydrochloric Acid (HCl) (Merk). Then this solution is kept in the ice bath below 5^0C temperature. Ammonium Persulphate solution (Usually 10%) was added to the above solution with constant stirring. This polymerization process were completed within the three to four hours and the finally the green colour polyaniline was formed. It is washed with the hot dilute HCl and dried it in the oven for 24 Hours.

b. DopingofPANI :

Anhydrous $CoCl_2$ (0.1298 g, 1.0 mmol) was dried in high vacuum at 30 °C for 3 hours. Dry $CoCl_2$ was dissolved in acidic methanol solution (pH=1). Polyaniline -ES (0.200 g) powder was mixed with dopant solution and stirred for 2 hrs. The doped mixture was kept for 12 hrs at room temperature in the glass crucible and dried in the oven at 60^0 for 5 hrs. Finally, the powder of doped polyaniline was formed and it grind to fine powder.

c.General procedure of synthesis of curcumin substituted 4H-pyran.

In a oven-dried RBF Curcumin (**1**, 0.25 mmol; 0.092 g), malononitrile (**2**, 0.25 mmol; 0.017 g), aromatic aldehyde , doped polyaniline (5%), and ethanol (3 mL) were transferred sequentially at ambient conditions. The overall reaction mixture was then stirred vigorously for 2 days (24 h). The progress of the reaction was monitored by TLC. After completion of the reaction, 5 mL of distilled water was added to the resulting mixture when a solid mass precipitated out that was filtered off, washed with aqueous ethanol. For further purification, the products were recrystallized from methanol. The structure of purified compound was confirmed by its spectral studies including 1 H-NMR.

RESULTSANDDISCUSSION :

The structure and functionality of synthesized bare PANI catalysts material were confirmed by FTIR spectroscopy shown in Fig.2. The

bands at 1560 and 1480 cm−1 can be assigned to C=N and C=C of aromatic systems. The bands at 1300 and 1245 cm−1 can be assigned to C−N stretching vibrations of the benzenoid unit, and the band at 1115 cm−1 corresponds to the quinoid unit of the PANI polymer.[9,10]

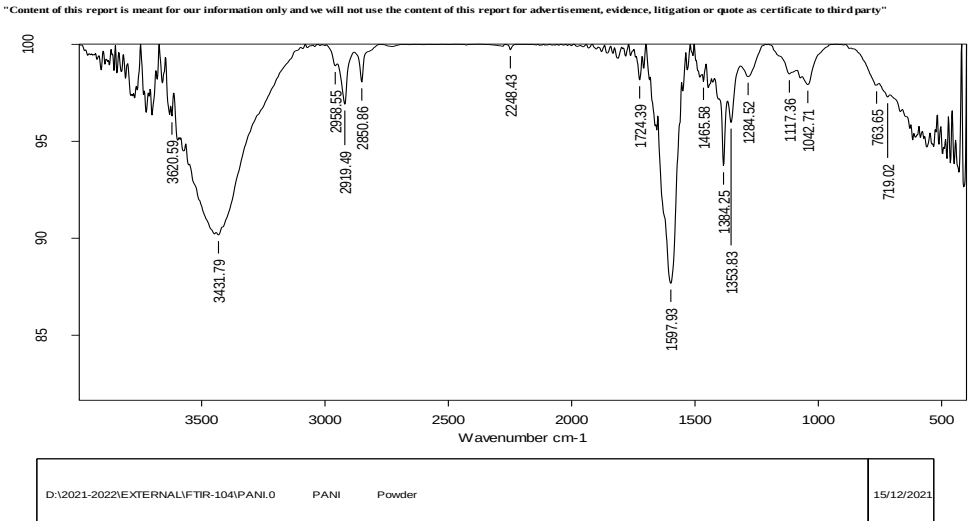

Fig.2 FTIR images PANI (Emeraldine Salt)

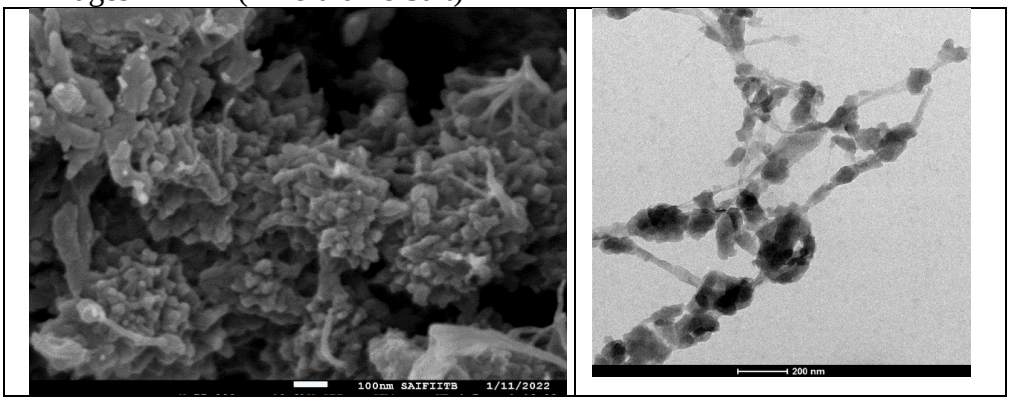

Fig.3 FEG-SEM images of PANI TEM images of PANI

The synthesized compounds not yet evaluated for their antimicrobial activities.There are four curcumin substituted 4-H pyran derivatives have been synthesized and theywerefoundto havethe satisfactory resultsandyield ofthe product.

Sr. No.	**Product**	**R in 3**	**Time in Hrs.**	**Isolated Yield (%) Observed**	**Reported**
1		R=H	20	63	70 [8]

2		$R=NO_2$	22	65	----
3		R=Cl	24	60	---

Table. 1

Reaction conditions: In a round-bottom 10 mL reaction flask, curcumin (0.25 mmol), aromatic aldehyde (0.25 mmol), malononitrile (10.25 mmol), PANI –Co catalyst (5 wt %), and ethyl alcohol (3 mL) were placed, and the reaction mixture was stirred for 24 hrs at room temperature.

TheRepresentative analytical dataoffew Compounds

2-amino-5-((E)-3-(4-hydroxy-3-methoxyphenyl)acryloyl)-6-(4-hydroxy-3-methoxystyryl)-4-phenyl-4H-pyran-3-carbonitrile (Table Entry01)
Molecular Formula- C31H26N2O6 Mol.Weight-552.18 Yellow solid; m.p. 165°C-168°C; yield: 68% 1 H NMR (400 MHz, DMSO-d6): δ 9.29 (br s, 1H, ─OH), 9.09 (br s, 1H, ─OH), 7.64-7.39 (m, 6H, four Ar─H and two vinylic protons), 7.22-7.15 (m, 2H, Ar─H), 6.96-6.52 (m, 7H, five Ar─H and two vinylic protons), 4.03 (s, 1H, ─CH), 3.78 (s, 3H, Ar─OCH3), 3.75 (s, 3H, Ar─OCH3); elemental analysis: calcd (%) for C31H26N2O6: C, 71.25; H, 5.02; N, 5.36; found: C, 71.16; H, 5.01; N, 5.38.

2-amino-5-((E)-3-(4-hydroxy-3-methoxyphenyl)acryloyl)-6-(4-hydroxy-3-methoxystyryl)-4-(nitrophenyl)-4H-pyran-3-carbonitrile (Table Entry02)
Molecular Formula- C31H25N3O8 Mol.Weight-567.16 Yellowish brown solid; m.p. 158°C-160°C; yield: 76% (106 mg; 0.25 mmol scale); Rf (50% ethyl acetate/petrol ether) 0.37; 1 H NMR (400 MHz, CDCl3): δ 8.02 (d, J = 8.4 Hz, 2H, Ar─H), 7.58 (d, J = 15.6 Hz, 2H, vinylic protons), 7.44 (d, J = 8.4 Hz, 2H, Ar─H), 7.12 (dd, J = 8.2, 2.0 and 1.6 Hz, 2H, Ar─H), 7.05 (d, J = 2.0 Hz, 2H, Ar─H), 6.93 (d, J = 8.4 Hz, 2H, Ar─H), 6.47 (d, J = 16.0 Hz, 2H, vinylic protons), 5.80 (s, 1H, ─CH), 3.94 (s, 6H, 2 × Ar─OCH3); elemental analysis: calcd (%) for C31H25N3O8: C, 66.85; H, 4.52; N, 5.03; found: C, 66; H, 4.50; N, 4.91

2-amino-4-(2-chlorophenyl)-5-((E)-3-(4-hydroxy-3-methoxyphenyl)acryloyl)-6-(4-hydroxy-3-methoxystyryl)-4H-pyran-3-carbonitrile (Table Entry03)
Molecular Formula- C31H25ClN2O6 Mol.Weight-556.14 Brown solid; m.p. 162°C-164°C; yield: 71% (107 mg; 0.25 mmol scale); Rf (50% ethyl acetate/petrol ether) 0.15; 1 H NMR (400 MHz, DMSO-d6): δ 9.33 (br s, 1H, ─OH), 9.12 (br s, 1H, ─OH), 7.87-7.63 (m, 2H, vinylic protons), 7.57-7.51 (m, 1H, Ar─H), 7.44-7.30 (m, 2H, Ar─H), 7.19-7.12 (m, 2H, Ar─H), 7.05-6.93 (m, 2H, Ar─H), 6.84-6.71 (m, 5H, three Ar─H and two vinylic protons), 4.94 (br s, 1H, ─CH), 3.79 (s, 3H, Ar─OCH3), 3.75 (s, 3H, Ar─OCH3); elemental analysis: calcd (%) for C31H25ClN2O6: C, 61.91; H, 4.19; N, 4.66; found: C, 61.80; H, 4.22; N, 4.60

CONCLUSION

In the above reported work we extended the methodology for the synthesis of curcumin substituted 4-H pyran by using nanostructure Cobalt Chloride doped polyaniline composite as catalyst .We

synthesize the three different curcumin substituted 4-H pyran by using nanostructure composite as Catalyst. The Cobalt Chloride Doped polyaniline as catalyst has been used as an efficient,cheap and nontoxic catalyst in the synthesis of 4H-pyran derivatives.Ambient reaction conditions is the key benefits of this extended protocol.

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REFERENCES:

[1]A. J. Phillips, J. A. Henderson, and K. L. Jackson University of Colorado, Boulder, CO, USA 2008, p338

[2]. Kumar KA, Renuka N, Kumar GV, et al. Pyrans: Heterocycles of chemical and biological interest. J Chem Pharm Res. 2015;7: pp 693-700

[3]. Khaligh NG, Abd-Hamid SB. 4-(Succinimido)-1-butane sulfonic acid as a Brönsted acid catalyst for the synthesis of pyrano[4,3-b]pyran derivatives using thermal and ultrasonic irradiation. Chin J Catal. 2015;36: pp 728-33.

[4].Anatoly NV, Michail NE, Fedor VR, et al. Multicomponent assembling of salicylaldehydes, malononitrile, and 4- hydroxy-6-methyl-2H-pyran-2-one: A fast and efficient approach to medicinally relevant 2-amino-4H-chromene scaffold. C R Chimie. 2015;18:1344-9.

[5]. Niknam KM, Mohammad R, Mohamed S. Silica-bonded S-sulfonic Acid as a Recyclable Catalyst for Synthesis of 2,3- Dihydroquinazolin-4(1H)-ones. Chin J Chem. 2011;29:1417- 22.

[6].Viviana M, Elsa MF, Torres N, et al. Sol-gel synthesis of V2O5-SiO2 catalyst in the oxidative dehydrogenation of nbutane. Appl Catal A: General. 2006;312:134-4

[7] (a) Mansoor SS, Logaiya K, Aswin K, Sudan PN. An appropriate one-pot synthesis of 3,4-dihydropyrano[c]chromenesand 6-amino-5-cyano-4-aryl-2-methyl-4H-pyrans with thioureadioxide as an efficient, reusable organic catalyst in aqueous medium. J Taibah Univ Sci. 2015;9:213-26. (b) Smits R, Belyakov S, Plotniece A, et al. Synthesis of 4H-Pyran Derivatives Under Solvent-Free and Grinding Conditions. Syn Commun. 2013;43:465-75. (c) Romdhane A, Janne HB. Synthesis of new pyran and pyranoquinoline derivatives. Arabian J Chem. 2017;10:S3128- S34.

[8]Goutam Brahmachari , Mullicka Mandal,J Heterocyclic Chem. 2019;1–7.

[9]Khalafi-Nezhad, A.; Nourisefat, M.; Panahi, F. Org. Biomol. Chem. 2015, 13, 7772−7779.

[10]Ashish Bahuguna, Priyanka Choudhary, Tripti Chhabra, and Venkata Krishnan ACS Omega 2018, 3, 12163−12178

[11] Gao, Y.; Du, D.-M. Tetrahedron: Asymmetry 2013,pp 2, 1312− 1317.

[12]Harichandran, G.; Parameswari, P.; Kanagaraj, M.; Shanmugam, P. Tetrahedron Lett. 2015, 56, 150−154

[13]Wang, Y.; Wang, X.; Antonietti, M. Angew. Chem., Int. Ed. 2012, 51, 68−89.

[14]Datta, K.; Reddy, B. S.; Ariga, K.; Vinu, A. Angew. Chem. 2010, 122, 6097−6101.

[15]Goutam Brahmachari , Mullicka Mandal,J Heterocyclic Chem. 2019;1–7.

[16] G. Brahmachari, I. Karmakar, *ChemistrySelect* **2019**,4,747.

[17]E. A. A. Hafez, M. H. Elnagdi, A. G. A. Elagamey, F. M. A. A. Eltaweel, *Heterocycles* **1987**, *26*, 903.

[18] Ellis, G. P. in: Weissberger, A.; Taylor, E. C. (Eds.), *The Chemistry of Heterocyclic Compounds: Chromenes*, Chromanes and Chromones, John Wiley, New York, **1977**, pp. 11–139

[19] D. Armetso, W. M. Horspool, N. Martin, A. Ramos, C. Seaone, *J. Org. Chem.* **1989**, *54*, 3069.

[20] K. Nurjamal, G. Brahmachari, ChemistrySelect 2019, 4, 2363.

[21] Nazari, P.; Bazi, A.; Ayatollahi, S. A.; Dolati, H.; Mahdavi, S. M.; Rafighdoost, L.; Amirmostofian, M. Synthesis and evaluation of the antimicrobial activity of spiro 4H-pyran derivatives on some gram positive and gram negative bacteria. Iran J. Pharm. Res. 2017, 16, 943−952. (26) Zarei

POPULATION, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

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Abstract:

Sustainable development has been defined differently by different institutions and people even though there is similarity in the basic concept. According to the World Development Report (1992), "sustainable development is the development that lasts. A specific concern is that those who enjoy the fruits of economic development today may be making future generations worse-off by excessively degrading the earth's resources and polluting the earth's environment". The Human Development Report, on the other hand, states that, "sustainable development is a process in which economic, fiscal, trade, energy, agricultural, and industrial policies are all designed to bring about development that is economically, socially and ecologically sustainable. That is, current consumption cannot be financed by incurring economic debts that other s must pay in the future." The World Commission on Environment and Development (WCED, 1987) defines sustainable development as that development which "meets the needs of the present without compromising the ability of future generations to meet their own needs" and "requires meeting the basic needs of all and extending to all the opportunity to fulfill their aspirations for a better life".

Introduction:-

Population, Environment, and Sustainable Development are the interrelated issues to each other. If we will be successful to make the balance of population and environment then we will be benefited to sustainable development. Therefore, in this paper firstly introduced what is sustainable development then highlighted impact of population explosion

Sustainable Development:

Sustainable development has been defined differently by different institutions and people even though there is similarity in the basic concept. According to the World Development Report (1992), "sustainable development is the development that lasts. A specific concern is that those who enjoy the fruits of economic development today may be making future generations worse-off by excessively degrading the earth's resources and polluting the earth's environment". The Human Development Report, on the other hand, states that, "sustainable development is a process in which economic, fiscal, trade, energy, agricultural, and industrial policies are all designed to bring about development that is economically, socially and ecologically sustainable. That is, current consumption cannot be financed by incurring economic debts that other s must pay in the future." The World Commission on Environment and Development (WCED, 1987) defines sustainable development as that development which "meets the needs of the present without compromising the ability of future generations to meet their own needs" and "requires meeting the basic needs of all and extending to all the opportunity to fulfill their aspirations for a better life". A more complete nation of sustainable development, thus, should mean something that is generalizable to all members of the present generation and too many future generations". Thus, sustainable development is "does imply limits- not absolute limits but limitations imposed by the present state of technology and social organizations on environmental resources and of the ability of the biosphere to absorb the effects of human activities". 1

Effects of Population Explosion:

Although the total fertility rate has decreased, due to the increase in the total number of births has increased. This has lead to the current enormous population size of approximately 1 billion. This has greatly hampered the development of the Indian economy. The amount of resources that could have been available to one person a few years ago now need to be shared between two people, which are not sufficient for either of them. The population increase has lead to air and water pollution, unemployment, poverty, lack of educational resources, malnourished women and children and so on. 2

1) Environmental Pollution:

Large scale Industrial development of India has lead to an increase in the number of factories. That has lead to air and water pollution. More energy needs to be produced to power these factories. When fossil fuels are burnt, gases are added to the atmosphere. Many cities in India have crossed the limits of suspended particulate matter, sulphar dioxide, and other pollutants due to vehicular and industrial emissions. Delhi is one of the world's most polluted cities. In fact, in 1999, the average total suspended particulate (TSP) level in Delhi was 378 micrograms per cubic meter – approximately five times the World Health Organizations (WHO) annual average standard.

Population explosion is one of the most common reasons for deforestation; people destroy forests to make houses for increased number of people to live in, and to use wood as a fuel in the industries. As a result, the trees that help us in reducing the air pollution through the process of photosynthesis are not able to do so any more.

Increasing air pollution level in the year 1999, caused 3,650 untimely deaths and about 15,45,003 persons had been reportedly suffering with air (polluted) burns diseases. Some of the diseases caused by air pollution are respiratory diseases, asthma, chronic obstructive pulmonary diseases, cardiovascular diseases and cancer of the lung.

Due to the tropical climate of India, air pollution also causes smog which may result in headsets, dizziness, breathing difficulties, or even mass illness due to carbon monoxide. This slow murder goes unnoticed because people die of diseases like cancer, asthma, and heart problem after long exposures to deadly air pollutants. Besides the untimely deaths of several thousands of people every year due to air pollution, the pollutants also have a deadly impact on our national heritage. Global warming is another major issue developed from overpopulation. Like glass in greenhouse, gases like carbon monoxide admit the sun's light but tend to reflect back downward the heat that is radiated from the ground below, trapping heat in the earth's atmosphere. This is called the greenhouse effect. However, due to the increase in pollution, especially due to carbon dioxide and chlorofluorocarbons, the ozone layer is getting depleted. This layer plays the major role in controlling the temperature of earth, saving it from the harmful. However, with the depletion of the ozone layer on the rise, the temperature of the earth is increasing. This is global warming.

As India is mainly an agrarian country, temperature and climate plays an important role in the economy of the country. Researchers have estimated that only a 20 degree Celsius increase in mean air temperature will be enough to decrease the rice yield by 0.75 ton/hectare in high-yield areas like Panjab, Haryana and Uttar Pradesh.3 It is also estimated that a drastic increase in greenhouse gases like carbon dioxide may cause wheat production to fall as much as 68 percent. Additionally, the changing climatic conditions have the potential to significantly increase tropical disturbances like cyclones and storms in coastal regions. The effect on crops greatly hampers the economy of the country, especially for those farmers who solely depend on agriculture for their survival.4For them, the loss of one crop would lead to a plunge into absolute poverty, and thus, the vicious cycle of poverty and population explosion continues.

The effect of air pollution on the climate conditions reveals that air pollution not only affects our environment, but it also greatly endangers the lives of everybody. Nowadays water pollution is also one of the increasing problems due to the population explosion. Water is considered the essence of life. There is no life without water.5 One might think that 70 per cent of the earth is covered with water, so, why worry about the water problem? In fact, three sides of the Indian sub continent are surrounded by water. And there are several rivers, lakes, and other sources of water within the country as well. However the fact is that less than three per cent of that water we see can be used for human consumption and industrial uses.

Nearly 10 per cent of the world's population faces chronic freshwater shortage. This figure may rise if the population growth is uncontrolled. As in the case of air pollution, the increasing population calls for increasing numbers of factories lead to various kinds of population, including water pollution.

India is being an agrarian country; the water pollution also comes from particular used for agriculture. Some of the major types of pollutants are:

- Petroleum products required for automobiles, cooking, and other such human activities.
- Pesticides and herbicides used for agriculture by the Indian farmers.
- Heavy metals from industries, automobiles' exhausts and mines.
- Hazardous wastes.
- Excessive organic matter like fertilizers and other organic matter used by farmers.
- Sediments caused by soil erosion produced by strip mines, agriculture and roads.
- Thermal pollution caused by deforestation.

2) Poverty:

Population explosion results in the shortage of even the most basic resources like food. According to an article by World Bank Group, more than half of all children under the age of four are malnourished, 30 per cent of newborns are significantly underweight, and 60 per cent of women are anemic. Resources are limited everywhere. Thus we cam develop a technology that would enable us to live on just one grain of wheat, the population increase remains a serious problem in India.

3) Unemployment:

In India, resources of all types are limited. Being a developing country, India has a limited number of jobs available. Due to the increasing number of people, the competition for the most menial jobs is also tremendous. 6 With the increasing population, unemployment rates are bound to rise even further. Several highly educated people with Bachelors and Masters Degrees in India sit at home, because they cannot find jobs. Such unemployment and underemployment leads to corruption and exploitation of people by the richer classes of the society. This lack of resources further leads to lack of educational resources. Due to the unavailability of resources, parents cannot afford to educate their children to higher levels. Some parents simply cannot afford to teach their children further, and in some families, children need to along with their parents in order to bring food to the table.

4) Illiteracy:

About 32 million primary school –age children, mostly girls or those from the poorest households are not in school; more than half of rural students drop out before completing the primary cycle, and only one-third of females make it to the secondary level. Nearly half the population over is years old and about 60 per cent of all women over 15 years old is illiterate. Also, basic education has become a commodity that acts on the basis of supply and demand. Basic education has become too expensive in India for a commoner to afford for his/her children. Lack of education further leads to even more unemployment. 7These are the effects of population explosion in India.

Relation between Population, Environment and Sustainable development:-

The interaction between societal needs and aspirations, on the one hand and the life support system on the other needs closer scrutiny for national welfare. The population size that an ecosystem can support under particular environment conditions is also known as the carrying capacity of that system. If the population overshoots the carrying capacity, it damages the ecosystem and the quality of life. Therefore, there is need to evolve a population policy taking into consideration both the dynamic and the limiting character of the resources and the environment. In quest of use of resource to meet the needs of human population, inputs from science and technology are inevitable for each cluster of human needs. The different inputs can be of two types: those that are more efficient of resource use and environmental protection, and those that are more intensive of resource use and result in environmental degradation. On an average, the current industrial technologies are of the latter type and are less sustainable in the long term. For long term development, therefore, the scientific and technological options should be able to accentuate more efficient resource use with high productivity, protect environment and employ sustainable methods with renewable resource components.

Environmental protection, planning and improvement require a coordinated, and somewhat decentralized approach in which the cooperation and active participation of every segment of society is involved. In this context, some meaningful perspective relevant to India comprise a demographic transition to a stable population, an energy transition to high efficiency without environmental degradation, a resource transition to enhance and utilize the products of nature more judiciously without depleting the capital, and an economic transition to a sustainable growth and a broader sharing of benefits. In the view of this, the immediate priorities identified could be conservation of essential resources and the development of new resources, breakthrough in preventive measures of health, family welfare and population planning, and the dissemination of the knowledge and skill to the people concerned. Of special relevance could be the biotechnology with inputs in agriculture, human health, population control, and renewable energy resource, information and communication technology, agro meteorological survey, and rational resources based on proper survey, and appropriate awareness of the scientific options. 8

In view of the diversities in relief, climate, food habits, traditions and cultures, all programs must operate through a series of networks, each unit catering to a complex. The technology furnished to each unit must be an optimum mix of indigenous and new, and close to the sociological norms. These networks again should interact, so that there is minimal overlapping, and more important, no lacunae. However, the rate at which science and technology can generate solutions for expanding needs of the population and economic growth is limited due to the various constraints.

Early misconceptions about incompatibility of environment and development have to replace by complementarily. The sustainable utilization of resources would help safeguard the environment to meet the needs of the people through the development of natural systems that include land, water, fisheries, agriculture and industrial development. If we do not harmonize environment with development, we will never be able to solve our environmental problems. Unless we carefully manage our environmental and integrate it with development process from the very inception of planning to development, we may find ourselves transgressing not only the inner limits, with mounting social and economic costs of development, but we may even come close to transgressing the outer limits which may lead to ecocides with serious consequences to people leaving in the ecosystem or even to the entire nation. It is felt that the policy of resource use is not merely an economic process, but it also involves man-environment relationship. Therefore, the average input-output analysis has little function to perform, especially in the ecologically sensitive Himalayan region. With the rapid growth of population and overexploitation of resources, the damage to environment is likely to continue, in spite of the valiant attempts to decelerate the worsening of the environment. The backlogs of negative environmental impacts of population and development policies and practices have shown most discouraging results.

For integrated development and environmental protection, in the context of growing population, the main tasks would be integrated land, soil, water and forest management, pollution control, development on non-polluting energy resources, waste utilization through recycling, conservation of biological diversity, slum removal, and development of human settlements for a happy and healthy leaving, population control and health care and the will to rehabilitate and optimize environment along with harmonious development. The population has continued to grow in spite of all efforts, aggravating environmental and natural resource problem. There has been slight abatement of the trend, which provides measures of satisfaction, yet the size of decennial increase of population is larger in each succeeding decade. Therefore, there is an urgent need to rectify the disequilibrium between the rates of change in population and changes in resources, environment and development, to help achieve the larger societal goals. These are to provide for minimum needs of the poorer sections of society, to protect the environment and

renewable resources, and to improve the quality of life. 9

Conclusion:

Briefly, rapid population growth, industrialization and urbanization in India are adversely affecting the environment. Though the relationship is complex, population size and growth tend to expand and accelerate these human impacts on the environment. All these in turn lead to an increase in the pollution levels. However, environmental pollution not only leads to deteriorating environmental conditions but also have adverse effects on the health of people. Therefore, the population and environment is correlated to each other. And the happy relationship between population and environment depends on sustainable development.

Reference:

1) Ahmad Aijazuddin, Noin Daniel, Sharma H.N., "Demographic Transition The Third World Scenario", Rawat Publications Jaipur, 1977. p.314.
2) DubeySurendraNath, "Population of India 2001", Authorsoress, Delhi, 2001. p.6
3) Ibid, p.7
4) Kiessling Kerstin, Landberg Hans, "Population, Economic Development and the Environment- the making of our common future", Oxford University Press, New York, 1994.
5) DubeySurendraNath, "Population of India 2001", Authorsoress, Delhi, 2001.p.9
6) Sinha P.N., "Population Growth and Global Stability", Authors Press, Delhi, 2001.
7) Oneill Brian C., Mackellar, Wolfgang Lutz, "Population and Climate Change", Cambridge University Press, New York, 2001.
8) Ahmad Aijazuddin, Noin Daniel, Sharma H.N., "Demographic Transition The Third World Scenario", Rawat Publications Jaipur, 1977. p.377.
9) Ibid, p.378.

TO STUDY THE PHYSICAL PROPARTIES OF SUBSTITUTED PYRAZOLE CARBOXYLIC ACID IN 80% XYLENE-WATER MIXTURE AT DIFFERENT TEMPERATURE UNDER VISCOMETRIC TECHNIQUE

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ABSTRACT:

To study the physical proparties of substituted pyrazole carboxylic acid in 80% xylene-water mixture at different temperature under viscometric technique.Jones-Dole empirical equation analyzed the obtained data .we have studies thermodynamic parameters such as enthalpy change , entropy change and Gibbs free energy change. The interactions between solute-solute, solute-solvent and solvent–solvent interactions are studied.

KEYWORDS*:* Substituted pyrazole carboxylic acid derivatives, Jones-Dole empirical equation and thermodynamic parameters.

INTRODUCTION:

Number of workers gives information about viscometric studies of some drug , metformin hydrochloride (MH), ranitidine hydrochloride (RH), and tramadol hydrochloride (TH) in aqueous solutions at different temperatures . Density and viscosity measurements have been studied for substituted 2,3-Dihydroquinazolin-4-(1H)-ones in 70% DMF-water at different temperatures . Most of the modern drugs are studied by viscometric which containing heterocyclic nucleus . Viscosity measurements play an important role in medicinal pharmaceutical, and drug chemistry . Volumetric, viscometric and thermodynamic data gives valuable information about the solute-solute, solute-solvent and solvent–solvent interactions.

Viscosity measurements have been studied by Grunberg and Nissan , Hin , Tamura and Kurata , Katti and Chaudri , Sedgwick , McAllister , Krishnan and Laddha Model . Viscometric study of complexes of poly(vinyl pyrrolidone) with Co^{2}+ was measured . The density and viscosity measurement of (pyridoxine hydrochloride + water) and (thiamine hydrochloride + waterat different temperatures was given . Viscosity for different molal concentration of L-Proline, L-Cerine and L-Histidine in dioxane-water mixture and evaluated the values of viscosity coefficients A and B of Jones-Dole equationhave investigated. Determination of thermodynamic parameters of substituted azomethine drugs viscometrically was reported. Viscosity and values of viscosity coefficients (A and B) of mixture of chromic anhidride, sodium dichromate, sodium chromate and water. They studied the solutesolute interaction, A series of compounds ethyl/methyl-4-(aryl)6-methyl-2-oxo/thioxo-1, 2, 3, 4-tetrahydropyridimidine-5-carboxylate under investigation for acoustical parameters in the present paper was reported. Densities and viscosities of binary mixtures of n-decane + 1-pentanol, + 1-hexanol, + 1-heptanol at temperatures from 293.15 to 363.15 K and atmospheric pressurewas studied. Effect of Temperature on Viscosity of Substituted aminopyrimidine in 60% DMF-Water mixture are reported.

Volumetric and viscometric Studies of *N*,*N*'-Bis(salicylaldehyde)-1,3 diaminopropane schiff base (Salpr) in ionic liquid + DMF solutions are reported. Volumetric, viscometric and speed of sound measurements Studies on molecular interactions of some thiocyanate salts in coaqueous solutions of 1,3-Dioxolane + water is reported. Co(III) complexes in water+alcohol mixtures regardingion association and solvation at different temperatures are studied. Viscometric Studies on Substituted-2, 3-Dihydroquinazolin- 4 (1H) -ones in 70%DMF-Water are done . Comparison tests for the determination of the viscosity values of reference liquids by capillary viscometers and stabinger viscometer SVM 3001 Prediction of viscosity of biodiesel

blends using various artificial model and comparison with empirical correlations have been reported. Preparation, characterization, and viscosity studding the single-walled carbon nanotube nanofluids was studied. Neural network for predicting the fragility index and the temperature-dependency of viscosity was studied.

In the present work, viscometric study of substituted substituted pyrazole carboxylic acid is carried out at different temperatures by using their solutions of different concentrations.

Following substituted pyrazole carboxylic acid are used.

1) Ligand A (L_A)= 1- phenyl-3-(4'- methyl) phenyl-1H- pyrazol-4-carboxylic acid

2) Ligand B (L_B)= 1- phenyl-3-(4'- bromo) phenyl-1H- pyrazol-4-carboxylic acid

3) Ligand C (L_C)= 1- phenyl-3-(4'- ethyl) phenyl-1H- pyrazol-4-carboxylic acid

4) Ligand D (L_D)= 1, 3-diphenyl-1H-pyrazol-4-carboxylic acid

The solutions of ligands are prepared in the 80% xylene-water at different temperature (*T*= 295K, 300K, 305K and 310K) and at different concentration.

EXPERIMENTAL

The reported protocol used to synthesizes the ligand of physical parameters are to be explored. Solvents and freshly prepared doubly distilled water are used to analyzed grade. The densities of pure solvent and solutions of various concentrations were measured at different temperatures using a specific gravity bottle. All the weights are taken on one pan digital balance (petit balance AD-50B) with an accuracy of ± 0.001 gm. Viscosities of the solutions are determined with the help of calibrated Ostwald viscometer (± 0.11% $Kgm^{-1}s^{-1}$). The flow time of solutions are measured by using digital clock (Racer Company) having an accuracy up to ±0.01Sec

.

RESULTS AND DISCUSSION

To calculate the relative and specific viscosity the following empirical equations are useful.

$$\eta_r = \frac{\eta}{\eta_o} = \frac{d_s \times t_s}{d_o \times t_o} \quad (1)$$

$$\eta_{sp} = (\eta_r - 1) \quad (2)$$

Where,

η_r = Relative viscosity

η_{sp} = Specific viscosity

η = Viscocity of solution

η_o = Viscosity of solvent

d_s = Density of solution

d_o = Density of solvent

t_s = Flow time for solution

t_o = Flow time for solvent

The viscosity data can be analyzed by Jones-Dole empirical equation.

$$\frac{(\eta_r - 1)}{\sqrt{C}} = \frac{\eta_{sp}}{\sqrt{C}} = A + B\sqrt{C} \quad (3)$$

Where, *A* = Falkenhagen coefficient

B = Jones-Dole coefficient

C = Concentration of solutions

The Falkenhagen coefficient (*A*) reflects the solute-solute interactions while Jones-Dole coefficient (*B*) reflects the solute-solvent interactions.

In present study with increase in concentration, the relative viscosity and density of the compounds increases. The increase in viscosity with increase in concentration credited to the increase in the solute-solvent interactions. The viscosity and density data for different ligands at different concentration is given in table no.1

Table1: Densities(d) and viscosities(η_r) of substituted pyrazole carboxylic acid derivatives at different concentration in 80% (Xylene+ water) solvent at 295K

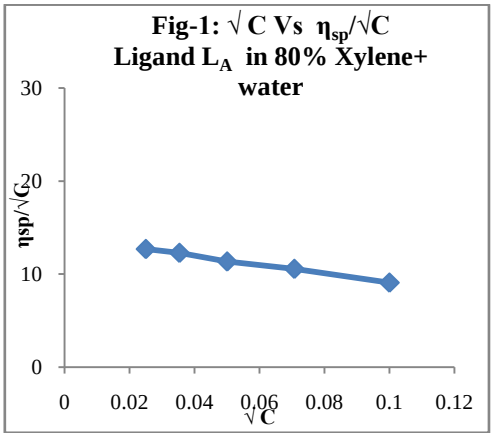
Conc. (C) mol/lit	L_A		L_B		L_C		L_D	
	Density (d) gm/cc	**Relative Viscosity (η_r)**	**Density (d) gm/cc**	**Relative Viscosity (η_r)**	**Density (d) gm/cc**	**Relative Viscosity (η_r)**	**Density (d) gm/cc**	**Relative Viscosity (η_r)**
0.01	1.0565	2.4707	1.0823	2.5701	1.0445	2.3012	1.0689	2.4261
0.005	1.0530	2.4218	1.0760	2.4214	1.0423	2.1710	1.0673	2.3281
0.0025	1.0490	2.3246	1.0685	2.3203	1.0399	2.0710	1.0662	2.2543
0.00125	1.0472	2.2971	1.0690	2.2265	1.0382	1.9862	1.0601	2.1579
0.000625	1.0454	1.9906	1.0593	1.9947	1.0373	1.8423	1.0593	1.8909

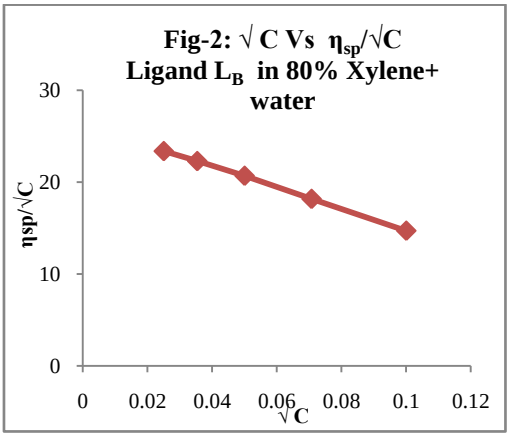
The graphs are plotted between √C versus $\eta_{sp}/\sqrt{C}$. The graphs for each system show the validity of Jones-Dole equation. The values of *A* and *B* have determined from the intercept and slope of √C versus $\eta_{sp}/\sqrt{C}$ respectively. The plots of √C versus $\eta_{sp}/\sqrt{C}$ for all four systems are shown in Fig. no. 1 to 5. From the table no. 2 the *B*-coefficient is found to be negative for all the systems and it is a measure of disorder introduced by the solute into the solvent in all the systems. The Falkenhagen coefficient-*A* is positive in all the systems and this coefficient reflects strong solute-solute interaction.

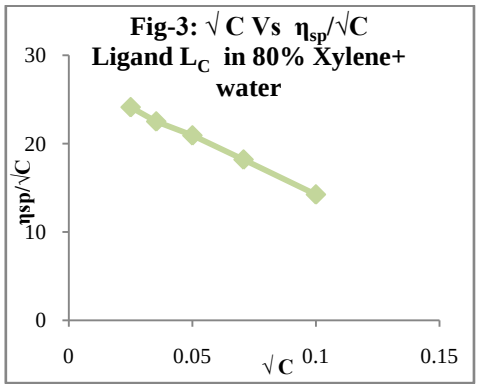
Viscometric study is performed for substituted pyrazole carboxylic acid at following different temperatures 295, 300, 305 and 310K. The experimental data of different ligands is presented in table no. 3.

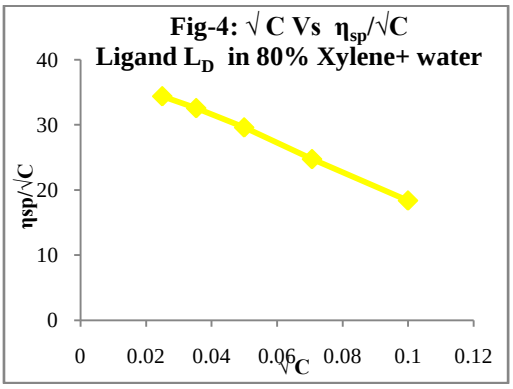
Table 2: *A* and *B* Coefficient values

Ligand + 80% Xylene-Water	***A* (lit$^{3/2}$ mol$^{-1/2}$)**	***B* (lit mol^{-1})**
L_A	15.808	-52.289
L_B	25.364	-115.22
L_C	26.410	-130.65
L_D	34.015	-222.23









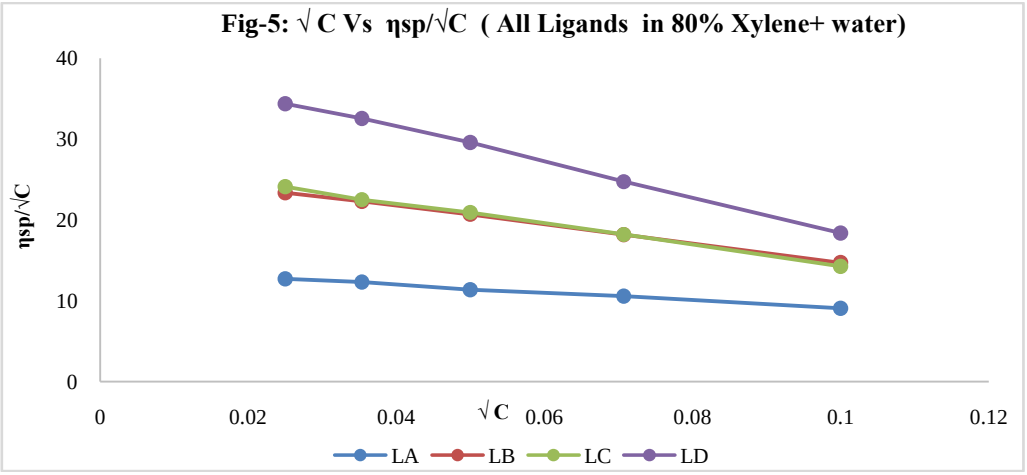


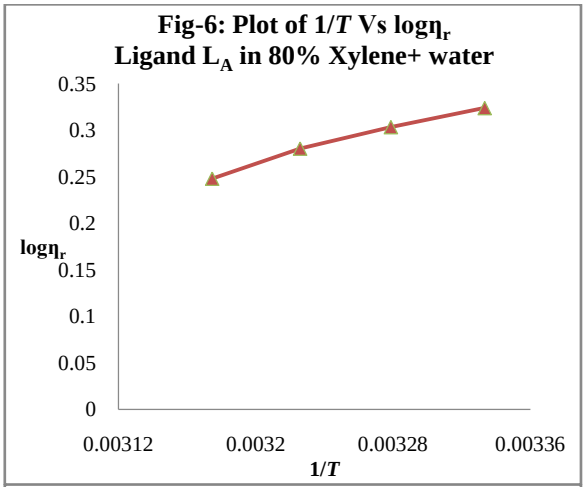
Table 3: Densites (d) and relative viscosities (η_r) of Substituted 1-phenyl-3-aryl-1H-pyrazol-4-carboxylic acid derivatives of 0.01M concentration in 80% (Xylene+ Water) solvent at different temperature (*T*= 295, 300, 305,and 310K).

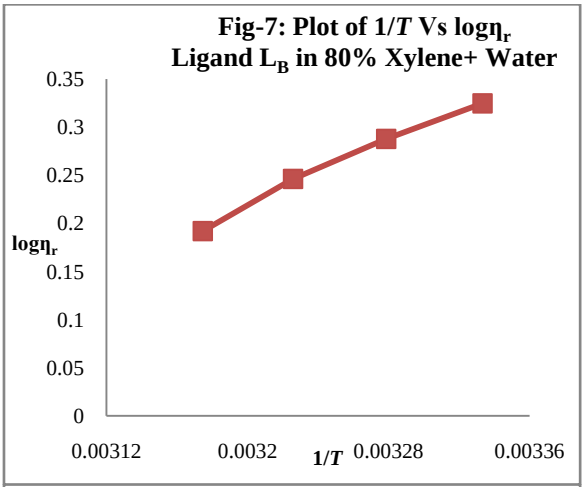
Temp. (K)	L_A		L_B		L_C		L_D	
	Density (d) gm/cc	Relative Viscosity (η_r)	Density (d) gm/cc	Relative Viscosity (η_r)	Density (d) gm/cc	Relative Viscosity (η_r)	Density (d) gm/cc	Relative Viscosity (η_r)
295	1.0532	2.1774	1.0824	2.4231	1.2847	1.2844	1.0915	2.4263
300	1.0519	2.1202	1.0819	2.3711	1.2437	1.2242	1.0798	2.3265
305	1.0508	1.9749	1.0801	2.2291	1.2032	1.2026	1.0636	2.2657
310	1.04980	1.8031	1.0793	1.9730	1.1973	1.1968	1.0588	1.9825

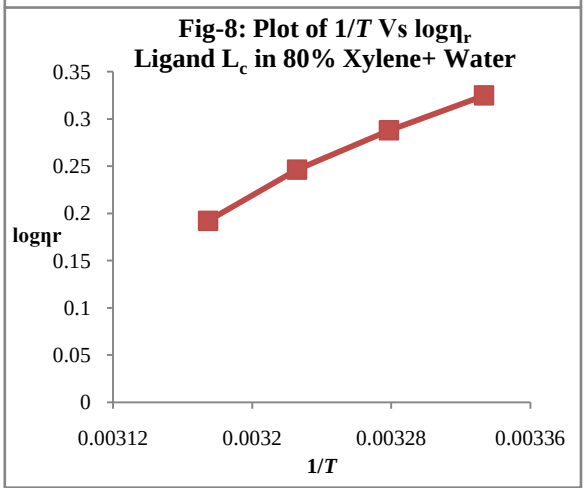
The thermodynamic parameter Gibbs free energy change (ΔG), enthalpy change(ΔH) and entropy change (ΔS) are studied for substituted pyrazole carboxylic acid at different temperatures. All these thermodynamic parameters are calculated by plotting graphs between 1/T versus logη_r. These are shown in the fig. no. 6 to 10. These thermodynamic parameters for solutions of different ligands at various concentrations are presented in table no. 4. The values of ΔG and ΔH are found to be negative. The negative values of ΔG and ΔH indicate the reactions are spontaneous and exothermic respectively. The negative value of ΔS indicates that there is an association of solvent molecules around the ligand.

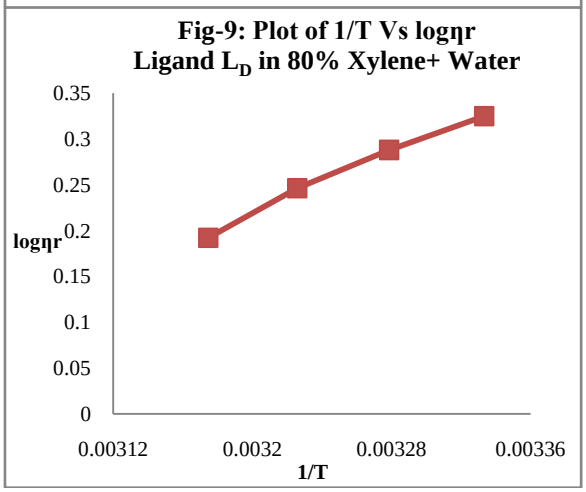
Table 4: Values of thermodynamic parameters for temperature difference(295 to 310K)

Ligands	**ΔG (J mol^{-1})**	**ΔH (J mol^{-1})**	**ΔS (J mol^{-1} K^{-1})**
L_A	-1398.3	-4592.6	-99.76
L_B	-1223.7	-3536.8	-76.37
L_C	-1099.3	-3591.2	-73.28
L_D	-1009.7	1703.4	-49.25









CONCLUSIONS

In the present work, viscometric study is performed at different temperatures for substituted substituted pyrazole carboxylic acid. It is found that as the concentration increases the density and relative viscosity increases. And it is attributed to the concentration increases the increase in the solute-solvent interaction. For all the systems *B*-coefficient is found to be negative and it measures the disorder introduced by solute into the solvent. The Falkenhagen coefficient-*A* is positive in all the systems and this coefficient reflects strong solute-solute interaction in systems. The reactions are spontaneous and exothermic on the basis of the negative values of ΔG and ΔH . The negative values of ΔS indicate that there is an association of solvent molecules around the ligand.

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REFERENCES

1. Dhondge S S ,. Zodape S P, Parwate D V (2012).Volumetric and viscometric studies of some drugs in aqueous solutions at different temperatures,J. Chem. Thermodynamics 48, 207–212.

2. Hedaoo D S, Kalaskar M M, Wadekar (2015). Effect of Temperature on Viscosity of Substituted Aminopyrimidine in 60% DMF-Water Mixture M P, J. Chem. Bio. Phy. Sci. Sec. A, 5(3), 1719.

3. a) Singh N, Walia R K, Malik, (2005). M S, Proc. ICCE-2005, Indore, A-2051, 74.

b) Shrivastava S K, Shrivastava, S D, Shrivastava S (2006). Proc.NCCRTDHC-2006, Hyderabad, 16.

4. a) Solanki A, Thakur (2006).synthesis of pyrazolines and aminopyramidinesas a bilogical potent agents I, Indian journal of Chem, 45B, 517,

b) Saleem F(2008). Viscometric Studies of N-(3-Substituted) Phenyl-4-Methoxy

Eur.Pot, CHAPPL, 87/19.

c) Baldaniya B.B(2009).Patel P.K. Synthesis, Antibacterial and Antifungal Activities of s-Triazine Derivatives, E-Journal of Chem., ,6(3), 673

.a) Kaur K, Kumar H, (2013). Volumetric, viscometric and thermodynamic study of the solute-solute, solute-solvent and solvent–solvent interactions J. Mol. Liq., 177, 49;

b) Dack M R J, Bird K J, Parker A study of Solvation of ions. XXV. Partial molal volumes of single ions in protic and dipolar aprotic solvents J, Aust. (1975), J. Chem., 28, 955.

6. Grunberg L, Nissan A, (1949). mixture law for viscoty ,Nature, 164, 799.

7. Hind R K, Mclaughlin E, Ubbelohde,(1960). Structure and viscosity of liquids. Camphor + pyrene mixtures Trans. Faraday Soc., 56, 328.

8. Tamura M, Kurata,(1952). Bull Studies of viscosity and excess molar volume of binary mixtures: 2. Butylamine+1-alkanol mixtures at 303.15 and 313.15 K Chem. Soc. Jpn., 25,32.

9. Katti P K, Chaudhari M M,(1964). Viscosities of Binary Mixtures of Benzyl Acetate with Dioxane, Aniline, and m-Cresol. J. Chem. Eng. Data, (9), 442.

10. Sedgwick T O(1962). Ph. D. Thesis,

11. McAlliter R A, (1960). A I C H E J., 6, 427.

12. Krishnan M R V, Laddha G S, Indian Chem. Eng. Trans., 57, (1963).

13. E.Díaz, R.Valenciano, J.González, Polymer Testing,(2002). 21(3), 247.

14. Dhondge S S , Deshmukh D W , Paliwal L J(2013). The study of molecular interactions of ascorbic acid and sodium ascorbate with water at temperatures (278.15, 288.15 and 298.15) K ,J. Chem. Thermodynamics 58, 149–157.

15. R Palani , A Geetha, S. Saravanan , Vijaya S,(2008). Intermolecular interactions of some amino acids in aqueous 1, 4-dioxane solutions at 298.15 kRasayan J. Chem., Vol. 1(3), 495.

16. Kawalkar AV, Hedaoo D S, Wadekar M P,(2015). Determination of thermodynamic parameters of substituted azomethine drugs viscometrically , Journal of Chemical, Biological and Physical Sciences 5(4) ,3751-3758

. Tekade, P V, Thaokar M S, Bajaj S. D, Mahodaya, O A, Patil V B, (2013). (National Conference on Green Chemistry) VNIT, Nagpur,

. Baltazar A E, Sanchez M G B, Silva G A I, Alvarado J F J, Gonzalez E O C, Estrada M R,(2015). Densities and viscosities of binary mixtures of n-decane + 1-pentanol, + 1-hexanol, + 1-heptanol at temperatures from 293.15 to 363.15 K and atmospheric pressure Chinese J. Chem. Eng., 23(3), 559.

. Kalaskar M M, Chandak H S WadekarM P, (2015). Effect of Temperature on Viscosity of Substituted aminopyrimidine in 60% DMF-Water mixture J. Chem, Bio. and Phy. Sci, 5(4).

. Shekaari H, Bezaatpour A, Elhami(2012). R, J. Solution Chem., Volumetric and viscometric Studies of N,N'-Bis(salicylaldehyde)-1,3 diaminopropane schiff base (Salpr) in ionic liquid + DMF solutions are reported 41, 516.

. Roy M N, Chanda R, Banerjee A,(2009). molecular interactions of some thiocyanate salts in coaqueous solutions of 1,3-Dioxolane + water J. Chem. Eng. Data, 54, 1767.

. Dash U N, Mahapatra J R, Lal B,(2006). Co(III) complexes in water+alcohol mixtures regardingion association and solvation at different temperatures J. Mol. Liq., 124, 13.

. Hedaoo D S. Kalaskar M M, Wadekar M P, (2015). Viscometric Studies on Substituted-2, 3-Dihydroquinazolin- 4 (1H) -ones in 70%DMF-Water J. Chem, Bio. and Phy. Sci, 5(3).

24. Gokce Sevim Sariyerli*, Orhan Sakarya and Umit Yuksel Akcadag, (2018). Comparison tests for the determination of the viscosity values of reference liquids by capillary viscometers and stabinger viscometer SVM 3001 int J of Mtrology and Quality Engineering Volume 9

25. YuanzhouZhengabMostafa SafdariShadloo (2020). Prediction of viscosity of biodiesel blends using various artificial model and comparison with empirical correlations Renewable Energy, 153, 1296-1306.

26. V. Ya Rudyakabc A.V. Minakovab M.I. Pryazhnikova,(2021). Preparation, characterization, and viscosity studding the single-walled carbon nanotube nanofluids J of Molecular Liquids , 329, 1 115517.,

27. Daniel R.Cassar Acta Materialia(2021). Neural network for predicting the fragility index and the temperature-dependency of viscosity, 206, 116602.

28. Min W, Jing J G, Zhi G S , Lei W, (2012). Org. Prep. Proced. Int., 44, 159.

29. a) Bhal B S, Tuli G D, Bahl A, (1999). Essentials of Physical Chemistry, 24th Edition, S. Chand, New Delhi, 356;

b) Kaur K, Kumar H, J. Mol. Liq., 177, (2013). 49;

c) Raghuwanshi P B, Narwade M L, Doshi A G, Asian J. Chem., 12(4), 973.

30. a) Jones G, Dole M, (1929). J. Am. Chem. Soc., 5 (1), 2950;

b) Gupta R, Singh M, (2005). J. Chem. Sci., 117(3), 275.

31. Banipal T S, Singh H, Banipal P K, (2010). J. Chem. Eng. Data, 55, 3872

A REVIEW OF STUDIES ON THE EFFECT OF ENVIRONMENT ON SPORTS PERFORMANCE

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Abstract:

The aim of this study was to review studies on the effect of environment on sports performance. Six reviews were reviewed in this study. As we know that every living thing and non-living thing is a part of environment, therefore every single thing is related to environment. Every living thing is more affected by environment. As athlete or a sport person environment is important for the performance because every athlete is born in different regions therefore there body and the physical structure is build according to that environment but as a athlete sportsman have to compete in different places or countries which have different environmental or climatic condition therefore that will affected on the performance of the athlete and it may lead to failure therefore it is important to study the environmental condition were sports are perform and were they get training. Because health, environment and sports are interrelated with each other.

Keywords: Environment, Sports performance

Introduction:

A player must educate himself for his better performance and achievement. Sports make us strong physically as well as mentally / psychologically also. Sports teach us how to fight with or face with pressure or tension situation before, during and after the competition. Daily exercise makes psychologically fit and this helpful for our personal life also, to fight in such situation. Winning and failure it's a two part of sport, its teach us how we should react in winning situation and how in loose, we must balance our self in both situation. If we win don't get overconfidence and when loose don't get depressed. Due to failure situation only we learn how to fight with or overcome from such problems. In our personal life also we face different pressuring situation, but through regular exercise we make our self mentally skilled or fit to face any situation and it's called sportsmanship.

Sports help in building good health. But in today's time, a new problem has arisen, that is environment. Health is better than wealth, better than opulence, but today's situation is changing day by day. Through sport we can learn how we can differentiate ourselves from others, how we can stay fit and healthy, what we need to do to improve personal, environmental and social health and implement as much research as possible. Sports play a very important role in our personality development, discipline, what to eat, what environment to live in, how to make a daily exercise routine different from others, all these things and the environment affects our life. Environment includes all the external factors that surround the mind, such as animate, inanimate, matter, vegetation, water, air, sunlight, land and other man-made objects. The environment in which a player lives depends on their sports performance. Athletes' health and sports performance depend on the environment. That is why the researcher has reviewed the previous researches.

Review of relevant research literature:

A research done by Kuok Ho, (2021) found that serious challenges faced by athletes during sports performance or practice include changes in the environment i.e. hot and humid environment. In an environment that does not reduce heat, the body temperature of the athletes increases and this has a negative effect on their sports performance. Also, the extremely cold environment puts stress on the respiratory system, which makes the athletes gasp for breath. Due to extreme cold, sportsmen's muscles move faster, reaction time decreases, muscle stiffness is created and due to this, sportsmen get tired quickly. Global warming has become a major problem. While the heat and humidity of the tropics have an effect on the athletes' performance, there are some cooler climates where the athlete is more suited to take their sports performance to the

highest level. Pollution has a negative impact on sports performance and health of athletes. Along with that, increasing pollution in cities and metros today is putting additional pressure on the sportsmen's performance. Research conducted by them revealed that high pitches are beneficial for players in some sports and some pitches have a negative effect. Research by Pezzoli, et al. (2013) revealed that climate and environment can have significant effects on sports performance.

Sports Information Resource Centre. (2013). According to published articles, the average body temperature should be 37°C (98.6°F). Environmental factors such as body temperature of athletes need to be taken seriously otherwise it may adversely affect their health8. In extreme cold and warm weather, athletes need to wear appropriate clothing to perform sports otherwise it may have adverse effects. This can impair the sports performance of the players by putting them at risk of injury. Also, the players have to warm up properly at the beginning of the game. Some athletes have problems such as allergies to plants or dust mites, in which case proper precautions are necessary, as these can cause breathing problems.

Donnelly, et al. (2016) studied and explained that there is a close relationship between environment and climate on human health. Environmental quality can have a positive effect on physical health, mental health, and the health of elite athletes.

Air quality at competition and training venues is critical. High altitude can cause significant disadvantages for an athlete. High altitudes can affect athletes' sports performance by reducing oxygen levels. Breathing problems and blood circulation problems can worsen as air pollution is high.

Dogra, S. (2014) study pointed out that environmental factors affect the sports performance of international level athletes. A polluted environment can impair sports performance. Sports performance of athletes can be improved by acclimatization to environmental conditions.

Conclusion:

From all the studies we can conclude that Every living thing is more affected by environment as athlete or a sport person environment is important for the performance because every athlete is born in different regions therefore there body and the physical structure is build according to that environment but as a athlete sportsman have to compete in different places or countries which have different environmental or climatic condition therefore that will affected on the performance. Therefore it is important to study the environmental condition were sports are perform and were they get training.

References:

1. Kuok Ho, D. T. (2021). A Review of the Association between Environmental Factors and Athletic Performance. Journal of Specific Sport Science, 1 (1), 21-30.
2. Pezzoli, A. et. al. (2013). Effect of the environment on the sport performance. icSPORTS 2013-Proceedings of the International Congress on Sports Science Research and Technology Support.
3. Sport Information Resource Centre. (2013). Environmental factors in exercise and sports performance. 26 September. http://sircsportresearch. blogspot. com
4. Donnelly, A.A. et. al. (2016) Environmental Influences on Elite Sport Athletes Well Being: From Gold, Silver, and Bronze to Blue Green and Gold. Front. Psychol. 7:1167. doi: 10.3389/fpsyg.2016.01167
5. Dogra, S. (2014). Environment and Sports. Journal of Sports and Physical Education, 1 (6), 19-20.
6. Williams, C. (2011). Environmental factors affecting elite young athletes. Craig Williams. Med Sport Sci., 56, 150-170.

THE SIGNIFICANT ROLE OF FAMILY ASTERACEAE AS IMPLICATION IN SUSTAINABLE DEVELOPMENT OF ENVIRONMENT- A REVIEW

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Abstract:

The Asteraceae family is one of the largest flowering plant families, with 1600 genera and 2500 species worldwide. Some of its most well-known taxa like Ageratum sp and Emilia sp attributed environmental, ecologicalandagricultural and health benefits. Present study is on the review and updated informationexisted on the basis of ecological and environmental impacts on Some plants of family Asteraceae and based upon prior study about the plant species on the Cytological and Morphological level, which play the vital role in the Sustainable Development of Environment.

Keywords: Asteraceae and Sustainable Development.

Introduction:

Family Asteraceae is a widespread plant family and it is substantially used for bio removal of a wide range of pollutants in urban areas and developing sectors. This is major cause why the most urban and wild also taken up by members of family Asteraceae. The family members comprise genus like *Ageratum sp, Emilia sp* which having various ecological and eco-friendly properties. In the plant kingdom this is very important family which naturally promote the phenomenon like microbial growth in their root zone by exudation of carbohydrates, amino acids and other compounds from roots. That's why they are as a good candidate for phytoremediation.

So, it is significant to study this family on Cytomorphological basis. It not only improves but also update the previous scientific data available in the vast ocean of knowledge. It also relates the family Asteraceae directly with ecology and environment because of its biological significance and properties. The aim of this study is to investigate the ecological and environmentally sustainable aspects of family Asteraceae in relation with Cytomorphology.

Importanceof family Asteraceae in Sustainable Development of Environment:

D. Nguyen et.al; (2021) stated that the presence of heavy metal ions (Cu^{2+}, Pb^{2+}, Cd^{2+} etc.) In waste water occurs due to their direct/indirect leak or release from mining industries, batteries and others these nonbiodegradable species can accumulate in aquatic system (eg, groundwater and surface water) and hence reducing their quality. Even very low content in drinking water can generate many threats for organism including brain skin liver etc (Shooto 2020). To improve the quality of contaminated water sources, it is important to remove their trace using green and sustainable treatment methods reported extensive applications of bioadsorbant from Asteraceae plant as efficientremediators to heavy metal ions (Naik et. al; 2017, Shandi et. al; 2019, Jain et. al; 2020)

Sunflower was found the most important Asteraceae plant for phytoremediation of heavy metals such as cadmium, lead, uranium and chromium studied by Zehra et. al; in 2020.

Patil and Jadhav 2013 stated that many kinds of Asteraceae plants could uptake toxic azodyes such as Remazol red, reactive blue with good efficiencies of 90-96% however many factors e.g. soil properties, microbial communities in soil, anthropogenic aspects, etc. can restain the widespread utilization of Asteraceae plants hence more surveys should be investigated to shed light on such influences.

Aiyen B. Tjoa and Henry N Barus demonstrated that significant amount of Ni and Fe in the shoot *Emiliasp* grown in saprolitic laterite provide sufficient indication that metal extraction is possible with some species of plants. Addition of manure on topsoil and over burden soil seemed to reduce deficiency of plants to play as mining agent. Phytoextraction potential of the individual plant species of

Asteraceae is given not only by their accumulated metal content, but also by their biomass production at the contaminatedsite, characterization of which includes the quality and quantity of contaminants. Small scale experiments should be the initial step in finding of the best conditions for the phytoextraction of the given localities. (Petr Soudek et.al;2010)

Suman Paul and et.al; in 2022 postulated that, the genus Asteraceae comprises the importance in the waste water management at very low expenses. With the help of this plants we retreat the waste water naturally because of associative microbial population.

Role of Family Asteraceae in the Sustainable Development of Environment:

It is veryprior that while studying any parameter or phenomenon in science, one has to start it with from the bottom of that phenomenon. Every living species contribute to its genetical and environmental and ecological composition. Our present study will raise if we do with all basics including investigation on chromosome number, morphology of the plants species which are beneficial in sustainable development of environment. With the help of Cyto-Morphological study of selected plant family, the resultant study will be more effective and useful for further study as one's knowledge concern. As already stated, that Asteraceae Family comprises the most vegetation among all plants, so Cyto-Morphology enhance and upgrade the present data about the plant species.

Conclusion:

From the above stated reviews studied by different Scientist comes to know, such useful genus needs Cytological and Morphological investigation to meet the present challenges and expansion of area of research in case of Sustainable Development of Environment.

Reference:

1. Aiyen B. Tjoa1and Henry N. Barus "Uptake of Heavy Metals and Other Elements by Emilia sonchifolia Grown on an Overburden in Ultramafic Soil from Sorowako, Indonesia."
2. DuyenThi Cam Nguyen,ThuongThiNguyen,· Hanh T. N. Le, Thi Thanh Thuy Nguyen,
3. G.M. Mudd. (2009) "Nickel Sulfide Versus Laterite: The Hard Sustainability Challenge Remains."
4. I.C. Baillie, I. C., P.M. Evangelista, and N.B. Inciong. (2000) "Differentiation of upland soils on the Palawan ophiolitic complex, Philippines." Catena 39: 283-299.
5. Interior. U.S. Geological Survey. U.S. Government Printing Office, Washington.
6. K. Salazar, M.K. McNutt. (2010) "Mineral Commodity Summaries" U.S. Department of the
7. Long Giang Bach, Trinh Duy Nguyen, Dai-Viet N. Vo5 Thuan Van Tran,(2021) "The sunfower plant family for bioenergy, environmental remediation, nanotechnology, medicine, food and agriculture: a review."
8. R.R. Brooks, C. Anderson, R. Stewart, B. Robinson (1999) "Phytomining: growing a crop of a metal." Biologist 46 (5): 201-205.

ADAPTING CHANGING ECOLOGICAL AND ENVIRONMENTAL CONDITIONS: A THEORETICAL CASE STUDY OF GENUS *RUELLIA*

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Abstract:

India is currently harboring ten species of Ruellia L. All are wild, mostly neglected and considered as weed. However, some of them are being used in traditional medicine since ages. The present theoretic study revealed that most species of Indian Ruellia have shown considerable elasticity and adaptability in their physiological and morpho-anatomical features to survive in changing environmental and ecological conditions. Especially, the anatomical variation in the anatomical features like thickened epidermis, extended cortex and reduced vasculature are among major changes noted. Its sustenance potency also looked over by its ability of metal detoxification and phytoremediation.

Key Words: Adaptability, ecological, environmental, Morpho-anatomical, *Ruellia* L.,

Introduction:

All Components of the biosphere are facing threats of pollution by a variety of organic and inorganic pollution because of manmade activities that after the normal biogeochemical cycle along with changing ecological and environmental conditions (Prasad and Freitas, 2003). These changing climatic/ environmental conditions can adversely affect flora and fauna including human beings. Plants have to face all these extremes directly as they can not move from their places.

The genus *Ruellia* belongs to family Acanthaceae; most member of this genus are commonly known as Wild Petunias (Humayun, 2005; Jain and Jain 2009). It is consists of over 250 species distributed all over the world. *Ruellia* is represented by 10 species from India. Present theoretic study is focused on the impact of changing ecological and environmental conditions on the growth and survival of *Ruellia* species and morpho-anatomical changes associated. Further, its ability of phytoremediation is also discussed to illustrate this weed as useful plant with multidirectional usability.

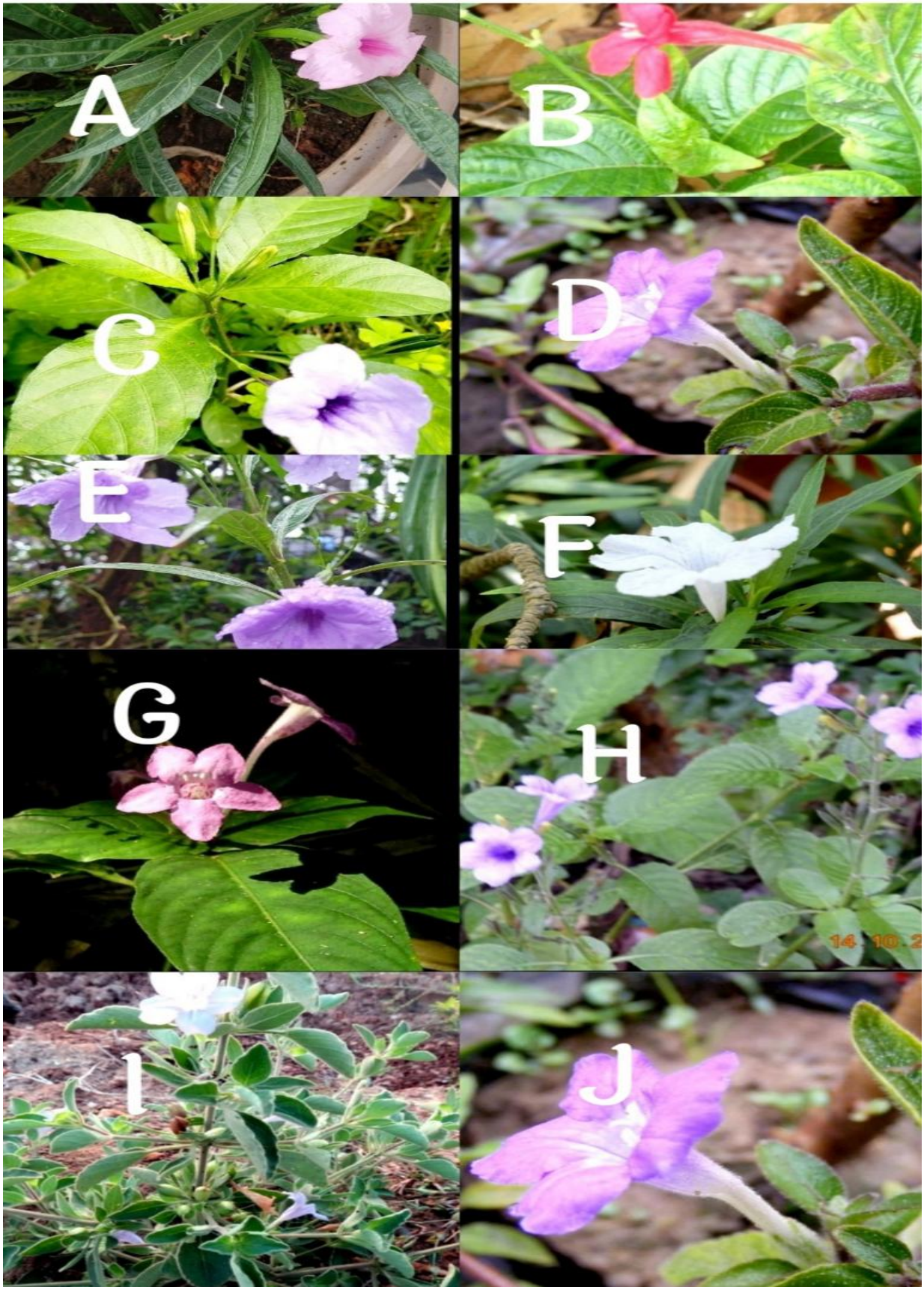
Ethnomedicinal uses of *Ruellia*:

Ruellia is one of the most under rated medicinal plant genus of Acanthaceae. Some species of *Ruellia* are being used in traditional medicine preparations by different communities and also been part of Ayurveda and Ayush systems in India. The fresh leaves of the plant *Ruellia patula* is been use in earache (Tesfaye, 2004). One of the species, *R. tuberosa* has been extensively used as diuretic, anti-diabetic, antipyretic, analgesic, antioxidant (Chen *et al.*, 2006), to treat gonorrhea, anti-hypertensive and gastroprotective (Nasir and Ali, 1971-1991; Lans, 2006). Most of the plant species of *Ruellia* has been widely used as anti-diabetic, antipyretic, gastroprotective, antimicrobial, analgesic, anti-oxidant and anticancer against the epidermis of nasopharynx region (Jain *et al.*, 2009). *Ruellia asperula* is used in bronchitis, asthma, flu, fever and uterus inflammation (Agra *et al.*, 2008). The leaves of *R. prostrata* are being used in the treatment of chronic rheumatism, eczema, facial paralysis, cephalgia and hemiplegia; its leaf juice is an efficient remedy on colic infection in children (Rajan *et al.*, 2012). *R. brittoniana* is being used for cardiovascular screening and also as antioxidant plant (Khan *et al.*, 2017). Choudhary (2018) has documented the use of *R. patula* to cure bone fracture (stem decoction with cow milk), wound healer (leaf paste for external application) and antidote against snake bite (leaf chewing) from tribal belt of Rajsthan, India.

Impact of Ecological/ Environmental Changes on *Ruellia*:

Mary Kensa and Neelamegam (2016), reported that *Ruellia tuberosa* collected from polluted soil sources showed reduced leaf and flower size and internode length, stunted tops of plants suppressed root growth in proportion to shoot growth and reduced seed size as compared to *R. tuberosa* grown in unpolluted soil source. Further they illustrated that the changing stressful environmental condition affects thickness of epidermis, increase the cortex area and reduced the vasculature. Sumithra and Senthikumar (2018) demonstrated that *Ruellia tuberosa* show high accumulation at 40^{th} day of contamination due to this there was a significant growth inhibition, decreases of biomass and photosynthetic pigments proline and content showed positive responses to cope with the Hg-induced stress. Proline accumulation accepted as an indicator of environmental stress and maintaining of high level of MDA content is one of the important anti-oxidative responses of plant to mitigate the increased oxidative stress

The floral morphology of Ruellias is also reported to show variation according to the changing environment and available stimulants or fertilizers. Fardous et.al, (2020) recommended to irrigate *R. brittoniana* plants with 5% dil. Sea water combined with organic or bio stimulants (humic acid 80% concentration 5ml/lit, amino acids 26.18% concentrated free amino acids 1 gm/lit or active dry yeast 5gm/lit) as foliar spray on plants leaves fortnightly (20 spray per season) to obtained best growth and flowering character. Water availability is a primary factor in the induction of the type of floral morphological variations produced by *R bravifolia* chasmogamous morph are produced in high moisture soil (100% water holding capacity) and cleistogamous morphs are produced by plants in the drier soil (50 % water holding capacity). Drought stress reduces vegetative growth and fruits and seed production. All three measures were higher in plant on 100% water holding capacity which produce only chasmogamous flower (Miranda and Milene, 2016).



A) *R. simplex*(Pink Mexican petunia), B) *R. elegans*, C) *R. tuberosa L.*, D) *R. beddomei*, E) *R. brittoniana* Leon. (Maxican petunia), F) *R. simplex* (White Mexican Petunia), G) *R. strepens* , H) *R. nudiflora* I) *R. patula* J) *R. longepetiolata*

Usability of *Ruellia* in Phytoremediation :

Ruellia is good accumulator of lead, the species can be recommended for the remediation of lead contaminated soil (Subhashini et. al; 2015). Seerangaraj et. al., studied that the synthesis of FeONPs using *Ruellia tuberosa* green leaf extract for biomedical and bioremediation application. The major advantage of this strategy is that it can provide antibacterial activity to readymade fabrics and hospital related dressing, uniforms, etc. and developed the efficient non- woven cotton fabrics for wiping out of bacterial pathogens in hospital and industrial sector. Further determining the retaining capacity and evaluation of bacterial killing rate after repeated washing of cotton fabrics will give a better solution instant killing of pathogenic microbes. Apart from this FeONPs synthesized via green route will also promote sophisticated way for degrading synthetic dyes, thus exploring its bioremediation potential of *Ruellia* species.

Sun et.al., (2020) conclude that among ten herbaceous plants they selected *Ruellia brittoniana* and recommended as herbaceous alternative for heavy water pollution and light water logging environment. *Ruellia tuberosa* showed better resistance to exhaust pollutant the seedling performance of *Ruellia* tuberosa was better which might be due to its resistance to exhaust pollutants. It is also suggested that plantation of such species eventually results in significant emission reduction and lessen the burden of the pollutant of the atmosphere (Jafar et.al., 2016)

Ramadhan et. al., (2018) demonstated that hydrophenolic root extracts of *R tuberosa* L. have antibacterial activity that could inhibit the growth of *S. aurens*, *E. coli*. The plant based products that active as antibacterial agents may be developed as ecofriendly cure for bacteria related diseases through this study he has highlighted the future for conservation of *R tuberosa* L.

Conclusion:

The present work is emphasized on theoretical study of the role of different members of genus *Ruellia* in phytoremediation and their ecological adaptation due to environmental change studied by various scientists. Further it could be stated that, the members of genus *Ruellia* showed sizable elasticity to adapt in different environmental conditions and changing their physiological and morpho-anatomical features. The above study indicates that the genus *Ruellia* is an important ethnomedicinal plant with high value in pollution control and remediation of contaminated polluted soil and water.

References:

1. Agra, M. D. F.; Silva, K. N.; Basilio, I. J. L. D.; Freitas, P. F. D. and Barbosa-Filho, J. M. (2008). Survey of medicinal plants used in the region Northeast of Brazil. *Revista Brasileira de Farmacognosia*, 18: 472-508.
2. Ahammad, S. J., Sumithra, S. and Senthikumar, P. (2018) Mercury Uptake And Translocation By Indigenous Plants. *Rasayan- Journal of Chemistry*, 11(1): 1-12.
3. Chen, F. A.; Wu, A. B.; Shieh, P.; Kuo, D. H. and Hsieh, C. Y. (2006). Evaluation of the antioxidant activity of *Ruellia tuberosa*. *Food Chemistry*, 94: 14-18.
4. Chotani, D. L.; Patel, M. B.; Mishra, S. H. and Vaghasiya, H. U. (2010). Review on *Ruellia tuberosa* (Cracker plant). *Pharmacognosy Journal*, 2(12): 506-512.
5. Choudhary, M. (2018). Ethnobotanical studies for Beer Jhunujhunu conservation reserve of Jhunujhunu District of Rajsthan and screening of selected plant species for their antibacterial activity. A thesis submitted to University of Kota, Kota Rajsthan, India.
6. Das, P. K. (2018) Phytoremediation and Nanoremediation : Emerging Techniques for Treatment of Acid Mine Drainage Water. *Defense Life Science Journal*, 3(2): 190-196.
7. Fardous, M. A., Hegazi, M.A., EL-Bably, S. Z., Hana, M. R. (2020). Response of Mexican Petunia (*Ruellia Brittoniana*,L) to salinity, organic and

biomaterials. *Applied Ecology and Environmental Research*, 18(4): 5789-5802.

8. Hamayun, M. (2005). Studies on Ethnobotany. Conservation and Plant Diversity of Utror and Garbal Valleys District Swat, Pakistan. Ph.D. thesis. Department of Plant Sciences. Quaid-iAzam University, Islamabad, Pakistan. 12, 345.
9. Jain, S. C.; Jain, R. and Singh, R. (2009). Ethnobotanical Survey of Sariska and Siliserh Regions from Alwar District of Rajasthan, India. *Ethnobotanical Leaflets*, 13:171-88.
10. Lans, C. A. (2006). Ethnomedicines used in Trininad and Tobago in urinary problems and diabetes mellitus. Journal of Ethnobiology and Ethnomedicine, 2: 45.
11. Mary Kensa, and Neelamegam, R. (2016) Effect of soil pollution on Pharmacognostic properties of *Ruellia tuberosa* L. *International Journal of Applied and Pure Science and Agriculture*, 2(12): 114-120.
12. Nasir, E. and Ali, S. I. (1971-1991). Flora of West Pakistan. Technical Reports No. 1-190. Pakistan Agricultural Research Council, Islamabad, Pakistan
13. Rajan, M., Kumar, P. V. K., Kumar, S., Swathi, K. R. and Haritha, S. J. (2012). Antidiabetic, antihyperlipidemic, and hepatoprotective activity of methanolic extract of *Ruellia tuberosa*. *Journal of Chemical and Pharmaceutical Research*, 4: 2860 -2868
14. Ramdhan, M., Akhmad, S., Anna Safitri (2018). In Vitro Anti-microbial activity of hydroethanolic root extract of *Ruellia tuberosa* L. ecofriendly based product against selected pathogenic bacteria. *IOP Conference Series: Earth and Environment Science*, 239: 012028
15. Salah, A. M., Gathumbi ,J., Vierling, W. and Wagner, H. (2002). Estrogenic and cholinergic properties of the methanol extract of *Ruellia praetermissa* Sceinf. ex. Lindau (Acanthaceae) in female rats. *Phytomedicine*, 9: 52- 55.
16. Salt, D. E., Smith, R. D., Raskin, I. (1998). Phytoremediation. *Annual Review of Plant Physiology and Plant Molecular Biology*. 46: 643- 668.
17. Seerangaraj, V., Selvam, S., Palanisamy, S., Felix L. O., Arivalagan, P. (2019). "Biosynthesis of Iron Oxide Nanoparticles Using Leaf Extract of *Ruellia tuberosa* Antimicrobial properties and Their Applications In Photocatalytic degradation. Journal of Phytochemistry and Photobiology- B, 192: 74-82.
18. Sun, B., Pan, X., Han, L., and Fei, Y. (2020). Selection of waterlogging-tolerant and water purification herbaceous plants for the construction of a sponge city in Shenzhen, China. *Notulae Botanicae Horti Agrobotanici Cluj-Napoca*, 48(2): 1043–1056. https://doi.org/10.15835/nbha48211908
19. Tesfaye, S. (2004). Ethnobotanical and Ethnopharmaceutical Studies on Medicinal Plants of Chifra district, Afar region, North Eastern Ethiopia. A thesis submitted to the School of Graduate Studies of the Addis Ababa University in partial fulfilment of the requirements of the Degree of Master of Science in Pharmaceutics (2004)

INNOVATIVE GREEN SYNTHESIS OF AZOMETHINE: A SHORT SURVEY ON AN EVERGREEN CHEMISTRY.

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Abstract :

Azomethine constitute a class of pharmaceutical and medicinally important molecules.Green chemistry has become a motivational and inspirational tools for organic synthesis.Green synthesis involves the utilization of set of principle that reduce or eliminate the use or generation of hazardous substance in the design,manufacture,and application of chemical products.This methodology is applicable to as an energy efficient ,facile, and for the preparation of environmental ecofriendly synthesis for the preparation of Schiff –Base.The reaction rate of green synthesis rise the yield of the product increase by 30% compare to conventional method.The advantage of the use of natural catalyst areinexpensive, ecofriendly , best yields, reduce waste , non-hazardous,short reaction times and inverse in conversion.As we know Schiff base have been reported to have wide range as anti-cancer,anti-neoplastic,antifungal,antibacterial,antipyretic. Green synthetics approaches are important issues in organic synthesis. The preferred interesting methodology in green chemistry that may benefit from advantage of solvent free process.

Key Words :Green Chemistry, Azomethine,Green Synthesis,Natural Catalyst, Anticancer,

Introduction :

Green chemistry is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances. Green chemistry applies across the life cycle of a chemical product, including its design, manufacture, use, and ultimate disposal. To be called "green," each reaction should have three green components: solvent, reagent / catalyst and energy consumption.Green chemistry is based on twelve principles that can be used to create or recreate molecules, materials, reactions andprocesses that are safer for human health.

The processes of the Green Chemistry that have been developed to date include almost all areas of chemistry, including organic, inorganic, biochemistry, polymer, toxicology, environmental, physical, technological, etc. [1]Through the several prevailing trends of the green program such as catalysis, biocatalysis and the use of alternative: renewable feedstock (biomass), reaction media (water, ionic liquids and supercritical fluids), reaction conditions (microwave irradiation) and new synthetic pathways (photocatalytic reaction), the dual goals – environmental protection and economic benefit can be achieved.[2,3] Green chemistry aims to design and produce cost-competitive chemical products and processes that attain the highest level of the pollution-prevention hierarchy by reducing pollution at its source.[4] In addition, green chemistry is interested in the best form of waste disposal and designing the process of degradation of chemical products after use, all in accordance with pollution prevention and sustainable development measures [5]. Basic principles of green chemistry cover a wide spectrum of synthetic organic synthesis: designing processes in organic synthesis to reduce byproduct/waste generation, reduce the use of hazardous chemicals/raw materials and enhance the use of safer or more environmentally-safe solvents and (bio) catalysts, renewable raw materials and how Would improve energy efficiency.[6,7]Azomethine derivatives are very important and the initiating compound for most synthetic chemistry compounds in all their fields.[8]

During the past few decades there has been great interest in Schiff base compounds.[9]The rules of the lip stone are the basis for the construction of modern chemistry. Since R, R1 is an alkyl or aryl group, the first to prepare and isolate it was the German scientist Hugo

Schiff in 1864 from the condensation of the carbonyl group (aldehyde, ketone) with a primary amine compound (aliphatic, aromatic).[10] Since the presence of the azomethine group is responsible for the various biological activities in these compounds, they are used as anti-bacterial and anti-fungal, anti-cancer, antiviral and plant growth regulators, antidepressant and anti-inflammatory, as well as being used in the fight against HIV, anti-malarial and antipyretic.[11,12] Such type of compounds have exhibited significant anticancer and antidepressant activities even at micro molar concentrations as well and are nontoxic to normal cells in comparison with a number of similar reported compounds in the literature.[13,14]

Due to presence of amine moiety, Schiff bases are playing an essential role in perceiving the alteration phenomenon and racemization response in biotic systems.[15] In the industrial field, azomethine derivatives were used when they were associated with azo groups in the manufacture of dyes for fabrics, textiles and cotton that contain nylon to give colors between yellow and coffee.[16]

Mango (Magniferaindica) is grown in South Asia from where it has been distributed worldwide to become most cultivated edible fruits in the tropics.The green mango fruits is sour in taste. The acid part is one of the main ingredients of mango fruit. Thus aqueous extract of mango fruit is acidic due to presence of organic acids and hence it may be work as an catalyst for condensation of aromatic amines and aldehydes.[17,18]

Literature Review :

The current literature shows that there has been growing interest towards green synthesis of these compounds due to numerous application in various fields of chemistry.[19]Various research groups have developed different method for synthesis of Schiff Base or Azomethine.[20] Many of reported method require long reaction time, use of expensive and toxic catalysts and organic solvents.[21,22] In such condition we have developed a new method for synthesis of amino Schiff base by the condensation of benzene with various aromatic aldehyde using mango water as a catalysts under grinding with short times and high yields.[23]

General Scheme :

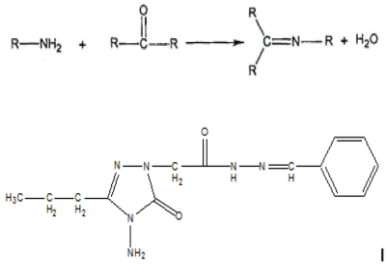


Figure 1 : Anticancer agent

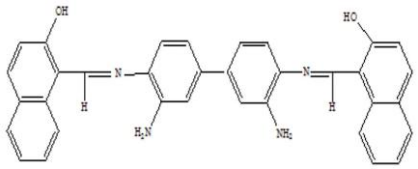


Figure 2: Anti-inflammatory agent

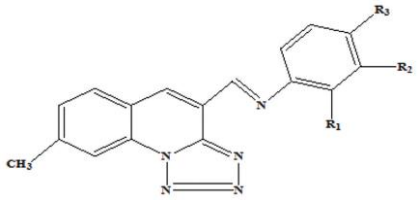


Figure 3: Anti nociceptive agent

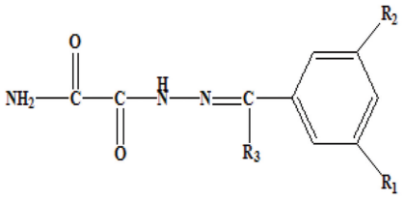


Figure 4 : Anticonvulsant agent

EXPERIMENTAL TECHNIQUES : -

1.General procedure for extraction of Mango juice:- Firstly wash the mango with water, then peel off the mango. Cut it into small pieces. Add 20 ml water and 25 gm mango pulp into hot water. After adding mango pulp boil it for 5 minutes. Then cool it. Then it was used as catalyst.

2. Melting Point:-

The melting points were determined in a theils tube apparatus and are uncorrected.

3. I.R Spectrum:-

I.R .Spectra was recorded on Shimadzu FTIR (ModelISI118675A) using KBr pallets.

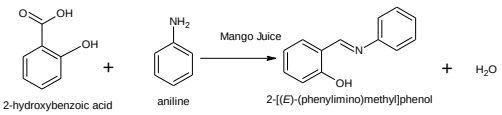
Method Of Synthesis Of Schiff Base Derivatives : -

General procedure for the synthesis of Schiff base as given below**.**

1. Synthesis of 2-[(E)-(Phenylimino) methyl] Phenol

In this synthesis 3.05 ml of 2-Hydroxy benzoic acid {0.025} first taken in a beaker and then add 2.33 ml of Aniline {0.025} to it, then after this add 10 ml of mango juice into this mixture, stir this mixture continuously until the mixture starts to solidify.

Now take a water bath with crushed ice and keep the beaker in water bath, mixture will forms the precipitate and then solid separated was filtered by filter paper and washed with the help of water and then filter this mixture. Dry the product and then recrystalised from ethanol. The Schiff base was formed.



- Yield obtained :- 2.7 gm
- Solubility :- Chloroform
- Color :- Daffodil
- Melting point :- 185°c

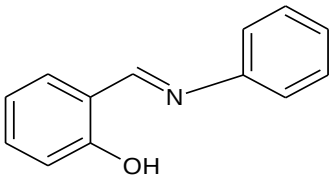
Synthesis of N-(Furan-2-ylmethylene)-4-nitroaniline

In this synthesis 3 ml of furfural {0.025} first taken in a beaker and then add 4-nitroaniline {0.025} (0.52) gm to it, then add 10 to 15 ml of mango juice into this mixture, stir this mixture continuously until the mixture starts to solidify.

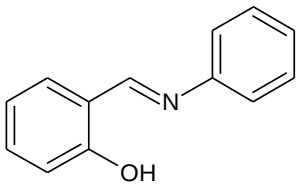
Now take a water bath with crushed ice and keep the beaker in water bath, mixture will forms the precipitate and then solid separated was filtered by filter paper and washed with the help of ethanol and then filter this mixture. Dry the product and then recrystallized from ethanol. Then Schiff base was formed.

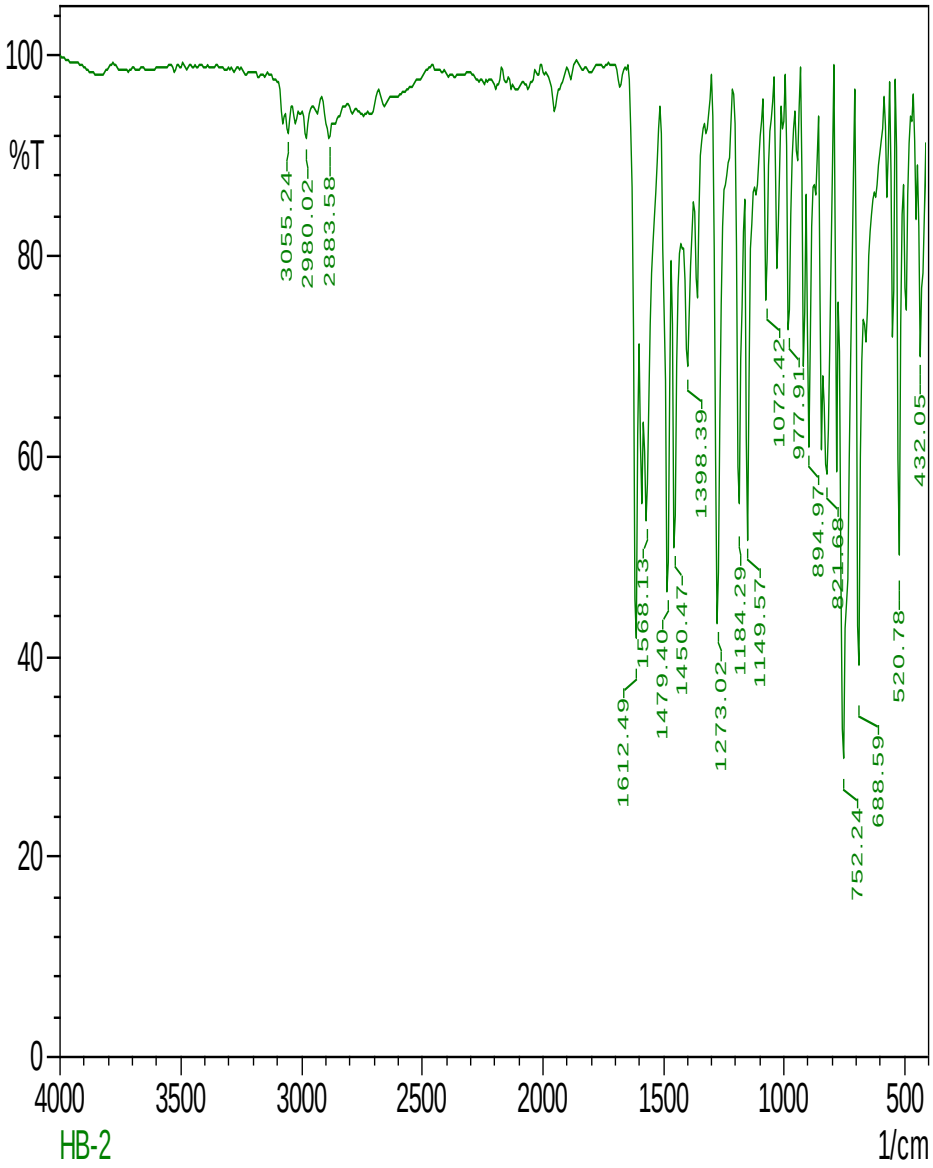
- Yield obtained :- 1.0 gm
- Solubility :- Chloroform / DMSO
- Color :- Summer dew
- Melting point :- 112°c

:-New Synthesized Schiff Base

Sr. No	Compound	Color	Reaction Time	Melting Point
1	 2-[(*E*)-(phenylimino)methyl]phenol	Daffodil	1.25 hours	185 ºc
2		Summer Dew	2.10 hour's	112ºc

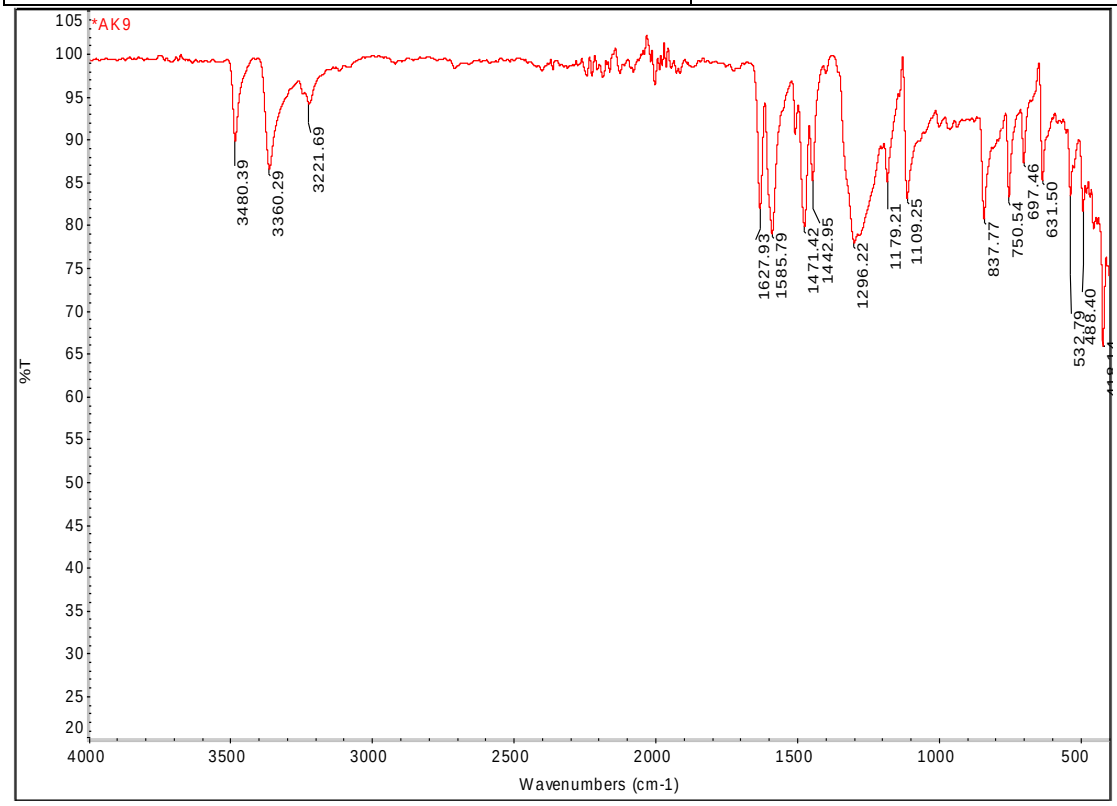
Spectral Data Of Compound : -
IR: 2-[(E)-(phenylimino)methyl]phenol:-

Structure Of Compound	I.R. Frequencies (cm^{-1})
 2-[(*E*)-(phenylimino)methyl]phenol	**Ar (C-H str)= 3055.24 cm^{-1}** **C=N Str.= 1612.49 cm^{-1}** **(C-O str) = 1184.29 cm^{-1}** **(C-N str) =1072.42 cm^{-1}** **(C=C str) = 1568.13 cm^{-1}**



IR:-N-(Furan-2-ylmethylene)-4-nitroaniline

Structure Of Compound	I.R. Frequencies (cm^{-1})
	Ar(N-H str)= 3480.39 cm^{-1} **(C-N str) =1296.22 cm^{-1}** **(C=C str) = 1627.23 cm^{-1}** **(NO_2 Str) =1471.42cm^{-1}**



RESULT AND DISCUSSION:-

In this project we have reported synthesis of number of Schiff bases, by using stirring method. Here in we report the synthesis of new Schiff bases using stirring method. Here in we report the synthesis of new Schiff bases using grindstone technique. Aromatic amine and substituted benzaldeyde in the molar ratio of 1:1respectively were taken in beaker and equal amount of lemon juice, grape juice, mango juice was added and grinded by pastel for appropriate time. Reaction mixture changes to pale yellow pasty mass. After completion of reaction, water (20- 30 ml) was added and stirred. Separated solid was filtered and purified by crystallizations. Structures of the synthesized products were characterized by IR analysis. IR spectra of Schiff bases showed a peak at 1610 -1625 cm^{-1} due to C = N stretching. All the Schiff bases showed negative test for aldehyde.

Structures were further confirmed by IR spectrum. All the Schiff bases were synthesized by stirring method, melting point of the product obtained by theil's tube method. A result shows that stirring method is superior as compared to conventional method.[20] No organic solvent required for this technique, reaction completed within less time giving pure products and high percent yield.

It is observed that the condensation between a carbonyl compounds and an amine leading to the formation of Schiff bases should be a facile reaction due to good electrophilic and nucleophilic characteristic properties of the carbonyl and amines group respectively.[21]

Logically, we focused our attention on protonation of heteroatom in organic transformation by natural acid. Recently, we reported that lemon juice, grape juice, mango juice as natural catalyst efficiently catalyzes the knoevenagel and biginelli reaction. To our satisfaction we found that the use of stoichiometric amount of lemon juice, grape juice, mango juice resulted in quantitative yield of the corresponding Schiff base at room temperature at minimum time.[22]

However, no result was obtained when condensation is carried without employing catalyst, if one of the reactant is deactivated by electronic effect. The role of lemon juice in catalyzing the reaction was demonstrated by the lack of Schiff base formation when the reaction is carried out in the absence of catalysts.

CONCLUSION :-

In the article, we are reporting s new eco-friendly route with good yet for the synthesis of Schiff bases by using Lemon juice, grape juice, mango juice and the product can be purified by recrystallization using appropriate solvents. This solvent – free approach material, quantifying it as a green approaching for the synthesis of Schiff bases.

In addition to this, comprised to traditional method , this new method is cleaner, safer and more eco-friendly involving mild reaction condition such as reaction time use of hazardous solvents con be reduce by maintaining good yield of product.[23]

We report the synthesis of some new Schiff bases under organic solvent free conduction and using stirring method. The advantage of this method include easy and simple product ,These method are more convenient and reaction can carried out in higher yield ,shouter reaction time with milder conduction , with no gyration of palpation and safer to analyst.[24]

References

1. Valavanidis, A., Vlachogianni, T., Fiotakis, K., (2009): Laboratory Experiments of Organic Synthesis and Decomposition of Hazardous Environmental Chemicals Following Green Chemistry Principles.
InternationalConference “Green Chemistry and Sustainable development”,
Thessaloniki, 25-26/9/2009.

2. Jukic, M., Djakovic, S., Filipovic-Kovacevic, Z., Kovac, V. and Vorkapic-Furac, J. (2005): Dominant trends of green chemistry. KemInd 54 (5): 255-272,

3. Ritter, S. K. (2001): Green Chemistry. Chem. Eng. News, 79(29), 27-34

4. Nagham MahmoodAljamali, Imad Kareem AlwanAlsabri., Development of Trimethoprim Drug and Innovation of Sulfazane-Trimethoprim Derivatives as Anticancer Agents., Biomedical & Pharmacology Journal. March 2020;13(2): 613-625.

5.HasaneenKudhairAbdullabass, AseelMahmoodJawad ,NaghamMahmoodAljamali . Synthesis of drugs derivatives as inhibitors of cancerous cells.,Biochem. Cell. Arch, Vol. 20 (2) – October 2020.,

6.A. Elzaher, M. Mokhles, A. Ammar, A. Mou sa, A. Samia, N. Moustafa, M. Mamdouh, A. A hmed synthesis, anticancer activity and molecular docking study of schiff base complexes containing thiazole moietyBeni-Suef Univ. J. Basic Appl. Sci., 7 (2) (2016), pp. 85-96,

7.Margetić, D. (2005): Mechanic-chemical organic reactions Withoutt the use of solvents.54 (7-8): 351-358

8. Koole, M.; Frisenda, R.; Petrus, M.L.; Perrin, M.L.; van der Zant, H.S.J.; Dingemans, T.J. Charge transport through conjugated azomethine-based single molecules for optoelectronic applications. Org. Electron. 2016, 34, 38–41.

9. Wał ˛esa-Chorab, M.; Skene, W.G. Engaging the Reversible Bonds of an Immobilized Styreno-Thiophene Film. Cryst.Growth Des. 2020, 20, 5688–5697

10. Suresh Patil *, S.D. jadhav and U.P patil scholar research Library, Archives of Applied science research, 2012, 4

11. A. R. Bendale, R. Bhatt, A. Nagar, A. G. Jadhav, G. Vidyasagar, *Der PharmaChemica*, 2011, 3(2), 34.

12. A thesis of synthesis & their metal complex by ABDUL RAUF, August 2005
13. Cimerman, Z, Miljanic, S, and Galic, N. 2000.Schiff bases derived from amino pyridines as spectrofluorimentricanaltric reagents, CroticaCchemicalActa, CACAA -73: 81-95.
14. Singh, P., Goel, R. L. and Singh, B.P. 1975. 8-acetyl-7-hydroxy-4-methly coumrain as a gravimetric reagent for Cu2+ and Fe+, Journal of Indian Chemical Society , 52: 958-959.
15. Perry, B. F., Beezer, A.E, Miles, R.J., Smith, B.W., Miller J. and Nascimento, M.G.1988. Evaluation of microlatemate as a drug, microbois, 45:181-191.
16. Patel PR, Thaker B T Zele S. (1999). Preparation and characterization of some lanthanide complexes involving a heterocyclic beta –diketone, Indian journal of chemistry, 38A: 563-566.
17. HaiJian YANG, Wen Hua SUN*, Long LI, ZhiMA Chinese Chemical Letters, 2*, et al.1 Research Article, Vol 5 Issue1, 2013
18. GHULAM FAREED 1, 2*, et al. 1 Research Article, Vol 5, Issue 1, 2013.
19. S.S.Murthy, A.Kaur, B.Sreenivasalu, R.N.Sharma, Indian J.Exp.Biol.,(1998)724
20. K.N.Venugopala and V.A.Jayashreee, Indian J.Pharma.Sci., 70(2009) 88.[3] N.Solak and S.Rollas, ARKIVOC, xii (2006) 173
21. N.Solak and S.Rollas, ARKIVOC, xii (2006) 173
22. S.J.Wadher, M.P.Puranik, N.A.Karande and P.G.Yeole Int...J.Pharm Tech Res., 1(2009)22.
23. M.Verma, S.N.Pandeya, K.N.Singh and J.P.Stables, Actapharm. 54 (2004) 49.
24. Macho V.; Kralik, M.; Hudac, J.; Cingelova, J.; J.Mol.Catal.A.Chem. 9(2004) 2009.P.Bey, J.P.Vvert, Tetrahedron Lett, 18 (1977) 1455

A REVIEW ON THE ALTERNATIVE ENERGY SOURCES

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Amolakchand Mahavidyalay, Yavatmal

ABSTRACT

Alternative Energy Sources and Renewable technologies are the clean sources of energy, it minimizes environmental impacts, produce negligible secondary wastes than conventional energy technologies, and it is a current and future economic and social needs. Sunlight and wind are the primary forms of natural energy it can transform into renewable energy flow. This provide an excellent opportunity for reduce emission of greenhouse gas and hence global warming. This paper provides a review of the importance and need of hydrogen fuel cell and different Renewable technologies.

***Keywords**: Energy Sources, Renewable technologies, global warming, greenhouse gas.*

Introduction

Everyday, the world produces carbon dioxide that is released to the earth's atmosphere. This increased content of Carbon Dioxide increases the warmth of our planet and is the main cause of the so called "Global Warming Effect". One answer to global warming is to replace and retrofit current technologies with alternatives.

Increasing awareness of environmental factors and limited energy resources (i.e. coal, petrol, diesel, etc.) have led to a profound evolution in one view the generation and supply of energy. Although fossil and nuclear sources will remain the most important energy provider for many more years, development of flexible technological solutions that involve alternative means of energy supply and storage is a need of time. Furthermore, the search for cleaner, cheaper, smaller and more efficient technologies has been driven by recent. World population is growing most rapidly, Renewable energy has been considered as one of the strong contenders to improve plight of Billions of people, mostly in rural areas, without access to modern forms of energy. Renewable energy sources currently supply somewhere between 15% and 20% of total world energy demand. It is estimated that in 1990, all renewable energy sources produced nearly 2900 TWh, accounting for about 24% of the world's total electricity supply. If traditional uses of biomass were also taken into account, then renewable would supply nearly 18% of global energy demand. Most of the renewable contribution to current electricity supply is provided by hydroelectric schemes [1].

Renewable energy has the potential to play an important role in providing energy with sustainability to the vast populations in developing countries who as yet have no access to clean energy. Although economically viable for several applications, renewable energy has not been able to realise its potential due to several barriers to its penetration. A framework has been developed in this paper to identify the barriers to renewable energy penetration and to suggest measures to overcome them [2]. It is widely accepted that generating energy within the city boundaries can bring many advantages, a main one being the increase in efficiency due to the reduction of energy transmission losses. Amongst all possible sources of renewable energy available in the urban context, such as wind, geothermal and solar energy, the latter is probably the most popular and has been studied to great lengths [3].

Need for alternative Energy Sources

It is very important to do this for two reasons. First, and perhaps most important, we are in danger of ruining the planet's climate. Internal combustion engines run on fossil fuels like petrol, diesel emits carbon dioxide. If we continue to use fossil fuels, we may increase the temperature of the planet in ways that will harm us and our entire ecosystem. Second, we cannot keep using fossil fuels forever, there are hundreds of years or just a few decades left of this resource, the fact remains that it is a finite resource. They will eventually run out, even as the population of Earth grows. For both these reasons, we need to find other sources of energy that do not emit carbon dioxide when used [4].

Climate change scenario

Demand for energy and associated services, to meet social and economic development and improve human welfare and health, is increasing. All societies require energy services to meet basic human needs (e.g., lighting, cooking, space comfort, mobility and communication) and to serve productive processes. Since approximately 1850, global use of fossil fuels (coal, oil and gas) has increased to dominate energy supply, leading to a rapid growth in carbon dioxide (CO2) emissions. Greenhouse gas (GHG) emissions resulting from the provision of energy services have contributed significantly to the historic increase in atmospheric GHG concentrations. The IPCC Fourth Assessment Report (AR4) concluded that "Most of the observed increase in global average temperature since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations.Recent data confirm that consumption of fossil fuels accounts for increased CO2 concentrations to over 390 ppm, or 39% above preindustrial levels, by the end of 2010 [7].

Alternative Energy Sources

Alternative energy encompasses all those things that do not consume fossil fuel. They are widely available and environment friendly. They cause almost no pollution [5].

Solar Energy

Sun is the first energy source in the world. It was in use much earlier before humans even learn how to light a fire. Many living things are dependent on solar energy from plants, aquatic life and the animals. Solar energy is one the alternative energy source that is used most widely across the globe. About 70% of the sunlight gets reflected back into the space and we have only 30% of sunlight to meet up our energy demands. Solar energy can be extracted either by Solar Thermal or using Photovoltaic (PV) Cells [5].

Wind Energy

Wind power is an affordable, efficient, pollution-free and cost-competitive. Wind is available virtually everywhere on earth, although there are wide variations in wind strengths. It does not cause any air pollution. Advancement in technologies has brought down the cost of setting up wind power plant. The total resource is vast; estimated to be around a million GW 'for total land coverage'. If only 1% of this area was utilized, and allowance made for the lower load factors of wind plants (15–40%, compared with 75–90% for thermal plants) that would still correspond, roughly, to the total worldwide capacity of all electricity-generating plants in operation today [6].

Wind energy can only be used in areas which experience high winds which mean that it cannot be used as a source to extract energy anywhere on earth. They sometimes create noise disturbances and cannot be used near residential areas. These disadvantages have made the use of wind energy to particular regions only [5].

Geothermal Energy

Geothermal energy is the heat from the Earth. It's clean and sustainable. Resources of geothermal energy include shallow ground, hot water, hot rock, and molten rock called magma. Found on the Earth. The shallow ground or upper 10 feet of the Earth's surface maintains a nearly constant temperature. Geothermal heat pumps can tap into this resource to heat and cool buildings. A geothermal heat pump system consists of a heat pump, an air delivery system (ductwork), and a heat exchanger-a system of pipes buried in the shallow ground near the building. In the winter, the heat pump removes heat from the heat exchanger and pumps it into the indoor air delivery system. In the summer, the process is reversed, and the heat pump moves heat from the indoor air into the heat exchanger. The heat removed from the indoor air during the summer can also be used to provide a free source of hot water [8]. Geothermal energy comes from the natural heat of the Earth primarily due to the decay of the naturally radioactive isotopes of uranium, thorium and potassium. Because of the internal heat, the Earth's surface heat flow averages 82 mW/m2 which amounts to a total heat of about 42 million megawatts [6].

Hydroelectric Energy

Moving water is a powerful entityeasily used for the clean power generation.power is derived from the energy of water moving from higher to lower elevations. It is a proven, mature, predictable and cost-competitive technology. Thousands of years ago the Greeks used water wheels, which picked up water in buckets around a wheel. The water's weight caused the wheel to turn, converting kinetic energy into mechanical energy for grinding grain and pumping water. In the 1800s the water wheel was often used to power machines such as timber-cutting saws in European and American factories. More importantly, people realized that the force of water falling from a height would turn a turbine connected to a generator to produce electricity. Niagara Falls, a natural waterfall, powered the first hydroelectric plant in 1879 [9, 7].

Biomass Energy

Biomass materials are used since millennia for meeting myriad human needs including energy. Main sources of biomass energy are trees, crops and animal waste. Until the middle of 19th century, biomass dominated the global energy supply with a seventy percent share (Grubler and Nakicenovic, 1988). Among the biomass energy sources, wood fuels are the most prominent. With rapid increase in fossil fuel use, the share of biomass in total energy declined steadily through substitution by coal in the nineteenth century and later by refined oil and gas during the twentieth century. Despite its declining share in energy, global consumption of wood energy has continued to grow. During 1974 to 1994, global wood consumption for energy grew annually by over 2 percent rate (Figure 1). Presently, the biomass sources contribute 14% of global energy and 38% of energy in developing countries (Woods and Hall, 1994). Globally, the energy content of biomass residues in agriculture based industries annually is estimated at 56 exajoules, nearly a quarter of global primary energy use of 230 exajoules (WEC, 1994). Bio mass is the plant material derived from the reaction between CO2 in the air, water and sunlight, via photosynthesis is, to produce carbohydrates that form the building blocks of biomass. Typically photosynthesis converts less than 1% of the Available sunlight to stored, chemical energy. The solar energy driving photosynthesizes stored in the chemical bonds of the structural components of biomass. If biomass is processed efficiently, either chemically or biologically, by extracting the energy stored in the chemical bonds and the subsequent ‘energy’ Product combined with oxygen, the carbon is oxidized to produce CO2 and water. The process is cyclical, as the CO2 is then available to produce new [10].

Despite its declining share in energy, global consumption of wood energy has continued to grow. During 1974 to 1994, global wood consumption for energy grew annually by over 2 percent rate. Presently, the biomass sources contribute 14% of global energy and 38% of energy in developing countries [11, 12].

Ocean Energy

Ocean energy is a term used to describe all forms of renewable energy derived from the sea. There are two broad types of ocean energy: mechanical energy from the tides and waves, and thermal energy generated by converting the temperature difference between surface water and water at depth into useful energy. Ocean thermal energy conversion (OTEC) plants may have a range of applications including electricity generation [13].

Nuclear Power

The nuclear Power has a relatively short history: the first nuclear reactor was commissioned in 1954. Uranium is the main source of fuel for nuclear reactors. Worldwide output of uranium has recently been on the rise after a long period of declining production caused by oversupply following nuclear disarmament. The present survey shows that total identified uranium resources have grown by 12.5% since 2008 and they are sufficient for over 100 years of supply based on current requirements.. The nuclear share of total global electricity production reached its peak of 17% by the late 1980s, but three major nuclear accidents have slowed down its growth in some countries, since then it has been dropped down to 13.5% in 2012. In absolute terms, the

nuclear output remains broadly at the same level as before. Its relative share in power generation has decreased, mainly due to Fukushima nuclear accident. Japan used to be one of the countries with a high share of nuclear (30%) in its electricity mix and high production volumes. Today, Japan has only two of its 54 reactors in operation [6].

Although nuclear power plants are efficient and moderate,some Drawbacks are also there such as nuclear waste disposal, Liabilities in case of nuclear accident and public concerns about operation

Hydrogen Energy

Hydrogen is high in energy, yet an engine that burns pure hydrogen produces almost no pollution. NASA has used liquid hydrogen since the 1970s to propel the space shuttle and other rockets into orbit. A fuel cell is a device that converts the chemical energy from a fuel into electricity through a chemical reaction with oxygen or another oxidizing agent. Hydrogen fuel cells power the shuttle's electrical systems, producing a clean byproduct - pure water, which the crew drinks.

A fuel cell

A fuel cell combines hydrogen and oxygen to produce electricity, heat, and water. Fuel cells are often compared to batteries. Both convert the energy produced by a chemical reaction into usable electric power. However, the fuel cell will produce electricity as long as fuel (hydrogen) is supplied, never losing its charge. Fuel cells are a promising technology for use as a source of heat and electricity for buildings, and as an electrical power source for electric motors propelling vehicles. Fuel cells operate best on pure hydrogen. But fuels like natural gas, methanol, or even gasoline can be reformed to produce the hydrogen required for fuel cells. Some fuel cells even can be fueled directly with methanol [14].

Advantages of fuel cells

In fuel cell, the use of hydrogen produce negligible greenhouse gases than does burning fossil fuels. fuel cell convert energy efficiently, which helps to conserve energy resources. A byproduct of this electrochemical process is pure water aclear benefit for the environment.

- Hydrogen (a testless, odorless, colourless gas) is, however , not found freely in nature. It must be extracted from other substances
- High efficiency reduced CO_2 emissions
- Clean fuels — including biogas, methanol, H_2(Hydrogen)
- Hydrogen — can be produced cleanly using sunlight or biomass directly, or through electrolysis, using renewable electricity [15].

Conclusion

Alternative energy refers to energy sources that have no undesired consequences such for example fossil fuels. Alternative energy sources are renewable and are thought to be "free" energy sources. They all have lower carbon emissions, compared to conventional energy sources. These include Biomass Energy, Wind Energy, Solar Energy, Geothermal Energy, Hydroelectric Energy etc, combined use of all these will defiantly fulfill the need of energy without compromising on environmental factors.

All the alternate energy sources have better performance, but use of fuel cells with hydrogen as fuel seems to be most promising energy source. As long as a fuel cell is supplied, it will generate electricity. Since fuel cells create electricity chemically, rather than by combustion, they are not subject to the thermodynamic laws that limit a conventional power plant. Therefore, fuel cells are more efficient in extracting energy from a fuel.

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References

1. J.P. Painuly Renewable Energy 24 (2001) 73–89
2. J.P Painuly, Renewable Energy Volume 24, Issue 1, September 2001, Pages 73–

89
3. Juan Jose Sarralde, David James Quinn, Daniel Wiesmann, Koen Steemers, Renewable Energy 73 (2015) 10-17
4. http://greenliving.lovetoknow.com/Why_Do_We_Need_Renewable_Energy
5. http://www.conserve-energy-future.com/AlternativeEnergySources.php
6. World Energy Resources, 2013 Survey by World Energy Council
7. Renewable Energy Sources and Climate Change Mitigation, Special Report of the Intergovernmental Panel on Climate Change
8. http://www.renewableenergyworld.com/rea/tech/geothermal-energy
9. http://www.altenergy.org/renewables/hydroelectric.html
10. Peter McKendry, Bioresource Technology, 83 (2002) 37–46
11. P.R. Shukla, Transition From Traditional To Modern, The Social Engineer, Vol. 6, No. 2
12. Woods, J and Hall, D.O (1994), Bioenergy for Development - Technical and Environmental Dimensions, FAO Environment and Energy Paper 13, Rome, Italy
13. http://arena.gov.au/about-renewable-energy/ocean-energy/
14. http://www.renewableenergyworld.com/rea/tech/hydrogen
15. from wood through the combination of gasification and solid oxide fuel cells, Ph.D Thesis by Florian nagel, Swiss Federal Institute of Technology, Zurich (2008).

Table.1. Nuclear Power: top 5 countries 2011 [6]

Nuclear Country	Installed Capacity (MW)		Actual Generation (GWh)	
	2011	**1993**	**2011**	**1993**
United States of America	98 903	99 041	799 000	610 000
France	63 130	59 032	415 480	350 000
Japan	38 009	38 038	162 900	246 000
Russian Federation	23 643	19 843	122 130	119 000
Korea (Republic)	20 718	7 615	98 616	58 100
Rest of World	119 675	116 726	787 777	722 900
Global Total	364 078	340 295	2 385 903	2 106 000

PHYSICO CHEMICAL ANALYSIS OF GROUNDWATER SAMPLES FROM BALAPUR, DISTRICT AKOLA (MS).

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ABSTRACT

Water is extremely essential for survival of Life. On earth water is present in oceans, ice glaciers, underground and on ground. By the process of hydrological cycle fresh water is continuously get recharged. Ground water table is revitalized by percolation of rain water through soil and rocks. Potable water is primary need of human as it serves as lubricant, regulates body temperature and provides the basis for the body fluids and metabolism At global level most of the deaths were occurred due to waterborne diseases. Thus monitoring altered physico chemical parameters is essential to check water quality. The Drinking water samples of 5 different bore wells from Balapur area were collected in plastic bottles and Physico chemical parameters of water such as Colour, Odour, pH, EC, TDS , Chloride, Alkalinity, Hardness, DO, BOD, COD were analysed. From the result it is concluded that 5 different bore well of Balapur were found safe for drinking and domestic use.

***Keywords**: Physico chemical, Balapur, bore well etc.*

Introduction

The first life on earth is evolved in water. Water is very essential for survival of Life. On earth water is present in oceans, ice glaciers, underground and on ground. By the process of hydrological cycle fresh water is continuously get recharged. Ground water table is revitalized by percolation of rain water through soil and rocks. The quality of water is fundamental concern for humans as it is directly linked with health. Water is the central requirement for industry, farming, economic development many nourishing natural systems[1]. Potable water is primary need of human as it serves as lubricant, regulates body temperature and provides the basis for the body fluids and metabolism [2]. It is key requirement for maintaining personal hygiene.

While percolating many contaminants were added in to potable water, besides this now a days the rate of adding contaminants accelerated by humans anthropological activities such as adding excessive pesticides, insecticides, chemical fertilizers and improper management of rain water, pollution, urbanization, industrialization and discharge of sewage makes it unfit by altering its ideal physico chemical properties, such as colour, odour, pH, electrical conductivity, chloride content, alkalinity, hardness, Dissolved Oxygen, Biological Oxygen Demand, Chemical Oxygen Demand, and Total dissolved solids[3]. At global level most of the deaths were occurred due to waterborne diseases. Thus monitoring altered physico chemical parameters is essential to check water quality. Present research work under taken for the analysis of physico chemical properties of five randomly selected drinking bore wells form BalapurTahsil, District Akola (MS) India.

Materials and Methods

For the present research work one liter water was collected from each sampling site in the month of February 2021. The Drinking water samples of 5 different bore wells from Balapur area were collected in plastic bottles and preserved according to standard methods [4]. Collected water samples were having varying depth of 80 to 150 meters. Balapur is located at 20°41’ 17.5416”N, 76° 47’28.8924” E. It has an average elevation of 268 meters from sea level. Balapur is the westward taluka of Akola district. It is situated in *Vidharbha* region of Central Maharashtra. Balapur is famous historical place in Akola district. Balapur’s water bearing formation is basalt (Deccan trap) Physical parameters of water such as Colour, Odour, turbidity, pH, Electrical fractured, jointed and weathered basalt under phreatic conditions and

Figure01: location of study area showing in the map of Maharashtra.

the soil type is medium black cotton soil [5].

Conductivity, Total Dissolved Solids were

analysed on sampling site and chemical parameters such as Chloride, Alkalinity, Hardness, Calcium, magnesium, sodium, potassium, Sulphur dioxide and Florine were analysed within 24 hours by standard methods [6-7].

All physico chemical parameter were performed in triplicates and average was considered as a reading also data was analyzed statistically. The simple linear correlation analysis has been carried out to find out correlation between parameters [8]. The analyzed data were compared with standard values recommended by WHO [9].

Result and Discussion

The physico chemical parameters of drinking water collected from 5 different sites in and around Balapur were recorded and presented in table 01 while Table 02 shows the correlation between each parameter.

Physical parameters

All samples were colourless and odorless at the time of collection. Acidic and alkaline condition of sample was determined by pH. All are the samples were slight acidic except sample of Nakashi and Gaigaon. Hence all the samples of drinking water were found within desirable rang according to WHO and ICMR [10]. The pH all the sampling sites ranged from 6.93 to 7.33. ThepH controls chemical state of many nutrients, phosphate, nitrate and also dissolved oxygen [11].

Electrical conductivity ranges from 1337.33 to 1601.67µs/cm. Electrical conductivity was positively (0.8949) correlated with TDS. Same results were recorded by Patil and Patil (2010) [12]. Electrical conductivity determines the capacity of water to transmit electric current. It signifies the total number of dissolved salt [13]. TDS is the dissolved solids and it indicates the behavior of salinity in the groundwater. Water having more than 500 mg /L is not considered for drinking [14]. Lowest TDS is recorded in samples of Balapur (658.33) while Highest TDS is found in samples of Nakashi (787.67). Generally, it is assumed that TDS and Hardness are positively correlated with kidney stone patient but it is not related on the parameter it depends on drinking habits of people [15].

Chemical Parameters

Water said to be alkaline when concentration of OH ion is more than H ions. Alkalinity ranges from 122.00 to 472.33 mg/L .The alkalinity of ground water is because of carbonates and bicarbonates [16]. Concentration of alkaline earth metal cationscombienly present in water is called as Hardness. Among five sampling sitethe highest Hardness was recorded 1247.33 mg/L at site Nakashi while lowest hardness was recorded at site 1010.67 mg/L. According to Kanan (1991) among five samples water form two were found moderate hard and rest of three samples were found very hard [14]. Chloride was recorded highest in sample of Gaigaon and lowest in sample Ridhora i.e. 1211.67 & 260.33 respectively. More concentration gives salty taste to water and water becomes unsafe for drinking. According to WHO [9] 250 mg /L is safe for drinking and only two sample were found near to safe for drinking. Calcium is an important determinant of water hardness and it also function as a pH stabilizer because of its buffering quality. Calcium also gives water a better taste. Magnesium is safe and widely available in water absolutely essential for good health. The recommended daily intake is 400-420 mg/day. Calcium and magnesium recorded in low to moderate in water samples, lowest calcium found in Balapur 47.67 mg/L, whereas highest calcium concentration found in Ridhorakh 12.67 mg/L. Highest magnesium concentration found in Gaigaon Sample i.e. 425.33 mg/L and lowest found in Paras sample 102.67. Sodium is recommended in drinking water not exceeds 20mg/L in order to avoid adverse effect on taste. Highest sodium was recorded in sample of Nakashi 58.67 mg/L whereas lowest found in Paras 14.67 mg/L. Potassium Normally found in drinking water are generally low and do not pose health concern. Highest potassium found 5.67 in Nakashi whereas 2.33 found in Ridhora. Sulphate neither usually significant health hazards, Sulphate can have a temporary laxative effect on human body. Highest sulphate recorded in 162.00 mg/L inNakashiwhereas 14.33 mg/L at Gaigaon. Fluoride helps to rebuild and strength the

tooths or enamel. Water fluoridation prevents tooth decay keeping the tooth strong and solid. Excess fluoride most commonly in drinking water can causes fluorosis. Highest fluorine 0.77 mg/L at Gaigaon while lowest 0.37 mg/L at Paras.

Conclusions

It is concluded from the present research work that water collected from 5 different bore well of BalapurTaluka were found safe for drinking and domestic use.

References

1. Mishra SP and Pandey SN, (2008): Essential Environmental Studies, Ane Books Pvt. Ltd, New Delhi, pp. 82-83.
2. Staci N, (2005): Willaim's Basic Nutrition and Diet Therapy. ELSEVIER MOSBY. 1: 156- 165.
3. Trivedi, PA, Bajpai and S Thareja, (2010): Comparative Study of Seasonal Variation in Physico-Chemical Characteristics in Drinking Water Quality of Kanpur, India with Reference To 200 MLD Filtration Plant and Ground Water. Nature and Science. 8(4): 11- 17.
4. Barreara BP, Ganzalez BE, Barreara BA and Martinez, (1990): Milk Analyst, 115, 545.
5. Rafiuddin M K (2013): Ground water information of Akola District.
6. APHA (1998): Standard methods for the estimation of water, sewage and industrial waste, APHA, AWWA, Washington.
7. APHA, (2008): Standard methods for examination of water and waste water, (21st ed.) American. Public Health Association AWWA, WEF, Washington, DC.
8. Mungikar AM, (2003) : Biostastical Analysis., Saraswati Printing Press, Aurangabad.
9. World Health Organization, (1993): Guidelines for drinking water quality-I, Recommendations. 2nd Ed. Geneva WHO.
10. ICMR, (1975). Manual of Standards of Quality of Drinking Water Supplier, 2nd Edn. Special Report Series No. 44, ICMR, New Delhi.
11. Goldmann C.R. and Horne A.J. (1983) Limnology, McGraw Hill Book Co. London, pp. 464.
12. Patil VT and Patil PR, (2010): Physicochemical analysis of selected groundwater samples of Amalner town in Jalgaon District Maharashtra. J. of Chem ISSN,0973-4945, 7(1)111-116.
13. SudhirDahiya and AmarjeetKaur, (1999): physico chemical characteristics of underground water in rural areas of Tosham subdivisions, Bhiwani district, Haryana, J. Environ Poll., 6 (4), 281.
14. Kanan, K.,(1991): "Fundamentals of environmental pollution"S. Chand and Co.Ltd. New Delhi. 1991.
15. PubaliMitra, Pal DK, Das M. (2018):Does drinking water matter in kidney stone disease : A study in west Bengal, India. IC Urology, ISSN-2466-054X, Vol59;p158-165.
16. IstifanusChindo Y, Karu E, Ziyok I, Ephraim Amanki D (2013) Physicochemical Analysis of Ground Water of Selected Areas of Dass and Ganjuwa Local Government Areas, Bauchi State, Nigeria. World Journal of Analytical Chemistry 1: 73-79.

Table 01: Phyco chemical parameters of water samples from Balapur.

		Balapur	SE	Paras	SE	Nakashi	SE	Gaigaon	SE	Ridhora	SE
Sr. No	Parameters										
1	Colour	Colourless		Colourless		Colourless		Colourless		Colourless	
2	Odour	odourless		odourless		odourless		odourless		odourless	
3	Turbidity	1.00	0.0000	1.67	0.3333	1.00	0.0000	1.00	0.0000	1.000	0.0000
4	pH	7.13	0.0333	7.33	0.0882	6.93	0.0333	6.97	0.0656	7.100	0.0577
5	EC (µS/cm)	1337.33	2.6034	1427.67	4.4096	1601.67	4.6308	1496.33	4.0961	1431.667	7.2188
6	TDS (mg/L)	658.33	2.0276	709.33	5.6667	787.67	1.4530	759.00	2.8868	758.667	3.4801
7	Alkalinity (mg/L)	315.33	1.4530	472.33	1.7638	122.00	2.4037	230.67	1.3333	310.330	6.1101
8	Hardness (mg/L)	1010.67	2.3333	1098.33	4.6667	1247.33	2.0276	1155.33	27.9364	1150.670	4.0961
9	Chloride(mg/L)	800.33	4.4845	258.67	1.7638	928.67	13.9682	1211.67	1.2019	260.333	1.4530
10	Ca (mg/L)	47.67	0.3333	128.33	1.4530	57.00	0.5774	53.67	0.8819	129.667	1.2019
11	Mg (mg/L)	125.33	2.0276	102.67	1.2019	130.67	1.3333	425.33	5.2387	105.667	2.6034
12	Na	46.00	0.5774	14.67	0.6667	58.67	0.8819	28.00	0.5774	16.333	0.8819
13	K	5.33	0.3333	2.67	0.3333	5.67	0.6667	4.67	0.3333	2.333	0.3333
14	So4	161.33	1.2019	78.00	5.0332	162.00	3.6056	14.33	1.2019	99.333	0.8819
15	F	0.63	0.0333	0.37	0.0333	0.67	0.0333	0.77	0.0333	0.400	0.0577

Table 02: Correlation Matrix of different water quality samples formBalapur.

	Tur	pH	EC (µS/cm)	TDS (mg/L)	Al (mg/L)	Hrd (mg/L)	Cl(mg/L)	Ca (mg/L)	Mg (mg/L)	Na	K	So4	F
Tur	1												
pH	0.8459	1											
EC	-0.1787	-0.6463	1										
TDS	-0.2764	-0.6327	0.8949	1									
Al	0.7927	0.9731	-0.7067	-0.6249	1								
Hrd	-0.2202	-0.6227	0.9622	0.9733	-0.6643	1							
Cl	-0.5741	-0.7662	0.3959	0.20336	-0.7177	0.2243	1						
Ca	0.6015	0.6625	-0.1953	0.0674	0.6702	-0.0036	-0.9198	1					
Mg	-0.3031	-0.4964	0.2435	0.2714	-0.3260	0.1639	0.7491	-0.4710	1				
Na	-0.5275	-0.6176	0.3902	0.0794	-0.7487	0.2370	0.6197	-0.8070	-0.0517	1			
K	-0.5330	-0.6444	0.3120	-0.0108	-0.7118	0.1115	0.8407	-0.9637	0.2772	0.9267	1		
So4	-0.2254	-0.0560	-0.0456	-0.2318	-0.2449	-0.0729	-0.1278	-0.2212	-0.7447	0.6812	0.4099	1	
F	-0.6396	-0.7877	0.3574	0.1720	-0.7439	0.1936	0.9948	-0.9447	0.7041	0.6632	0.8677	-0.0538	1

A REVIEW OF THE DEVELOPMENT OF METAL OXIDE THIN FILMS AND APPLICATIONS

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ABSTRACT

Metal oxide thin films have been studied extensively as a result of a wide range of technical applications. It is also a gifted semiconductor material due to its direct wide energy band gap with a large exciton binding energy at ambient temperature. Because of its excellent optical, chemical, electrical, and luminescent properties, it has potential applications in many devices. Metal oxides possess a broad range of electronic, chemical, and physical properties that are often highly sensitive to changes in their chemical environment. This is an interdisciplinary and emerging research field. This situation motivated us to pursue the research activity in this interdisciplinary research field. The Metal Oxide materials like TiO2, In2O3, SnO2, ZnO, CuO, NiO, CdO, Bi2O3, Al2O3, etc. The present paper is an attempt to explore the photosensitive response of titanium dioxide (TiO2) functional nanostructure thin films that have been earlier studied by several researchers along with the discussion on the chemical bath deposition technique to grow titanium dioxide (TiO2) thin films on non-conducting (glass) and conducting (Germanium, stainless-steel) substrates. The properties of deposited TiO2 thin films such as optical, structural, morphological, and thermal that is studied by the corresponding different characterization techniques like scanning electron microscopy (SEM), transmission electron microscopy (TEM), X-ray diffraction (XRD), Fourier transform infrared (FTIR), and UV–spectrophotometer. Titanium dioxide thin films are utilized as a photocathode in photoelectrochemical (PEC) cells. The various experimental results show that the Chemical Bath deposition method allows the formation of photosensitive TiO2 thin film together with functional applications. The prepared TiO2 thin film is useful to improve the performance of various devices and their applications [1]. Metal-oxides are used as the main advanced materials for photovoltaic applications. There has been growing interest to prepare various types of metal oxide thin films by using different deposition techniques.

***Keywords**: Thin films, nanocrystalline, metal oxide, Properties, Application*.

Introduction

Thin films play an essential role in the development of new materials with unique properties, such as multifunctional materials, superlattices, and superconductors that allow the study of a new phenomenon. Thin films made inthe CBD method are cheaper because of their low-cost processing with minimal material usage, and mechanical flexibility is conclusive.Many scientists have studied metal oxide thin films as electric materials due to their semiconducting behavior, structural simplicity and low cost also verified that their physical and chemical properties are highly dependable on the deposition techniques. Chemical bath deposition is one of the most suitable techniques to get a uniform thin film with better reproducibility.on building blocks such as nanodots, nanowires, nanobelts, nanotubes, nanomaterials, etc. because of the demands for many practical applications in functional devices [2]. At present has been growing interest to prepare various types of metal oxide thin films by using various deposition techniques.Titanium dioxide as one of the most important metal oxide materialshas attracted considerable attention due to its good optical, electrical, and photoelectrochemical (PEC) properties [3–5].It does not require sophisticated instruments or very expensive and rare chemicalswhich means that the chemicals are commonly available and cheap for preparing TiO_2 thin film. To improve the physical and chemical performance of the devicesthe morphology of TiO_2thin films is developed. Hence, the researchers are mostly focusing on the morphology of TiO_2. Photonic structuration is an efficient way to improvelight harvesting in multiple optoelectronic applications. The researcher's interest has been the ever-photosensitivestructure of TiO_2 because of its unique properties and it is widely used in nanoscience and nanotechnology. Moreover, it attracts considerable attention due to its low-temperature compatibility, large area deposition with better homogeneity, and cost-effectiveness. But many factors affect the deposition mechanism and the quality of the thin films. Hence, it is very helpful to know about these different factors which influence

the CBD method. This review paper intends to present a screening of different works carried out so far to achieve a better understanding of the major factors affecting the chemical bath deposition method to get the best out of this deposition technique. Interconnected nanoflakes surface is one such morphology thatattracts interest due to its distinctiveness, large surface area, and high aspect ratio to synthesize nanomaterials various methods are under consideration, which is divided into two approaches. The nanomaterialsare either built from separate atoms (an approach from the "bottom-up") or by various dispersion and aggregation (an approach from the "top-down"). CBD's "bottom-up" process, has been well developed to fabricate large-area semiconductor thin films given its several advantages.By using the CBD method, the preparation of dense and adherent TiO_2 thin films are easily done. Based on the above discussion, the present study pays attention to the synthesis of TiO_2 nanostructure thin film. The present paper reportsa "bottom-up" process for TiO_2nanoflakes at room temperature by the CBD method [6-12]. Depending upon the CBD method, thin film growth can take place by ion-by-ion deposition of the materials on the substrates or by adsorption of the colloidal particles from the solution onto a substrate [13].

Literature review

Many researchers in the world synthesize materials by different methods like Chemical Vapour Deposition, Electrochemical Deposition, Puled Lased Deposition, Chemical Bath Deposition Technique, etc. The material exhibits different properties depending upon the method utilized for the synthesis. The properties of the materials are determined by the grain size in the materials, the substrate on which the materials are grown, the Band Gap of the materials, the crystal structure of the materials, thickness of the films, stoichiometry of the materials, growth parameters, etc.The properties of the materials are characterized by different characterization techniques Electrical Measurement, X-ray Diffraction, Raman Spectra, Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, Fourier Transform Microscopy, etc.

Over the past decades, titanium dioxide nanomaterials have been intensively studied for their application in solar to electricity conversion because of their compatibility with modern technologies. The continuous breakthroughs in the synthesis and modifications of titanium dioxide nanomaterials have brought novel properties and applications in the photovoltaic field with improved performance. Nanostructured TiO_2 has been studied as a photovoltaic material since the 1980s when the first observations of efficient photoinduced charge injection from dyes into TiO_2 were reportedestablishing the basis for dye-sensitized solar cells[14]. Metal oxides are one of the active components in a bulk heterojunction solar cell and also found applications as light management or charge collection in solar cells,it uses in different photovoltaic devices. The high dielectric constant of TiO_2[15-25] compared to other materials implies that thin layers of TiO_2 incorporated into a bulk heterojunction photovoltaic cell will influence the distribution of the optical field inside the structure. Larger effects on light harvesting might be achieved, in theory, by using photonic band gap or grating structures inside the device to strengthen the probability of absorption of photons. although photonic band-gap structures haven't yet been applied to solar cells, inverse opal TiO_2 structures are shown to enhance the dye-sensitized solar cells. Through a less complicated approach, the electronically inertTiO_2 nanoparticles inthe film have been shown to boost light absorption via scattering [26]. The XRD and FTIR studies confirm the formation of anatase TiO_2 thin film. SEM images reveal the improvement in flower size of TiO_2 as an effect of heat treatment. The strong influence of the wide band gap of this electrode despite this, PEC performance can motivate to check its feasibility in DSSC devices [27]. During deposition of thin films under similar conditions, higher rates and thickness have been observed on Ge substrate rather than on glass substrate because of better matching of the lattice parameters of films with those of Ge because no incubation period for nucleation is required compeering to the glass

in addition of substrate cleanness and types, its separation during deposition has a significant effect on film thickness [28]. Thin film (ZnO, CdO, TiO_2) is used asa material for various optoelectronics and photovoltaic devices. However, thin film technology continues to be being developed day after day since it's a key to the development of new materials like nanomaterials and a created superlattice. thin films have attention-grabbing properties that are quite different from those of the majority of materials that they're manufactured from. because the film becomes thinner, the surface properties become a lot more than the majority. Given that, the fundamental principle of CBD methodology and major factors influence the ultimate physical and chemical prosperities of the synthesized metal oxidefilms. The reviewed results additionally recommended that this methodology is comparatively cheap and extremely appropriate to synthesize quality thin films for varied terminal thicknesses discovered for those substrates whose lattices and lattice parameters match well with those of the deposited material.

Metal oxide; Titanium dioxide

The family of TiO_2has transition metal oxides. There are four commonly known polymorphs found in nature: i) anatase (tetragonal), ii) brookite (orthorhombic), iii) rutile (tetragonal), and iv) TiO2 (monoclinic) [29].New emerging materials, strategies, and techniques based on metal-oxides allowpushing forward photovoltaic performances. Ideally, those materials and systems should be durable and eco-friendly. As already largely well described in the literature, several steps need to take place in a photovoltaic phenomenon: their increased optical absorption, low cost of raw materials, and non-toxicity. Chemical interactions and bonding in nano partials are optimized owing to controlled nucleation and growth. Using nano-sized materials in solar cells and growing nano partials is key to producing nanocomposites. For price reduction and improved performance, the researchers focus on metal oxide and alternate materials rather than employing ancient materials. TiO_2 as the acceptor component avoids the use of toxic components like Cd or Pb. Titanium dioxide is one of the most important metal oxide materials, TiO_2 has attracted considerable attention due to its good optical, electrical, and photoelectrochemical (PEC) properties. TiO_2 is considered as a photoanode layer for perovskite solar cells to enhance light absorption through the excitation of quasi-guided modes within the photoactive perovskite material while optimizing the charge collection in the photovoltaic assembly and therefore its global efficiency. However, the potential toxicity of titanium dioxide nanoparticles is a controversial subject. Many cosmetic companies use titanium dioxide nanoparticles. Because of its bright whiteness, it is used in products such as paints, coatings, papers, inks, etc.

Titanium dioxide is one of the first materials to be used in nanotechnology products.The high dielectric constant of TiO_2 compared to other materials. TiO_2has a minimum conduction band andmaximum valence band i.e. The energy level at the bottom of the conduction band determines the reducing ability of photoelectrons while the energy level at the top of the valence band determines the oxidizing ability of photogenerated holes. The doping of TiO2 may inhibit charge recombination and expand its photo response to the visible region through the formation of impurity energy levels. Different transition metals are used as dopants in TiO_2 film. Improve photocatalysts behavior of TiO_2 addition of noble metals including Pt, Ag, Au, Pd, Ni, Rh, and Cu, after adding noble metals very effective enhancing in photocatalysis, because the Fermi levels of these noble metals are lower than that of TiO_2 [30]. TiO_2has received much attention in the past decade for use in environmental clean-upsuch as air purification, water disinfection also hazardous waste remediationof organic pollutants through photooxidation[31-32].

Conclusions

A key challenge in this research is to deposit nanostructured metal oxide thin films with consistent morphology. Another challenge is reproducible properties with long-term stability. A central challenge is “solar energy conversion” and “photon management” at the nanometre scale- from capture to transfer and conversion of solar photons into energy, or

fuels, or to drive chemical reactions. In studying the structural and electrical properties of metal oxide thin films, it is observed that the relevant morphology plays an important role, especially in defect removal.Therefore, it is necessary to study the method of synthesis, growth, and various properties of metal oxidethin film materials in detail with different annealing processes for consistent morphology.In the present paper, controlled growth of TiO_2 thin films and small further nanospheres has been realized by a low-temperature CBD methodology. The nanosheet's thin films are made with their dimension (100 nm) and thickness (20 nm). When some water is exchanged with ethyl alcohol or NH_4F is added, the crystal size of TiO_2 is significantly reduced. Synchronous nanorods within the microspheres indicate the development of nanosheets by merging aligned nanorods, which is supported by extended growth. Additionally, as the ethyl alcohol and NH_4F levels build up, a progressive change from mineral to anatase is seen.This observation suggests that the CBD method is dominated by cluster-by-cluster attachment throughout the initial growth, which is followed by the ion-by-ion condensation because of the attenuated answer supersaturation with extended growth. Many research findings further highlight the significance of the main crystal size in regulating the polymorph of TiO2 that develops in solution. The reviewed result additionally recommended that this methodology is comparatively cheap and extremely appropriate to synthesize quality thin films.In summary, TiO_2nanoflakes like morphology are controllably synthesized by the CBD methodology with NH_4Cl as a complexing agent. The XRD and FTIR studies ensure the formation of anatase TiO_2 thin film. SEM images reveal the development in flower size of TiO_2 as an impression of heat treatment. The sturdy influence of the wide band gap of this conductor despite this, PEC performance will inspire us to visualize its practicability in DSSC's devices.

References

1. Patil, U. M., Kulkarni, S. B., Deshmukh, P. R., Salunkhe, R. R., &Lokhande, C. D. (2011). Photosensitive nanostructured TiO2 grown at room temperature by novel "bottom-up" approached CBD method. Journal of Alloys and Compounds, 509(21), 6196-6199.
2. Huang, Y., Duan, X., Cui, Y., Lauhon, L. J., Kim, K. H., &Lieber, C. M. (2001). Logic gates and computation from assembled nanowire building blocks. Science, 294(5545), 1313-1317.
3. Yamakata, A., Ishibashi, T. A., &Onishi, H. (2003). Kinetics of the photocatalytic water-splitting reaction on TiO2 and Pt/TiO2 studied by time-resolved infrared absorption spectroscopy. Journal of Molecular Catalysis A: Chemical, 199(1-2), 85-94.
4. O'regan, B., &Grätzel, M. (1991). A low-cost, high-efficiency solar cell based on dye-sensitized colloidal TiO2 films. nature, 353(6346), 737-740.
5. Kavan, L., Attia, A., Lenzmann, F., Elder, S. H., &Grätzel, M. (2000). Lithium insertion into zirconia-stabilized mesoscopic TiO2 (anatase). Journal of the Electrochemical Society, 147(8), 2897.
6. Wang, H., &Xie, C. (2006). Controlled fabrication of nanostructured ZnO particles and porous thin films via a modified chemical bath deposition method. Journal of Crystal Growth, 291(1), 187-195.
7. Mane, R. S., &Lokhande, C. D. (2000). Chemical deposition method for metal chalcogenide thin films. Materials Chemistry and physics, 65(1), 1-31.
8. Lokhande, C. D. (1991). Chemical deposition of metal chalcogenide thin films. Materials Chemistry and Physics, 27(1), 1-43.
9. Lokhande, C. D., Eun-Ho, L., Jung, K. D., &Joo, O. S. (2004). Room temperature chemical deposition of amorphous TiO 2 thin films from Ti (III) chloride solution. Journal of materials

science, 39(8), 2915-2918.
10. Mane, R. S., Hwang, Y. H., Lokhande, C. D., Sartale, S. D., & Han, S. H. (2005). Room temperature synthesis of compact TiO2 thin films for 3-D solar cells by chemical arrested route. Applied surface science, 246(1-3), 271-278.
11. Pathan, H. M., Kim, W. Y., Jung, K. D., &Joo, O. S. (2005). A chemical route to room-temperature synthesis of nanocrystalline TiO2 thin films. Applied surface science, 246(1-3), 72-76.
12. Lokhande, C. D. (1991). Chemical deposition of metal chalcogenide thin films. Materials Chemistry and Physics, 27(1), 1-43.
13. Vlachopoulos, N., Liska, P., Augustynski, J., &Graetzel, M. (1988). Very efficient visible light energy harvesting and conversion by spectral sensitization of high surface area polycrystalline titanium dioxide films. Journal of the American Chemical Society, 110(4), 1216-1220.
14. O'regan, B., &Grätzel, M. (1991). A low-cost, high-efficiency solar cell based on dye-sensitized colloidal TiO2 films. nature, 353(6346), 737-740.
15. Nogueira, A. F., Durrant, J. R., & De Paoli, M. A. (2001). Dye-sensitized nanocrystalline solar cells employing a polymer electrolyte. Advanced Materials, 13(11), 826-830.
16. Ravirajan, P., Peiró, A. M., Nazeeruddin, M. K., Graetzel, M., Bradley, D. D., Durrant, J. R., & Nelson, J. (2006). Hybrid polymer/zinc oxide photovoltaic devices with vertically oriented ZnOnanorods and an amphiphilic molecular interface layer. The Journal of Physical Chemistry B, 110(15), 7635-7639.
17. Bouclé, J., Ravirajan, P., & Nelson, J. (2007). Hybrid polymer–metal oxide thin films for photovoltaic applications. Journal of Materials Chemistry, 17(30), 3141-3153.
18. Slooff, L. H., Wienk, M. M., & Kroon, J. M. (2004). Hybrid TiO2: polymer photovoltaic cells made from a titanium oxide precursor. Thin Solid Films, 451, 634-638.
19. Beek, W. J., Slooff, L. H., Wienk, M. M., Kroon, J. M., & Janssen, R. A. (2005). Hybrid solar cells using a zinc oxide precursor and a conjugated polymer. Advanced Functional Materials, 15(10), 1703-1707.
20. Liu, J., Kadnikova, E. N., Liu, Y., McGehee, M. D., &Fréchet, J. M. (2004). Polythiophene containing thermally removable solubilizing groups enhances the interface and the performance of polymer− titania hybrid solar cells. Journal of the American Chemical Society, 126(31), 9486-9487.
21. Zukalova, M., Zukal, A., Kavan, L., Nazeeruddin, M. K., Liska, P., &Grätzel, M. (2005). Organized mesoporous TiO2 films exhibiting greatly enhanced performance in dye-sensitized solar cells. Nano Letters, 5(9), 1789-1792.
22. Goh, C., Coakley, K. M., &McGehee, M. D. (2005). Nanostructuringtitania by embossing with polymer molds made from anodic alumina templates. Nano Letters, 5(8), 1545-1549.
23. Law, M., Greene, L. E., & Johnson, J. C. (2005). R. saykally, PD Yang. Nat. Mater, 4, 455.
24. Olson, D. C., Piris, J., Collins, R. T., Shaheen, S. E., &Ginley, D. S. (2006). Hybrid photovoltaic devices of polymer and ZnOnanofiber composites. Thin solid films, 496(1), 26-29.
25. Zhu, K., Neale, N. R., Miedaner, A., & Frank, A. J. (2007). Enhanced charge-collection efficiencies and light scattering in dye-sensitized solar cells using oriented TiO2 nanotubes arrays. Nano letters, 7(1), 69-74.
26. Bouclé, J., Ravirajan, P., & Nelson, J. (2007). Hybrid polymer–metal oxide thin films for photovoltaic applications. Journal of Materials Chemistry, 17(30), 3141-3153.
27. Patil, U. M., Kulkarni, S. B., Deshmukh, P. R., Salunkhe, R. R., &Lokhande, C. D. (2011). Photosensitive nanostructured TiO2 grown at room temperature by

novel "bottom-up" approached CBD method. Journal of Alloys and Compounds, 509(21), 6196-6199.
28. Gashaw Hone, F., &Abza, T. (2019). Short review of factors affecting chemical bath deposition method for metal chalcogenide thin films. International Journal of Thin Film Science and Technology, 8(2), 3.
29. Carp, O., Huisman, C. L., &Reller, A. (2004). Photoinduced reactivity of titanium dioxide. Progress in solid state chemistry, 32(1-2), 33-177.
30. Rupa, A. V., Divakar, D., &Sivakumar, T. (2009). Titania and noble metals deposited titania catalysts in the photodegradation of tartazine. Catalysis letters, 132(1), 259-267.
31. Dai, K., Peng, T., Chen, H., Zhang, R., & Zhang, Y. (2008). Photocatalytic degradation and mineralization of commercial methamidophos in aqueous titania suspension. Environmental science & technology, 42(5), 1505-1510.
32. Dai, K., Peng, T., Chen, H., Liu, J., &Zan, L. (2009). Photocatalytic degradation of commercial phoxim over La-doped TiO2 nanoparticles in aqueous suspension. Environmental science & technology, 43(5), 1540-1545.

AQUATIC WEEDS AND THEIR ECOLOGICAL ROLE IN UPPER MORNA RESERVOIR, MEDSHI, DIST- WASHIM, MAHARASHSTRA

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ABSTRACT

Upper Morna Reservoir is Medshi located in malegaonTalukaDist- Washim in Maharashstra state during study, the aquatic weeds like , Heterantheradubia plant, Sterile grass or sedge plant, Eichornia (Water hycianth) submerged Aquatic Weed, Juncus plant, Butomus, Pistia (floating weeds) were observed in the coastal sides of the reservoir during the period of June 2020 to January 2022 . Aquatic weeds play important role in protecting and restoring the aquatic ecosystem i.e. the aquatic weeds play major role in ecosystem.

***Keywords**: Aquatic weeds, Ecosystem, Medshi, Upper Morna Reservoir, Washim.*

Introduction

Ecosystem is the functional unit of ecology and represent highest level of ecological interaction which is energy based.The **"**Biotic community" and non-living environment function together called as an ecosystem.Ecology is the basic division of biology and also an integral part of any and all taxonomic division. It is consider in terms of the concept of several biotic level of organization as Community, population organism, organ, cell and gene. The major ecosystem of the world deals with easily recognized types, with emphasis on geographical and biological differences that underlie the remarkable diversity of life on earth. Fresh water eco-system is characterized as having running water (lotic) and still water (lentic). The fresh water stream (springs creeks, rivulets, brooks etc.) and rivers are lotic zone but pools, ponds, some swamps bogs, lakes, etc are lentic ecosystem. Different zonation and stratification are characteristics of lakes and large ponds. It may differentiate as littoral, limnetic and profoundal zone. Littoral zone containing rooted vegetation, which is a shallow water region. It is extends from shoreline to innermost rooted plants and passes from rooted species with floating leaves for example water lilies. This zone is populated by frogs, snakes, snails, clams and a variety of adults and larval insects. So from above ecosystem the aquatic biodiversity of weeds we need to study with its ecological importance.

Review of Literature

Anderson (2003) was carried out on diversity of aquatic weeds andgave a review of aquatic weed biology and management research conducted by the United States, Department of Agriculture Agricultural Research Service. Bhupendra and Mani (2008) studied floral diversity of Baanganga Wetland, Uttarakhand, India reporting a total of 178 plant species. Kolet*et.al.*(2013)Studies on the Biodiversity of Weeds from V.P.M.'s College Campus and Adjoining Areas in Thane, India The aquatic weed varieties are broadly classified as free floating, submerged, rooted floating, emergent and bank weeds. During the study Idhole*et.al.* (2016)from August 2015 to January 2016 found 8 species of fresh water aquatic weeds viz. Hydrilla, Eicchornia, Duckweed, Vallisneria, Pistia, M.algae, Typha, Nymphaea have been reported from various wetlands such as Ekburji dam ,Devtalav, Padmtirtha and Narayan baba talav in Washim region. S. D. Rathod (2022) studied the eight species from Upper Pus Reservoir at four sampling stations during July. 2020 To Jan. 2022 aquatic weed in Vasantsagarreservoir ,pusad, dist-yavatmal.

Materials and Method

Site description: The Upper Morna reservoir is located ($18^0$36"44'N and $76^0$56"33.61'E) at Medshi, Malegaon Taluka in Washim district of Maharashtra. It is constructed on the Upper stretch of the Morna River, one of the minor river of Vidarbha region of Maharashtra and one of the tributary of the Purna River.The

sample using selected plants was collected from water bodies. The aquatic weeds were collected by hand picking and also with the help of local fishermen. The collected weeds were then brought to laboratory and identified using standard literature on weeds. Visual observations about topographic changes in the water level of pond and its surface were also recorded to assess the extent of changes in the pond basis. Also photographic pictures also taken on spot of the reservoir.

Result and Discussion

In the Upper Morna Reservoir in Medshi, Dist-Washim, during study, the aquatic weeds like , *Heterantheradubia plant*, Sterile grass or sedge plant, Eichornia (Water hycianth) submerged Aquatic Weed, Juncus plant, Butomus, Pistia (floating weeds) were observed in the coastal sides of the reservoir during the period of June 2020 to January 2022 .the aquatic weeds are important for the aquatic environment . Aquatic weeds also keep the water temperature, humidity in the ecosystem. When aquatic plants grow it produce oxygen, which is impoertant for healthy life of eosystem and aquatic vegetation influences the oxygen levels within a water body and absorbs pollutants from contaminated water. They play important role in protecting and restoring the aquatic ecosystem Ie. the aquatic weeds play major role in ecosystem. Their role is important for fishes. The microscopic aquatics weeds biodiversity is of considerable interest to society because these are so important in the diet of different types of fish species that are commonly consume by humans for food ie. All plants whether in or around water play the important role in photosynthesize. They use sunlight, carbon dioxide, and water to grow and produce new plant tissue. They also produce oxygen through this process. It has been assured that aquatic weed have assumed greater awareness of the pollution in Aquatic ecosystem. The study of aquatic weeds is important in environmental monitoring as possible indicator of physiological and chemical changes in environmental ecosystem. Aquatic weed also useful for fishing purpose.In conclusion, biodiversity of aquatic weeds is useful biomarker for environment ecosystem.

Summery and Conclusion

In the Upper Morna reservoir have lost some of the aquatic weeds due to pollution other external factors so it necessary to protect it. There is a need for increased legal protection, well designed management practices to conserve the aquatic biodiversity. The measure for conservation of aquatic resources should be taken up on priority by different government and non-government organizations for benefit of humanity.

Aknowlegment

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References

1. Anderson L.W. (2003): A review of aquatic weed biology and management research conducted by the United States Department of Agriculture Agricultural Research. Pest ManagSciVol 59: 801–813.
2. Bhagyaleena P. and R. Gopalan(2012): Aquatic Medicinal Plants in Ponds of Palakkad, Kerala, India J. IOSR Journal of Pharmacy and Biological Sciences ; Vol 2, P 29-35.
3. Bhupendra S. A and M. B Mani (2008):Floral diversity of Baanganga Wetland, Uttarakhand, India ,Vol 4(3):P 279–290.
4. Kolet M., S,Gaikwad, S. Gosavi and S.Thosar(2013): Biodiversity of Weeds from V.P.M.'s College Campus and Adjoining Areas in Thane, India ISBN : 978-81-923628-1-6 National Conference on Biodiversity : Status and Challenges in Conservation vol 4: P 110-121
5. Idhole, S. D chhaba and D. S. Dabhade(2016):Biodiversity of aquatic weeds in washim region, Maharashstra, India,www.isrj.in. Page no (1-5).

6. Rathod S. D. (2022):Aquatic Weeds And Their Ecological Role In VasantSagar. Pusad. Dist. Yavatamal, Maharashtra (Ms) , International journal of creative research thought. ISSN:2320-2882, vol 10 (2).page no. 330-336.

PHOTOPLATE – (AQUATIC WEEDS)

	
*Eichornia (*Water hycianth) submerged Aquatic Weed	*Juncus plant*
	
Heterantheradubia plant	Sterile grass or sedge plant.
	
Butomus	*Pistia*(floating weeds)

STUDY OF GAS SENSING PROPERTIES OF SnO_2 DOPED WITH TiO_2

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ABSTRACT

TiO_2 skinny film was deposited onto n-Si substrate at a 100 °C by employing a sputtering methodology, and therefore the film was hardened in air atmosphere at vary of 500 °C– 1000°C. The structural and morphological properties of the all films were investigated by X-ray diffraction and atomic force magnifier. The gas detector with interdigitatedplatinum electrodes was invented with photolithographic techniques using the as-deposited and hardened TiO_2 skinny films as a lively material. The sensitivity of the detectors decided by fixing the conduction of the sensormaterial underneath gas gas with numerous concentration completely different operating temperatures. It had been determined that the invented detector victimization as-deposited TiO_2 thin film with 10-nm particle size has high sensitivityand quick response/recovery time. The detector operated at 50°C had conjointly sensitive to the methane gas and its detection performance multiplied with temperatures. it had been discovered that the fabricated sensors exhibited stable results. [1]

Introduction

Tin(IV) chemical compound, conjointly called metal chemical compound, is that the compound with the formula SnO_2. The mineral style of SnO2 is termed mineral, and this canbethe main ore of tin. With several different names,this chemical compound of tin is Associate in Nursing importantmaterialin tin chemistry. it's a colourless, magnetism, amphoteric solid.

Titanium dioxide (TiO2)

Titanium dioxide nanoparticles, additionally known as ultrafine pigment or nanocrystalline pigment or crystalline pigment, are particles of pigment (TiO_2) with diameters but 100 nm.Ultrafine TiO_2 is used in sunscreens thanks to its ability to dam actinic ray radiation whereas remaining transparent on the skin. it's in mineral crystal structure and coated with silicon oxide and alumina to forestall photocatalytic phenomena. The health risks of ultrafine TiO_2 from dermal exposure on intact skin square measure thought of very low, and it is considered safer than alternative substances used for actinic ray protection.

The TiO_2nano-particles are space of interest thanks to their distinctive technological properties and applications like memory devices, sensors, photograph chemical change and solar cells Nanostructure TiO_2 has been investigated as a prospective material for dye-sensitized photovoltaic cell (DSSC) during this manuscript, we tend to reportable solely potency of the TiO2 thin film based mostly photovoltaic cell. The nanostructures TiO_2 exists in 3 polymorphic part viz. rutile, anatase and brookite. Amongst these 3, anatase& mineral are most thermally stable phases of TiO2Anatasestructure of TiO_2 belongs to D144h-P42/mnm area group(lattice constant a = zero.4584 nm, c = 0.2953 nm, c/a = 0.664),while mineral structure belongs to D194h-I41/amd area group(lattice constant a = zero.3733 nm, c = 0.937 nm, c/a = 2.51) These 2 structures have nice importancein the preparation of dssc, thanks to its high surface area. TiO2nanoparticles take up a lot of amounts of dye molecules, which ends into the rise gauge boson to current conversion potency, as a result of a TiO_2 nanoparticles-coated photoelectrode sometimes has higher transparency, that cause to transmission of a big quantity of actinic ray, the smaller particle size of the TiO_2 nanoparticles solely permits negligible quantity of sunshine scattering .The several technique for preparation of nanocrystallitetitaniaar well reportable, most of them happiness to wet chemical technique. the advantages of the wet chemical technique are well studied .The best decisions of wet chemical ways ar hydrothermal and sol–gel . The Sol–gel technique is that the easy, economical, and accomplished and most frequently used ways of synthesizing TiO_2 nanoparticles. The sol–gel method provides accessibility for synthesizing TiO_2 nanoparticles with totally different morphologies like sheets, tubes ,particles, wires, rods, mesoporous and aerogels. The main aim of gift study is to synthesize the TiO_2

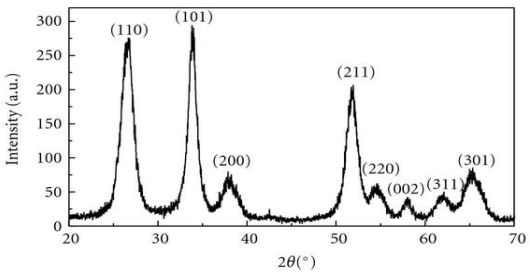
nanoparticles through hydrolysis method of metal (IV) isopropoxide and examine gauge boson to current conversion potency of the ready film.we synthesized TiO_2 nanoparticles through the chemical reaction method of metal (IV) iso- propoxide, that was followed by. [4] Self-hydrolysis of metal (IV) iso- propoxide is one in every of the effective processes to synthesize TiO_2crystalline powders byone step. The Synthesized TiO2 nanoparticles properties werestudied through XRD, FE-SEM, and UV-Visible spectrum analysis and DSC-TGA characterization techniques. [2,3]

Experimental Section

titanium tetra iso- propoxide [Ti(OCH(CH3)2)]4, Sigma-Aldrich, 97%], iso-propanol [(CH3)2CHOH, Sigma-Aldrich,99.7%] and acid [HNO3] were used as received with none more purification. A 20 metric capacity unit of resolution Ti characin isopropoxide was additional drop in drop into the twenty two metric capacity unit of resolution containing 10ml of iso-propanol and twelve metric capacity unit deionised water underneath constant stirring at 80º C into the into the round bottom beaker. After 1 h, concentrated HNO3 (.8 ml) mixed with deionised water was additional into the TTIP solution and keep it underneath constant stirring at 60 ºC for 6 h extremely viscous sol gel was obtained. The ready sol- gel was heated at 300ºC for two h within the open atmosphere. when hardening, the TiO_2nanocrystalline 2g powder was obtained. more preparation of TiO_2 film, the ready powder was added within the quantitative relation of 1:10 of the answer of iso-propanol. The TiO_2 nanoparticles deposited on titanium substrate (0.5 cm2) mistreatment the dip coating methodology. Further optical studies, The TiO_2 film were ready on the 2 glass substrates. The crystallite structure of the TiO_2 powder were evaluated by AN X-ray diffractometery [6](XPERT-PRO,2 Ajay Sharma, R.K. Karn, S.K. Pandiyan Journal of Basic and Applied Engineering analysis (JBAER)Print ISSN: 2350-0077; on-line ISSN: 2350-0255; Volume one, variety 9; Gregorian calendar month, 2014PW 3071/xx Bracket) mistreatment cu mountain peak radiation, moreover the grain size of TiO_2 was calculated by Scherrer'sformula. The particle copper and nanostructure of particles were studied by a emission scanning microscopy (FE-SEM, Jeol,jsm 6701 F).[7,8] The absorbance and transmittance spectrum was obtained for the nanocomposite coatings within the wave length vary of 200–1200 nm through a UV–Visible photometer by employing PerkinElmer lambda-35.DSC-TGA studies were examined through TG- DTA SDTQ600 instrument used by metal instruments (U.S.). DSCTGA studies were examined from 0 ºC to 1000 ºC with a heating rate 10 ºC/min [5]

Results

The structural analysis of TiO_2 particles was dole out exploitation XRD instrument. The diffractograms were recorded within the 2_range of 10-80º. Figure 1 shows representative XRD patterns taken from Sol residues heated at 300º C for 2h. The crystalline nature was determined within the powder XRD ofTiO2 TiO_2 and optical phenomenon peaks belong to mineral and anatase part of TiO2The broad lines were comparatively broad representing nano size crystal. The XRD patterns exhibited diffraction peaks at 25.44º, 36.16º, 47.91º and 54.43º, 63.4ºindicating TiO2 in anatase part with the corresponding (101),(103), (200) and (105), (204) planes respectively. The peaks observed at 27.47º, 41.20º, 56.62º, 69.35º indicating TiO_2 in mineral part with the corresponding (110), (111), (220) and(301) planes severally. All determined peaks are in smart agreement with the quality spectrum (JCPDS no.: 21-1272 and 21- 1276). Average particle size was calculable by victimisationscherrer equation. Grain size D = .wherever 9 = metallic element Go dwin Austen radiation Wavelength 1.549Aº K =form issue, TheAvg.particle size was calculated to be around 15 to 20 nm.



XRD Graph for TiO2 powder (300 ºC).

Further structural study of the ready TiO_2 powder was studied victimization FE-SEM image analysis. The fig. (a) and (b)shows the FE-SEM pictures of synthesized TiO_2 powder, which his heated at 300 ºC. From FE- SEM pictures aggregative spherical TiO_2 particle size was obtained ~25 nm. the dimensions obtained in FE-SEMis considerably beyond that calculated victimization the Sherrer formula. The FE-SEM pictures show the high degree of crystallinity of the TiO_2 nanoparticles. The FE-SEM image as shown in fig. (b), Particle was found spherical in form and surface morphology was found solid in specific regions. The agglomeration of the particles was seen within the FE-SEM pictures

Conclusion

Figure 4.1 shows the XRD spectra of the TiO_2 films, as deposited, when tempering at 500◦C for 24 h, and doping with totally different Co ratios. As deposited samples are basically amorphous and characteristic peaks are detected adore Titaniaanatase section when tempering at 500◦C for 24 h. The films are in anatase crystalline state with a discriminatory orientation of (101). (200) and (211) peaks additionally appeared within the tempered samples that confirm the anatase crystalline state. Intensity of the optical phenomenon peak (101) decreases and also the other two (200) and (211) peaks disappear with the doping by Co ions that reveals the Co ions getting in the structure and substitutes for Ti and crystalline structure distorts a lot of anymore with the rise of Co quantity within the resolution.

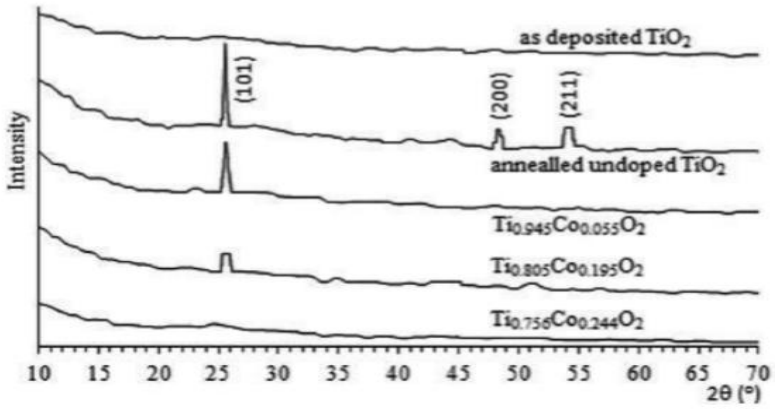
Estimation of the typical grain size in TiO_2 film as applied victimization the complete dimension ties of SnO_2 doped with TiO2 fifty-three at [*fr1] most (FWHM) values of the (101) peak (Fig. 2) and also the Deb ye–Scherrer formula Here is that the wavelength (= 1:5405 Å for metal K), D is that the angular line dimension at half most intensity and is that the general angle. These calculations showed that the average grain sizes of the tempered TiO2 and Co doped TiO_2 (Ti1 xCoxO2for x = 0:055) structures were thirty-four.5 nm and twenty.7 nm, severally. So the doping of Co (for x = 0:055) within the TiO_2 film stimulates the formation of Ti0:945Co0:055O2 with smaller average grain size than that for the TiO_2 film. Supported XRD knowledge, we determined the lattice constants a and c of tempered TiO_2sample to be three.7692 Å and 9.1870 Å, severally.

References

1. Comert, B., Akin, N., Donmez, M., Saglam, S., &Ozcelik, S. (2016). Titanium dioxide thin films as methane gas sensors. IEEE Sensors Journal, 16(24), 8890-8896.
2. Maziarz, W., Kusior, A., &Trenczek-Zajac, A. (2016). Nanostructured TiO2-based gas sensors with enhanced sensitivity to reducing gases. Beilstein journal of nanotechnology, 7(1), 1718-1726.
3. Nairan, A., Khan, M., Khan, U., Iqbal, M., Riaz, S., &Naseem, S. (2016). Temperature-dependent magnetic response of antiferromagnetic doping in cobalt ferrite nanostructures. Nanomaterials, 6(4), 73.
4. Boran, F., &Cetinkaya, S. (2016). Influence of reaction time on the size of SnO2 nanospheres and its sensing properties to VOC gases. International Journal of Biological and Medical Science, 1(2), 1-4.
5. Haidry, A. A., Durina, P., Tomasek, M., Gregus, J., Schlosser, P., Mikula, M., ...&Plecenik, A. (2012). Effect of post-deposition annealing treatment on the structural, optical and gas sensing properties of TiO2 thin films. In Key Engineering Materials (Vol. 510, pp.

467-474). Trans Tech Publications Ltd.
6. Chaiyo, P., Duangsing, B., Thumthan, O., Nutariya, J., &Pukird, S. (2017, September). Electrical and gas sensing properties of TiO2/GO nanocomposites for CO2 sensor application. In Journal of Physics: Conference Series (Vol. 901, No. 1, p. 012095). IOP Publishing.
7. Rashad, M. M., Ibrahim, I. A., Osama, I., &Shalan, A. E. (2014). Distinction between SnO2 nanoparticles synthesized using co-precipitation and solvothermal methods for the photovoltaic efficiency of dye-sensitized solar cells. Bulletin of Materials Science, 37(4), 903-909.
8. Sharma, A., Karn, R. K., &Pandiyan, S. K. (2014). Synthesis of TiO2 nanoparticles by sol-gel method and their characterization. J Basic ApplEng Res, 1(9), 1-5.
9. Caricato, A. P., Luches, A., &Rella, R. (2009). Nanoparticle thin films for gas sensors prepared by matrix assisted pulsed laser evaporation. Sensors, 9(4), 2682-2696.

Fig. XRD patterns of anatase $Ti0_2$ films as deposited, annealed and doped.



EFFECT OF DOPING ON ELECTRICAL PROPERTIES OF ZINC OXIDE THIN FILMS

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ABSTRACT

In the present study the effect of Fe doping was investigated on electrical properties of thin films of zinc oxide. It is found that the value of electrical resistance obtained is of the order of 5.878×10^3 Ωcm for pure ZnO films, whereas it reduces with dopant addition to 3.027×10^2 Ωcm, confirming the semiconducting nature of both deposited thin films.Thermo-emfmeasurement, reveals the n-type conductivity for pure and doped films.

***Keywords**: Spray pyrolysis; Thin films; Electrical properties.*

Introduction

Researchers are always interested in materials with a large band gap, low resistivity, and good optical transparency. One of such material which is abundant in nature and nontoxic is zinc oxide which possess all these properties. It has a wide direct band gap of around 3.3eV, due to which it is widely used in optoelectronic device applications. It possesses a number of exceptional physical and chemical properties, including as strong conductivity, radiation toughness, thermal and chemical stability, and piezoelectricity hence utilized in numerous applications such as solar cells, photo-detector, UV-protectors filters and photodiodes [1-5]. Different deposition techniques were utilized by different researchers to deposit these films [6-11]. In the current study we have utilized simple and economic spray pyrolysis technique for the deposition.

Experimental details

Spray pyrolysis technique (SPT) was employed to deposit pure and doped zinc oxide films.. The precursor solution used to deposit pure zinc oxide thin film was made using 0.1 M zinc acetate ($Zn(COOCH_3)_2 2H_2O$) prepared in distilled water, whereas ferric chloride ($FeCl_3$) was used as Fe source for depositing doped zinc oxide films also acetic acid (CH_3COOH) was used as the complexing agent. Glass substrate was used to deposit the films. The optimize value of temperature was found to be 623±5K.

Results and discussion

Electrical studies

We may understand about essential features of the film by measuring electrical conductivity at different temperatures. Film and growth parameters including composition, thickness, substrate temperature, and deposition rate have an impact on a film's electrical properties.

In the temperature range 300 K to 488 K the variability of dc-electrical resistivity with temperature (Figure 2) was investigated. The electrical resistance of pristine films was found to be in the order of 5.878×10^3 Ωcm, whereas it reduces with dopant addition to 0.5878×10^2 Ωcm, confirming the semiconducting nature of the films.

Thermal activation energy was calculated using relation [12],

$$\rho = \rho_0 \, exp^{(E_0/kT)} \text{ --------- (1)}$$

Where "ρ and k denotes resistivity and Boltzmann constant and ρ_0 is constant.

The activation energy (E_0) using the resistivity plots was found to be 0.072 eV for pristine and 0.054 for doped thin films.

Thermo-emf measurement

Type of conductivity can be thermoelectric power (TEP) measurement (Figure 3). The type of scattering mechanism and the position of the fermi energy level in the material influence thermo electric power.

The terminal linked to the hot end determines the sign of the majority charge carriers. In the

present research work it was found to be negative at the cold end, confirming the n-type nature of the deposited films.

Conclusion

In the existing research, the effect of Fe dopant on electrical properties of zinc oxide thin films has been reported.It is found that the value of electrical resistance obtained is of the order of 5.878×10^3 Ωcm for pure ZnO films, whereas it reduces with dopant addition to 3.027×10^2 Ωcm, confirming the semiconducting nature of both deposited thin films. Thermo-emfmeasurement, reveals the n-type conductivity for pure and doped films.

References

1. S H Jeong, et.al. (2007) Al-ZnO Thin Films as Transparent Conductive Oxides: Synthesis,Characterization, and Application Tests. Journal of the Korean Physical Society. 50 3 622.
2. Y R Sui, et al (2009) Fabrication and properties of B–N codoped p-type ZnO thin films Journal of Phys. D: Appl. Phys. 42 065101.
3. T.T. Chen, C.L.Cheng, S.P.Fu, Y.F.Chen (2007) Photo elastic effect in ZnOnanorods Nanotechnology. 18 225705.3
4. S J Pearton, D P Norton, K Ip, Y W Hew, and T Steiner (2003) Recent progress in processing and properties of ZnOSuperlattices Microstructure. 34,3-32.
5. A.U. Ubale, S. G. Ibrahim, Effect of acetic acid complex on physical properties of nanostructured spray deposited FeCdS3 thin films. Journal of Alloys and Compounds, 509(5)(2011) 2364–2367 DOI:10.1016/j.jallcom.2010.11.020
6. Wu, X., Wei, Z., Zhang, L., Wang, X., Yang, H., & Jiang, J. (2014). Optical and Magnetic Properties of Fe Doped ZnO Nanoparticles Obtained by Hydrothermal Synthesis. Journal of Nanomaterials, 2014, 1–6. doi:10.1155/2014/792102
7. Srinivasulu, T., Saritha, K., & Reddy, K. T. R. (2017). Synthesis and characterization of Fe-doped ZnO thin films deposited by chemical spray pyrolysis. Modern Electronic Materials, 3(2), 76–85. doi:10.1016/j.moem.2017.07.001
8. Roy, S., Ghosh, M. P., & Mukherjee, S. (2021). Introducing magnetic properties in Fe-doped ZnO nanoparticles. Applied Physics A, 127(6). doi:10.1007/s00339-021-04580-z
9. Hammad, T. M., Griesing, S., Wotocek, M., Kuhn, S., Hempelmann, R., Hartmann, U., & Salem, J. K. (2013). Optical and magnetic properties of Fe-doped ZnO nanoparticles prepared by the sol-gel method. International Journal of Nanoparticles, 6(4), 324. doi:10.1504/ijnp.2013.057175
10. Emmanuel O. Ichipi, Shepherd M. Tichapondwa, Evans M.N. Chirwa. Plasmonic effect and bandgap tailoring of Ag/Ag2S doped on ZnOnanocomposites for enhanced visible-light photocatalysis. Advanced Powder Technology 2022, 33 (6), 103596. https://doi.org/10.1016/j.apt.2022.103596
11. ZafarArshad, S. Wageh, T. Maiyalagan, Mumtaz Ali, UmairArshad, Noor-ul-ain, Muhammad Bilal Qadir, FahadMateen, Abdullah G. Al-Sehemi. Enhanced charge transport characteristics in zinc oxide nanofibers via Mg2+ doping for electron transport layer in perovskite solar cells and antibacterial textiles. Ceramics International 2022, 32https://doi.org/10.1016/j.ceramint.2022.05.018
12. electrical and optical properties of nanostructured Cd1-xFexS thin films deposited by chemical spray pyrolysis technique, J. Mol. Struct. 1076 (2014) 291–298 DOI: https://doi.org/10.1016/j.molstruc.2014.07.065

Figure 1: I-V characteristic of pure ZnO and doped ZnO thin films

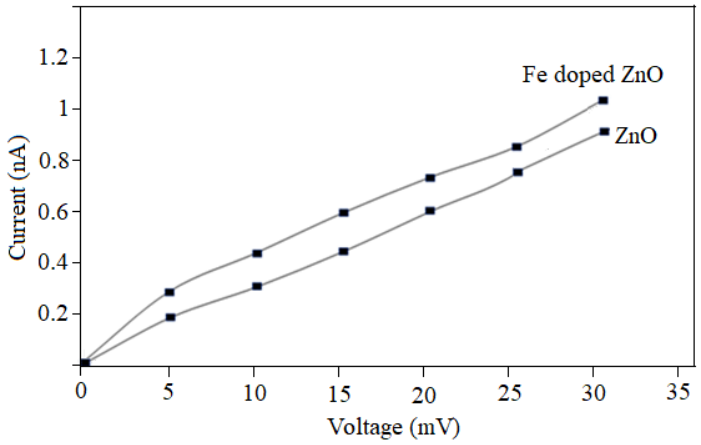


Figure 2: Log of resistivity with 1/T for pure ZnO and doped ZnO thin films

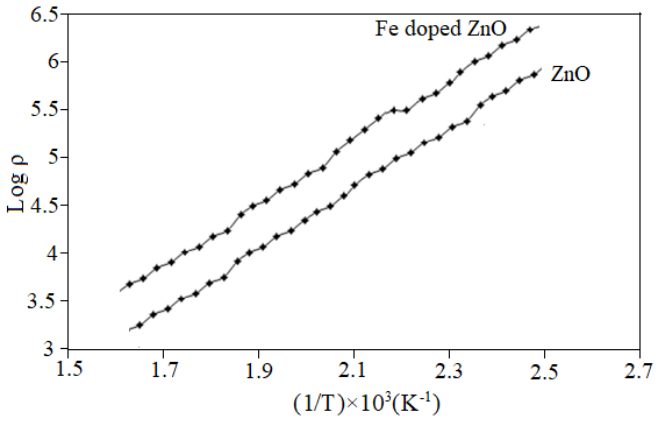
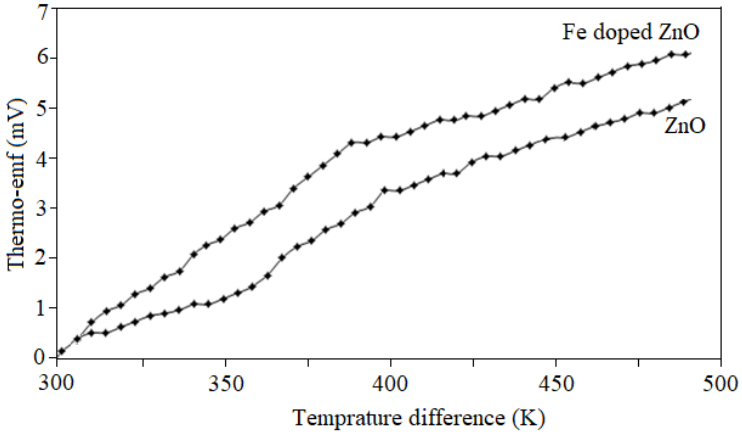


Figure 3: Figure 3: Variation of thermo emf (mV) with temperature difference for pure ZnO and doped ZnO thin films



STUDY OF FEMALE GAMETOPHYTE OF *VOLVULOPSIS NUMMULARIA* (L.) ROBERTY (CONVOLVULACEAE)

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ABSTRACT

In the present embryological investigations, female Gametophyte of Volvulopsisnummularia has been studied to understand the taxonomic consideration and affinities of the family Convolvulaceae. Family resembles superficially with some members of the Scrophulariaceae. Hutchinson (1973), Stebbins (1974) and Takhtajan (1980, 1997) are of opinion that it is derived from Scrophulariaceae and is very close to it. The findings in the present investigation will help to justify the position of the families of the order Tubiflorae.

The material for the present investigation was collected from localities in and around Nagpur District. The taxon Volvulopsisnummularia shows some interesting features with protandrous condition, anatropous ovules with unitegmic, sessile or showing short funiculus, chlorophyll pigments in the integument, nucellus degenerates at an early stage of ovule development, polygonum type of embryo sac, the embryo development is found to be of Caryophyllad type (Johanson, 1950).

Keywords*: Embryology, Tubiflorae, Convolvulaceae, Volvulopsisnummularia, polygonum, Caryophyllad, funiculus.*

Introduction

Angiosperms exhibit the dominant vegetation in the world. Diversity in angiospermous taxa is at high level because of unique pollination and genetic mechanisms. The group is also showing its distinctness due to adaptive features both in external and internal characters.

Literature on plant taxonomy shows that the history of plant classification is a fascinating subject as the classification of plants based on the biological facts. The three types of classification are recognizable viz. artificial, natural and phylogenetic. Artificial system based on one or few characters; the natural system reflects the situation as it is believed to exist in nature and utilizes all information available during the period. The phylogenetic systems indicate the arrangement according to their evolutionary sequence and reflect genetic relationship. Linnaeus's sexual system (1737) is exemplified as an artificial system. Bentham and Hooker's (1862-1883) system designed on that of de Candolle but descriptions differs from it as each and every taxon was studied fresh from the material in British and continental herbaria. Classification of plants based on evolutionary principals began from Engler and Prantl (1887-1915) who believed in simplicity to complexity.

The taxonomic consideration and affinities of family Convolvulaceae has been studied embryologically.

Family – Convolvulaceae

The family Convolvulaceae is allied to Polemoniaceae on one hand and to Solanaceae on the other and therefore placed under Solanales by Hutchinson (1973) along with Solanaceae, Nolanaceae and Scrophulariaceae.

Materials and Methods

The young and developing flowers, buds, mature fruits at different stages of development were fixed in 70% Formalin – Acetic – alcohol between 9.00 am. to 11.00 am. At times the fixation was done in between 4.00 pm to 6.00 pm. The material, after fixation, transferred to 70% alcohol.

The selected material was processed for dehydration. The clearing was done in alcohol - xylol series as per the method given by Johansen (1940). The infiltration was done in the wax having the melting point of 56ºC to 62º C and embeding was done as per the routine methods.

The sections were cut on rocking/rotary microtome at the thickness varying between 8 to 16 µ. They were stained either in 0.5 % Delafield Hematoxylin and also iron-alum or HeidenhainsHematoxylin. Some plants showed

satisfactory results in one stain and some in the others. The destaining was done in a picric acid .The light green/gentian violet was used as counter stain. The sections were mounted in canada balsam. After observations camera lucida figures were drawn and plates were prepared after inking.

Observation

The taxon under investigation shows protandrous condition (Fig.1) ovary is bicarpellary, syncarpous with axile placentation, 2 ovules in each locule. The ovules are anatropous, unitegmic, sessile or showing short funiculus, tenuinucellate (Fig.2) and the cells of integument are compactly arranged. The ovule arises as a small mound of homogenous tissue on the central placental axis (Figs.1 and 2). Initially the ovule looks orthotropous. The integument arises close to the base of these ovular tissues with the differentiation of integument; the ovule begins to curve (Fig.3). By the megaspore tetrad stage, the ovule becomes anatropous and the homogeneous tissue converted to the nucellus.

The integument then grows faster than the nucellus and surrounds it completely with a very narrow slit, a micropyle (Mi, Fig. 4). The taxon *Volvulopsisnummularia* showed the presence of chlorophyll pigments in the integument. This gives yellow green appearance to the ovule. The massive nucellus degenerates at an early stage of ovule development. The innermost glandular layer of the integument becomes specialized to perform the nutritive function for the embryo sac, is the endothelium (Fig. 6).

The archesporial cell functions directly as the megaspore mother cell (Fig.3). Cytokinesis in the megaspore mother cell accompanies meiosis forming dyad and linear megaspore tetrad. The three micropylar megaspores degenerate where as the chalazal one remains functional. The enlargement of chalazal megaspore takes place. It is accompanied by increased vacuolation on either side of the nucleus.After the first nuclear division, the two daughter nuclei move apart to opposite poles. Each nucleus is surrounded by dense cytoplasm. Thin peripheral layer of cytoplasm occur while the center being occupied by a large vacuole.

The next division gives rise to the four-nucleate embryo sac. The four nuclei are not exactly in the same plane but are arranged in the rhomboidal form (Fig. 6,7). This stage is followed by the 8-nucleate embryo sac comprising a micropylar and a chalazal quartet. The 3 nuclei at the micropylar end gives rise to egg and two synergids (Fig. 5), 3 at the chalazal end forms the antipodal cells and the remaining two, one from each pole fused in the center forming secondary nucleus thus forming the 8-nucleate Polygonum type of embryo sac (Fig. 7, 8).

The synergids are slender and elongated forming notch towards lower side with prominent hook. The upper part of synergid shows ‘filiform apparatus’, the egg nucleus lies just below the region of the hook. The lower part of synergid contains vacuole. Both the synergids persist even after fertilization and remain active. They degenerate when the primary endosperm nucleus divides.

In the egg, the nucleus and most of the cytoplasm lie in the lower part of the cell and the upper part is mostly vacuolar.

The antipodal cells are short-lived., degenerate after fertilization. The polar nuclei are close to egg apparatus rather than in the center. The fusion of polar nuclei occurs after the entry of pollen tube inside the embryo sac. This shows that, the polar nuclei fuses only in association with a male gamete. The secondary nucleus thus lies just below the egg separated with the antipodals by a large vacuole (Figs.8).

Fertilization

More than one pollen tube enters the stylar region but only one can make the passage through placental obturator (Fig.8) to the ovule and porogamy takes place. The placental obturator facilitates the easy entry of pollen tube. Penetrating the wall of embryo sac, the pollen tube passes between the wall of embryo and synergid. The synergids assume an egg like appearance. Both the synergids degenerate after fertilization.

Both the male gametes are discharged in close

proximity to their mates i.e. one male gamete fuses with the egg while other with the two polar nuclei. Thus the general phenomenon of syngamy and triple fusion takes place. The exact gametic fusion has not been observed.

Endosperm

The fusion of one of the male gamete with the two polars gives rise to primary endosperm nucleus. The endosperm formation is free nuclear initially (Fig. 6, 7). Later the nuclei are separated by walls. The number of divisions in the primary endosperm nucleus forms multiple nuclei. As the division proceeds, the nuclei become pushed more and more towards the periphery of the sac. As a result the center is occupied by a large vacuole (Fig.10). The nuclei are aggregated at the micropylar and the chalazal end of the sac forming the thin layer at the sides (Fig.9). Towards the chalaza, the layer of nuclei slightly is curved inside into the center of the embryo sac. The nuclear endosperm enveloped the developing embryo. Towards the maturity of the embryo the nuclear endosperm becomes cellular accompanied by wall formation and the sac is divided into several chambers (Figs.10).

Embryogeny

After Syngamy, the zygote divides shortly afterwards. The first division divides the zygote into the basal cell *cb* and the apical cell *ca* (Fig. A). The basal cell *cb* remains undivided and forms a large vesicular canal like structure.The*cb* does not involve in the further development of embryo (Fig.B). The terminal cell *ca* undergoes transverse divisions to form a row of cells as *ci, m*&*cc* (Fig.C). The lower cell *cc* again divides transversely to form the tier *ci, m, l, l'* (Fig.D). Each of the lower three cells divides by a vertical wall whereas the upper cell *ci* divides by a transverse wall (Fig. E). The embryo now comprises of 5 tiers including *cb* namely *cb* and derivatives of *ca,* viz *n, m, l'* and *l* (Fig. F).

The next division is again the vertical at the right angles to the first in *l, l'* and *m* forming three quadrants (Fig. G). The m also divides by a vertical wall &*n* divides by a transverse wall to give rise to *o* and *p* (Fig. H). The destination of all the six tiers is decided. The tier *l* is destined to give rise to the stem tip, *l'* to the cotyledons, *m* to the hypocotyl, *n* to the root cap and *o* and *p* formed a short suspensor abuts on the large cell *cb* (Fig. I). Thus, the embryo development is found to be of Caryophyllad type (Johanson, 1950).

The suspensor later undergo elongation but attached to a large vesicular structure. The transverse section of fruit showed the embryo with very long suspensor haustoria performing a special function of pushing the embryo into the endosperm. The cells of tier *o*& *p* divide longitudinally to form two suspensor cells. This enlarges to such an extent to occupy the entire micropylar part of the embryo sac (Fig. J). The long suspensor remains distinguishable upto the time of differentiation of the cotyledons (Fig.12). The apical meristem can be seen in the transverse section of fruit. The embryo at this stage is very much elongated with the distinct apical meristem and the radicle (Fig.11). By this time the suspensor reduced and the much elongated cotyledons can be seen (Fig.12).

The seed under favorable conditions germinate. Prior to this, the tissues undergo differentiation demarcating well the apical region of plumule which will form the shoot apex (Fig. 13). The elongated filamentous cotyledons easily break the seed coat exerting pressure on the wall. The cells of the micropylar region of the embryo differentiate into the radicle which will form the root apex (Fig. 14)

Development of Seed Coat and Pericarp

The four ovules which are arranged in apposite decussate fashion are developed into seeds. The seeds are dark brown in color and smooth walled. The young ovule consists of compactly arranged, chlorophyllous cells. The outer epidermis of the integument (seed coat) is thickly cuticularised comprises of 7-8 layers structure at the time of ovule development (Fig. 15).

In the fully mature fruit, the seed coat is formed by the outer epidermis and few hypodermal layers. This is because 2-3 hypodermal layers of integument are consumed by the developing embryo sac (Fig. 16). The hypodermal layers are densely filled with

chlorophyllous pigments. The mature fruit wall shows the inner wall, parenchymatous middle layers and the outer wall (Fig. 17). The hypodermal layers of the pericarp reduced later contributing its content to the developing embryo.

Its layer develops the thickenings on their radial inner tangential walls. The inner epidermis becomes lignified forming the protective layer. The lignin deposition can easily be seen in the longitudinal section of the pericarp. The outer epidermis is thin walled and mucilaginous (Fig. 18).

Discussion and Conclusions

Volvulopsisnumularius of the Convolvulaceae shows tetrasporangiate anther and its wall development corresponds to Dicotyledonous type (Davis, 1966). The epidermis is tuberculated. The cells of endothecium shows fibrous thickening of 'V' of 'W' shaped. Binucleate, glandular or secretary type of tapetum has been recorded in *Volvulopsisnumularia* (present study).

The taxon under investigation shows the orthotropous ovule initially but with the differentiation of the integument the ovule begins to curve which finally becomes anatropous. But this is not true with other members of the family Convolvulaceae as the bitegmic condition is frequent (Johri&Nand, 1934; Juliano, 1935).

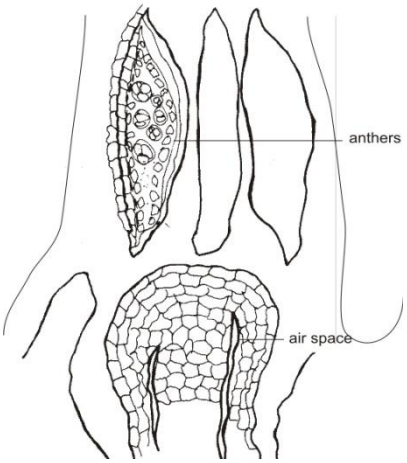
In the present investigation, the Polygonum type of embryo sac with slender and elongated synergids has been examined, which correlates with the study of Yana and Rao (1993). Thus it is concluded that the embryogeny in Convolvulaceae appears to be hetorogenous.

The author aggred with the seperation of family from Tubiflorae by Hallier (1912) and Wettstein (1935) and raised it to the ranked of an order Convolvulales on the basis of large embryo with folded cotyledons. Thus according the present embryological findings plays a key role in delimiting the taxa and proved to be helpful to enumerate that the placement of family Convolvulaceae in Tubiflorae is not justified.

References

1. Davis GL. 1966. Systematic Embryology of the Angiosperms. New York: John Wiley and Sons.
2. Govil CM. 1970a. Comparative embryology of Angiosperm Convolvulaceae. Indian Nat. Sci. Acad. 41B: 246-250.
3. Hutchinson J. 1973. The Families of Flowering Plants (2 Vols). 3rd Edition Macmillan London
4. Johanson DA. 1950. Plant Embryology. ChronicaBotanica Company. Waltham Mass, USA.
5. Jos JS. 1963. The structure and development of seeds in Convolvulaceae : Ipomoea spp. Agra Univ. J. Res. (Sci.) 12: 247-260.
6. Khalik Abdel KN. 2006. Seed morphology of Cuscuta L. (Convolvulaceae) in Egypt and its systematic significance. FeddersRepertorium 117 (3-4): 217-224.
7. Khalik Abdel KN, Osman AK. 2007. Seed morphology of some species of Convolvulaceae from Egypt (Identification of species and systematic significance) FeddesRepertorium 118 (1–2) :24–37
8. Maheshwari P. 1950. An introduction to the embryology of angiosperms. McGraw – Hill Company. Toronto, New York.
9. Stebbins GL. 1974. Flowering Plants: Evolution at Above the Species Level. Belknap, Cambridge MA
10. Stefanovi S, Krueger L, Olmstead RG. 2002. Monophyly of the Convolulaceae and circumscription of their major lineages based on DNA sequences of multiple chloroplast loci. Amer. J. of Bot. 89: 1510-1522.
11. Takhatajan A. 1967. A System and Phylogeny of Flowering Plants (in Russian). Moscow and Leningrad.
12. Takhatajan A. 1980. Outline of the classification of flowering plants (Magnoliophyta). Botanical Review 46

(3): 225–359.



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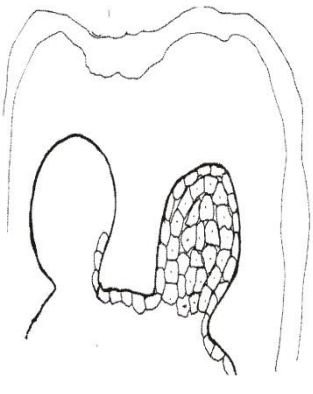

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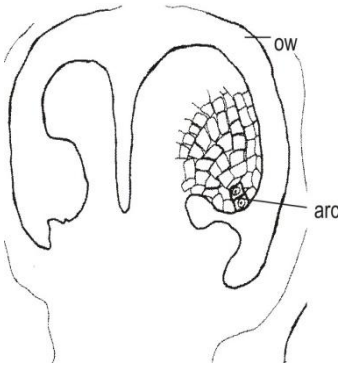

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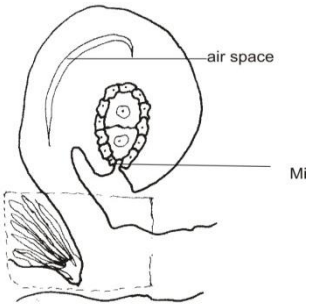

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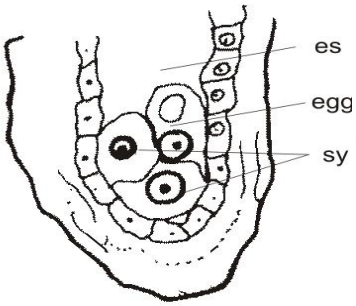

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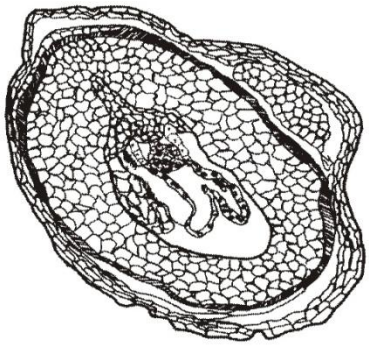

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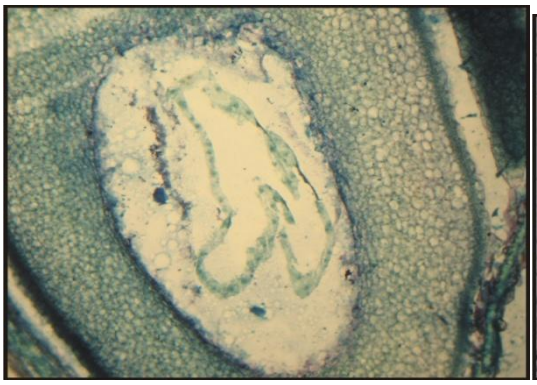

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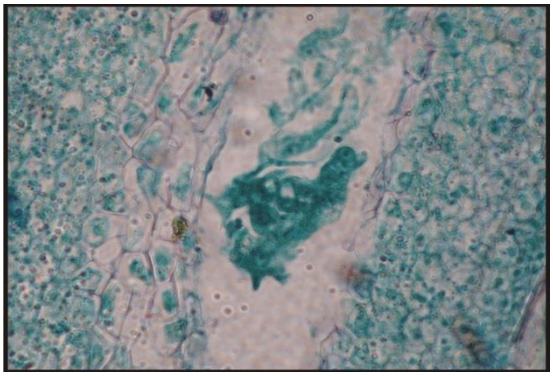

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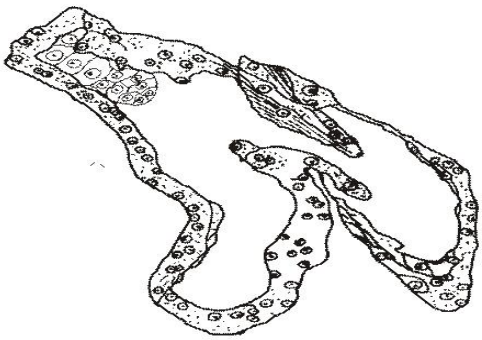

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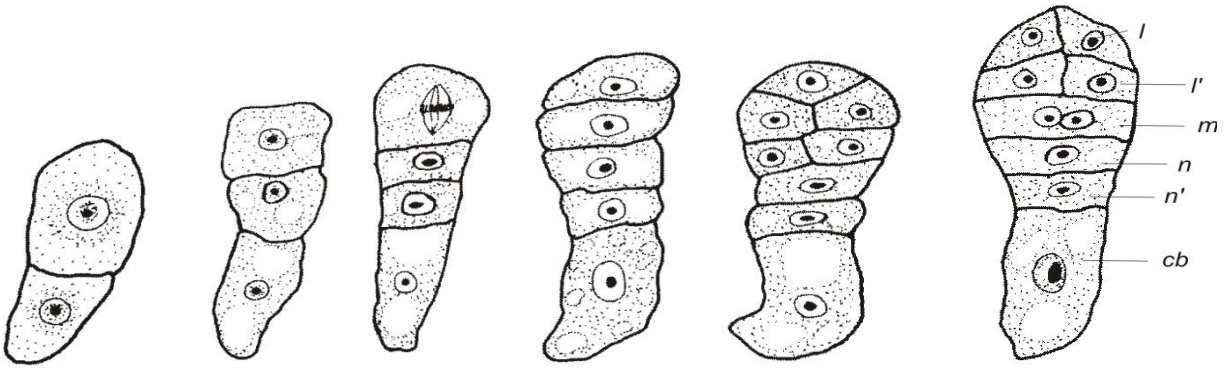

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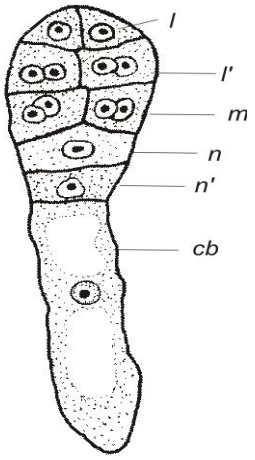

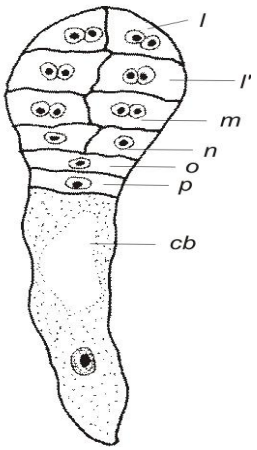

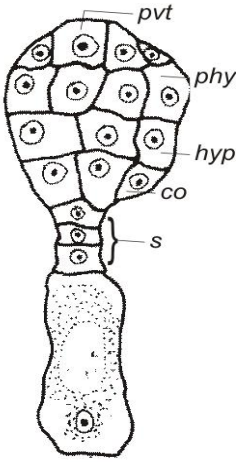

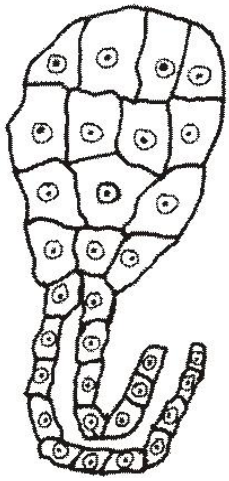

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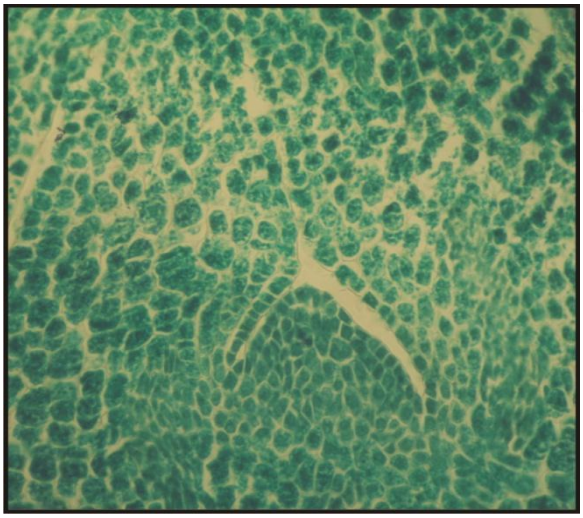

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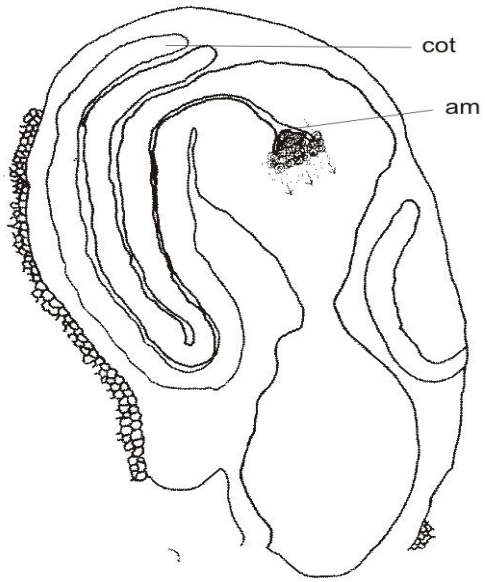

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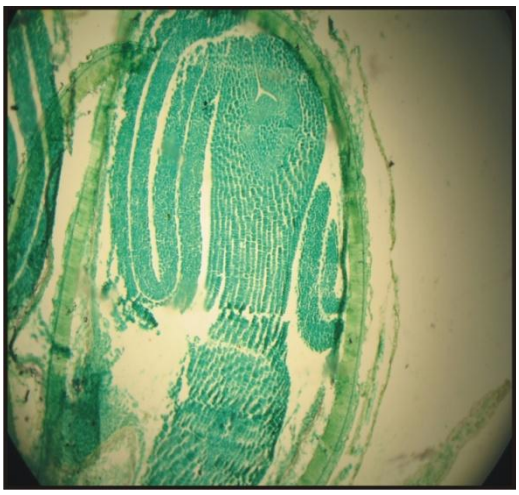

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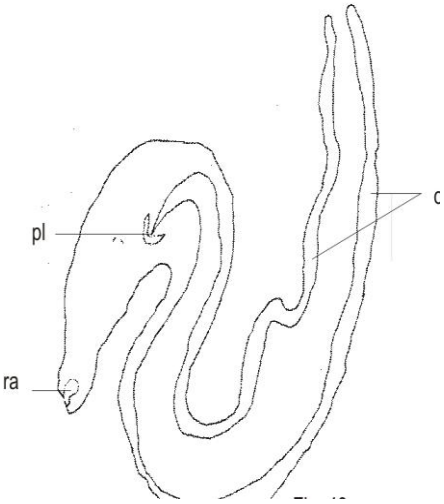

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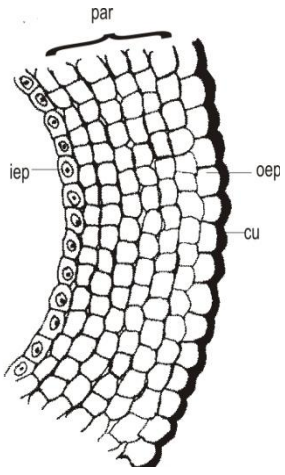

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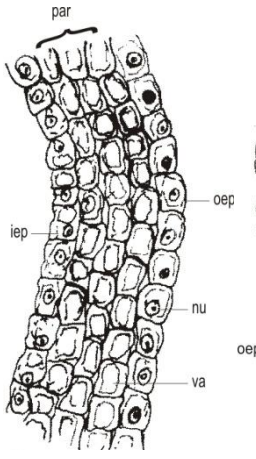

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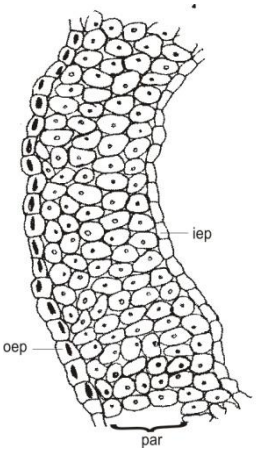

Fig. 17

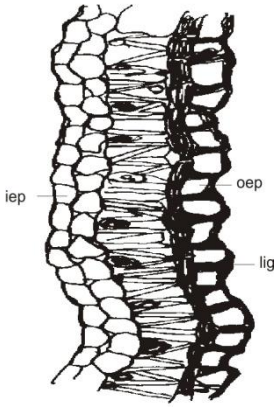

Fig. 18

STUDY THE DIVERSITY OF ODONATA (INSECTA: ZYGOPTERA, ANISOPTERA) NEAR KORADI LAKE, KORADI, DIST. NAGPUR, MAHARASHTRA

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ABSTRACT

The Koradilake, which is located 10–14 kilometres from Nagpur, Maharashtra, at a latitude of 21°15'25" N and a longitude of 79°05'23" E, served as the site for the biodiversity research of Odonata (dragonflies and damselflies). Every week in July and August, we conducted the survey at four sites around the lake, with a half-square-kilometre region chosen for odonate bio-monitoring. During the course of the study, we observed fifteen species of Odonates (dragonflies and damselflies) from the families Libellulidae and Coenagrionidae, and thirteen genera were identified. Nine species belonged to the order Anisoptera, while six species belonged to the order Zygoptera (damselflies) (Dragonflies).

***Keywords**: Odonata, Damselflies, Dragonflies*

Introduction

The order Odonata has some of the oldest and most exquisite insects. They represent focal organisms for conservation purposes (Samways 2008; Clausnitzer et al., 2009) in freshwater ecosystems, where they can be considered as a "flagship" indicator group of insects (Sharma et al., 2007; Balzan 2012; ArajushPayra et al., 2020) The majority of their life cycle is spent in freshwater environments, which are recognized as the pinnacle of freshwater health and include rivers, streams, lakes, marshes, and rice fields. They are crucial not only for water-rich environments like wetlands, lakes, and rainforests, but also for areas where water is scarce. Numerous Odonate species prevent pest pollution in agro-ecosystems (Andrew R.J. et al., 2008: The Handbook on Common Odonates of Central India). The adult Odonata is a vital biocontrol agent for mosquitoes, black flies, and other harmful insects because it consumes these pests (Aijaz Ahmad Qureshi et al., 2021).

Odonates have 6376 species in 693 genera worldwide (Schorr and Paulson, 2021), of which 498 species and 27 subspecies in 154 genera and 18 families are known from India (Subramanian and Babuet.al., 2020). The Maharashtra odonata fauna is well-documented, with 134 species (reviewed by Tiple and Koparde, 2015), but there are a few regional gaps. The eastern region of the Maharashtra state (Vidarbha) is home to 85 odonates (Tiple et al.; 2020; Talmale and Tiple; 2014, 2015). The current research presents a thorough analysis of the dragonfly and damselfly (Odonata) varieties of Koradi Lake in Koradi, Nagpur, Maharashtra.

Materials and Methods

Study area-

The Koradilake is situated 10–14 kilometres from Nagpur, Maharashtra, at a latitude of 21°15'18"N and a longitude of 79°06'00"E. There are three primary seasons in this region's tropical wet equitable climate: the wet monsoon of June/July and its aftermath from June through October; the chilly dry winter from October through November to February and March; and the hot dry season from April until the start of the rains. The city's temperature ranges from 12 to 45 degrees Celsius and has a relative humidity of between 15 and 95 percent (Tiple and Kurad 2009). There is 1138.5 mm of precipitation each year. 90% of the annual precipitation falls between June and September, with July being the wettest month (Tiple and Kurad 2009). The study's location was chosen to be close to the lake. We chose four 500-meter tenets each where bio monitoring of the odonates was done.

Odonates were captured on camera and identified in various Koradi sites. When odonates are most active, between 11 a.m. and 1 p.m., the majority of the sampling was completed (Subramanian, 2009; Payra and Tiple, 2019). The lake and its surroundings were examined for odonates. Between July and

August, a survey was carried out every week. The Handbook on Common Odonates of Central India by Andrew R.J. et al., 2008, was used to identify the adult odonates. The species were divided into groups based on how common they were in the area of Koradi Lake. VC Very common (> 100 sightings), C Common (50-100 sightings), NR Not rare (15-50 sightings), R Rare (2-15 sightings), VR Very rare (< 2 sightings) (Tiple et al., 2008).

Result and Discussion

Near the Koradilake, fifteen species of Odonates (dragonflies and damselflies) from the families Libellulidae and Coenagrionidae and thirteen genera were identified throughout the course of the study. Of them, six species belonged to the order Zygoptera (Damselflies), and nine species belonged to the order Anisoptera (Dragonflies). The Libellulidae family contained the greatest number of odonates. *Orthetrumsabina* and *Brachythemiscontaminata* are two species of dragonflies that are frequently seen in Koradi Lake, and *Ischnura aurora* is a species of damselfly. The presence of *Brachythemiscontaminata, Orthetrumsabina, Pantalaflavescens, Ceriagrioncoromandelianum,* and *Agriocnemispygmaea* in human settlement zones in Koradi implies contaminated water quality. The Koradi thermal power station, which is close to the lake, contributes significantly to the air and water pollution. Because fly ash lands on houses, automobiles, crops, and water supplies, the damage found in Odonates during the nymph stage is substantially larger (S.Meland et al., 2019). The effects on DNA strand breaks that could hinder growth are likewise significantly and strongly connected with the level of pollution.

References

1. R. Tippett, S. Willemse, L.G. Underhill. 2022.Dragonflies and damselflies of the Lower Olifants River Valley: Citrusdal to the sea Biodiversity Observations 12: 71-85. DOI: 10.15641/bo.1260.
2. Payra, A., Dash, S. K., Palei, H. S. Tiple, A. D., Mishra, A. K., Mishra, R. K. & Rout, S. D.2020.An updated list of odonata species from Athgarh Forest Division, Odisha, eastern India (Insecta: Odonata). Mong. J. Biol. Sci., 18(1): 55-64.
3. G.L. Priyanka and G. Prasad. 2022.Bio-monitoring of Western Ghats ream using Aquatic insects. Indian Journal of Ecology49(1):195-201.
4. Abbott, J.C.; Bota-Sierra, C.A.; Guralnick, R.; Kalkman, V.; González-Soriano, E.; Novelo-Gutiérrez, R.; Bybee, S.; Ware, J.; Belitz, M.W. Diversity of Nearctic Dragonflies and Damselflies (Odonata). Diversity 2022, 14, 575.
5. Aijaz Ahmad Qureshi, Nisar Ahmad Paray, RizwanMuthadirKhandi, SobiyaSyeed and Rais Ahmad Ganai. 2021. Diversity of Odonata of District Pulwama of Kashmir. Indian Journal of Entomology. DoI.:10.55446/IJE.2021.131.
6. AshishTiple, Rahul Bhende, ParagDandge. 2021.Dragonflies and damselflies (Odonata: Insecta) of the Seloo city, Wardha, Maharashtra, Central India. International Academy of Ecology and Environmental Sciences.11(1): 56-64.
7. Ashish D. Tiple and PankajKoparde. 2015. Odonata of Maharashtra, India with Notes on Species Distribution. Journal Insect Sci. 15(1): 47; DOI: 10.1093/jisesa/iev028
8. Meland S, Gomes T, Petersen K, Hall J, Lund E, Kringstad A, Grung M, Norwegian Institute for Water Research and Norwegian University of Life Sciences, Nov.2019
9. Schorr M, Paulson D. 2021. World Odonata List. https://www.pugetsound.edu/academics/a

cademicresources/slater-museum/. Accessed 1 October 2021
10. Subramanian KA, Babu R. 2020. Dragonflies and damselflies (Insecta: Odonata) of India. In: Indian Insects Diversity and Science (Ramani S, Prrashanth M, Yeshwanath HM, eds). 29-45, CRC Press, Taylor & Francis, USA
11. Samways MJ (2008). Dragonfies as focal organisms in contemporary consrrvation biology. In: Cordoba-AquilarA(ed) Dragonfies and demsefief: Model Organisums for Ecological and Evolutionary Research. Oxford University Press, Oxford, pp 97-108
12. Tiple A. (2020). Dragonflies and Damselflies (Odonata: Insecta) of the Bor Wildlife Sanctuary, Wardha, Maharashtra, Central India. Travaux du Muséum National d'HistoireNaturelle "GrigoreAntipa" 63(2): 131–140.
13. The Handbook on Common Odonates of Central India by Andrew R.J. et al., 2008.
14. Clausnitzer V, Kalman VJ, Ram M, Collen B, Baille JEM, Bedjanic M, Darwall WRT, Dijkstra KBD, Dow R, Hawking J, Karube H, Malikova E, Paulson D, Schutte K, Suhling F, Vilanueva R, von Ellenrieder N, group. Biol Cons 142:1864-1869. https://doi.org/10.1016/j.biocon.2009.028
15. A.D.Tiple, 2014, New Record of Dragonfly Ictinogomphusangulosus (Selys, 1854) from State Maharashtra, India, Ambient Science 1(2):56-58, DOI:10.21276/ambi.2014.01.2.nn01
16. Sharma G, Sundararaj, R, Karibasvaraja LR (2007) Species diversity of Odonata in the selected provenances of Sandal in Southern India. Zoos print J 22 (7):2765-2767. https://doi.org/10.11609
17. Balzan M (2012) Associations of dragonflies (Odonata) to habitat variables within the Maltes Islands: A spatiotemporal approach. J Insect Sci 12: 87. Available online: insectscience.org/12.87. https://doi.org/10.1673/031.012.8701

Table no. 3.1- Distribution of Odonata near Koradi Lake, Koradi, Nagpur, Maharashtra.

Species	Common name	Status
1. *Trithemispallidinervis* (Kirby,1889)	Long-legged marsh glider Dancing dropwing	Common (C)
2. *Pantalaflavescens* (J. C. Fabricius, 1798)	The globe skimmerGlove wanderer Wandering glider	Common (C)
3. *Crocothemisservilia* (Drury, 1773)	The scarlet skimmer Ruddy marsh skimmer	Common (C)
4. *Orthetrumsabina* (Drury, 1770)	The slender skimmer Green marsh hawk	Very Common (VC)
5. *Diplacodestrivialis* (Rambur, 1842)	Chalky percher Ground skimmer	Common (C)
6. *Rhyothemis variegate* (Linnaeus, 1763)	Picture wing Variegated flutterer	Not Rare (NR)
7. *Brachydiplaxsorbrina* (Rambur, 1842)	Little blue marsh hawk	Not Rare (NR)
8. *Brachythemiscontaminata*(Fabricius, 1793)	Ditch jewel	Very Common (VC)
9. *Trameabasilaris* (Palisot de Beauvois, 1817)	Keyhole glider Red marsh trotter Wheeling glider	Common (C)
10. *Ischnurasenegalensis* (Rambur, 1842)	Common bluetail Ubiquitous bluetail African bluetail Senegal golden dartlet	Common (C)
11. *Pseudagrionmicrocephalum*(Rambur, 1842)	Blue river damsel Blue sprite Blue grass dart	Common (C)
12. *Ceriagrioncoromandelianum* (Fabricus, 1798)	Coromandel dart Yellow waxtail	Common (C)
13. *Ischnura aurora* (Brauer, 1865)	Golden dartlet Aurora bluetail	Very Common (VC)

14.	*Agriocnemispygmaea* (Rambur, 1842)	Wandering midget Pygmy dartlet Wandering wisp	Not Rare (NR)
15.	*Pseudagrionrubriceps* (Selys,1876)	Saffron faced blue dart	Common (C)

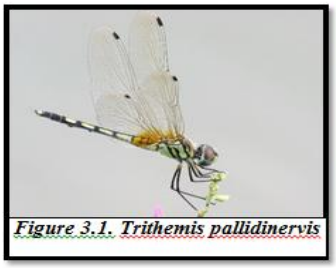

Figure 3.1. Trithemis pallidinervis

Figure 3.2. Pantala flavescens

Figure 3.3. Crocothemis servilia

Figure 3.4. Orthetrum sabina

Figure 3.5. Diplacodes trivialis

Figure 3.6. Rhyothemis variegate

Figure 3.7. Brachydiplax sorbrina

Figure 3.8. Brachythemis contaminata

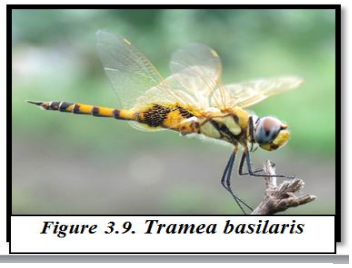

Figure 3.9. Tramea basilaris

Figure 3.10. Ischnura senegalensis

Figure 3.11. Pseudagrion microcephalum

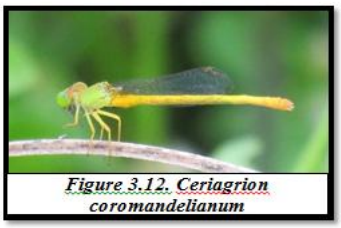

Figure 3.12. Ceriagrion coromandelianum

Figure 3.13. Ischnura aurora

Figure 3.14. Agriocnemis pygmaea

Figure 3.15. Pseudagrion rubriceps

PRELIMINARY INVESTIGATION OF ICTHYOFAUNAL DIVERSITY FROM WAGHADI RESERVIOR DIST.YAVATAMAL (M.S.) INDIA

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ABSTRACT

Because of anthropogenic activity, the fresh water ecosystem is constantly at risk. Fish samples were collected for the study from February 2021 to January 2022 over the course of a year. A total of 20 species from 10 distinct families were identified in the current study.

***Keywords**: fish diversity, wetland ecosystem ,waghadi dam, yavatmal*

Introduction

The Vidarbha region is abundant in natural resources, including forests, freshwater aquatic life, and a remarkable variety of ichthyofaunal species. Fish diversity enhances the stability of the aquatic ecosystem in the region of concern, however anthropogenic activities have an impact on both the aquatic and terrestrial habitat's floral and animal diversity.

A good bioindicator of water quality is fish variety (Madhusudan et al., 2011; Patole, 2014). Due to constant anthropogenic stress, fish diversity is progressively reducing every day. This diversity not only adds to the species richness of our planet but when declined also has some deleterious repercussions on fisheries (Sakhare, 2001)

Numerous researchers have examined the taxonomy and ichthyofaunal variety of Maharashtra and other states of the nation for the past 200 years. The ichthyofaunal diversity of the HarsoolSavangi dam in the Maharashtra region of Aurangabad was examined by Shinde et al. in 2009. Ubharhande and Sonawane (2012) studied the freshwater fish flora at Paintakli Dam in Maharashtra's Buldhana district.

"Waghadi,D -01427" is the Waghadi Project and Dam's official designation. The Maharashtra government built the Waghadi Dam as part of irrigation initiatives in 1978. The closest city to the dam is Ghatanji in Maharashtra's Yavatmal District. It is built on and impounds the Waghadi River. The dam is a gravity earthfill dam. The dam measures 960 metres in length and 26 metres in height above its lowest base. The project has a spillway, which is 170 metres long. The Dam's catchment area is 23.84 thousand hectors, and the spillway is ungated. 41.11 MCM is the maximum/gross storage capacity. The amount of live storage is 35.36 MCM. The primary icthyofaunal diversity of Yavatmal'swaghadi reservoir is the objective of the current study.

Material and Methods

With the assistance of local fishermen during various seasons, fish were caught from various locations of the Waghadi reservoir. Specimens were brought and preserved in a 10% formalin solution in the laboratory. Fishesh was identified with the aid of neighbourhood fishermen and established texts like Talwar PK and Jhingran A (1991), Jayaram K.C. and Sanyal A (2003).

Result and Discussion

In the current study, 20 fish species from 8 different orders divided into 10 different families were identified. The fish species recorded are shown in the table 1 below,Joshi et al. recorded 20 species belonging to 7 families from Purna River at Buldhana district. Sakhare (2001) reported 23 species belonging to 07 orders where Cyprinidae family is dominant with 11 species from Jawalgaon reservoir, Solapur District Maharashtra. This study have similar findings to the above investigations.

Ichthyodiversity from the Malangaon water reservoir containing 17 species of 15 different genera, 07 families and 05 orders were recorded. Khodake, S. P. and Petare, R. K (2020) However, In the present study fishes

from total 8 orders are recorded, which shows greater diversity than the earlier investigatins signifying better less anthropogenic activities in the dam.

Conclusion

Current investigation shows healthy status of fish diversity, further extensive investigation about icthyfaunal diversity needs to be done during various seasons to ascertain real time heath of the water reservoir and also to study the extent of anthropogenic disturbances to the water body.

References

1. Jayaram K.C. and Sanyal A. (2003): A taxonomic revision of he fishes of the genus Mystusscopoli (Family: Begridae) Records of the Zoological survey of India occasional paper no. 207 ZSI Culcatta pp. 141.
2. Patole, S. S. Ichthyofunal diversity of Nandurbar district (Northwest Khandesh region) of Maharashtra (India). Int.J. Fisheries and Aqua. studies. 2(2):167-172 (2014).
3. Madhusudan, V., Amrutsagar, V. and Lohar, P. S. Diversity of Mollusca and Fish in Gondoor and Nakane Lakes in Dhulia, Northwest Maharashtra, India. J. Ecobiotechnol, 3(6): 16-2 (2011)
4. Sakhare, V. B. Ichthyofauna of Jawalgaon reservoir in Solapur district of Maharashtra. J. Aqua Biol., 16(1 and 2): 31-33 (2001)
5. Joshi, P. S., S. A. Tantarpale, V. T. Tantarpale, K. M. Kulkarni (2012). Ichthyological Fauna of Buldhana District, Maharashtra (India). Online International Interdisciplinary Research Journal, 2 (2): 111-115.
6. Shinde, S.E., Paithane, R. Y., Bhandare, A. And Sonawane, D. L. Ichthyofaunal diversity of HarsoolSavangi dam, district Aurangabad (M.S.), India. Wrold J. Fish Mar. Sci., 1(3):141-143 (2009).
7. Khodake, S. P. and Petare, R. K (2020). ICHTHYODIVERSITY IN MALANGAON WATER RESERVOIR IN KHANDESH REGION OF MAHARASHTRA, INDIA, Volume 8, Issue 4 April 2020 | ISSN: 2320-2882
8. Sakhare, V. B. (2001). Ichthyofauna of Jawalgoan reservoir. Maharastra, Fishing Chimes, 19 (8): 45-47.
9. Talwar PK and Jhingran AG (1991a) Inland fishes of India and adjacent countries, volume 1. Oxford & IBH Publishing Co Pvt Ltd, New Delhi-Calcutta. 542 pp.
10. Ubharhande S. B. and Sonawane S. R. (2012). Study of freshwater fish fauna and water quality at Paintakali dam from Bulhana district, M.S., India, J. Exp. Sci., 3 (7), 4-8.

Table 1 - Ichthyofaunal diversity of Waghadi dam (During Feb 2021 to Jan 2022)

S.N.	ORDER	FAMILY	SPECIES	Local name
1	Mastocembeliformes	Mastocembelidae	*Macrognathuspancalus*	Bam
2	Cypriniformes	Cyprinidae	*Catlacatla* *Labiorohita* *Labioboga* *Labiobata* *Labiopangsia* *Cirrhinusmrigala* *Puntitusdorsalis* *Puntituschola*	Catla Rohu Chankora Navari Boharya mrigal podshi Tepri
3	Perciformes	Cichlidae	*Tilapia mossambica*	Talapia
		Gobidae	*Glossogobinusgiuris*	Dhangarya
4	Osteoglossiformes	Notopteridae	*Notopterusnotopterus*	Bhangad
5	Synbranchiformes	Channidae	*Channamarulis* *Channanama* *Channastriatus*	Dhokh Chandva Malar
6	Anguilliformes	Anguillidae	*Anguilla bengalensisbengalensis*	Wire
7	Atheriniformes	Belonidae	*Xenentodoncancila*	Chatarya
8	Siluriformes	Siluridae	*Ompakbimaculatus* *Mystuscavasius*	Patola Katarna
		Claridae	*Clariusbatracus*	mangur

PRODUCTIVITY AND FINANCIAL FEASIBILITY ANALYSIS OF FARMING *CHANNA PUNCTATUS* (BLOCH, 1793) FED ON WHEATGRASS BASED FORMULATED FISH FEED

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ABSTRACT

The farming of Channa punctatus (Bloch, 1793) has long been carried out by local farmers with traditional way. A reduction of land and water availability in urban aquaculture has been stimulating the application of Closed Recirculatory Aquaculture System (CRAS) and formulated feed. The present study aimed to analyze a productivity, financial feasibility and sensitivity analysis in Channa punctatus farming through utilizing of closed recirculatory aquaculture system and formulated feed. The experiment was performed during September to December 2021 under agro-climatic condition in closed recirculation aquaculture system at Jalgaon (Jamod), Maharashtra, India. The productivity analysis is the total production, productivity and survival. Financial feasibility analysis used cost-benefit analysis (CBA) and sensitivity analysis is carried out on changes in the amount of production based on the survival value. The results showed that the best productivity and financial feasibility of Channa punctatus was obtained with formulated wheatgrass based fish feed. The sensitivity analysis shows that the increased survival value in Channa punctatus culture with wheatgrass based fish feed as compare to commercial fish feed.

Keywords: *Agriculture, Channa punctatus, dietary wheatgrass, financial feasibility, productivity.*

Introduction

Aquaculture has been the world's most rapidly growing food production for the past three decades, and it currently generates more than half the fish needs for human consumption (Kobayashi *et al.*, 2015; FAO, 2016; Valenti *et al.*, 2018). It also plays a significant role in food security, income and economic community development (Asamoah *et al.*, 2013). As a result, the sustainability of the aquaculture system is required. The contribution of world aquaculture to world fish production has constantly increased, reaching 46.0 % and aquaculture production of farmed aquatic animals grew on average at 5.3 percent per year in the period 2001–2018. In terms of species, the majority (62.0 %) of global aquaculture production in 2030 is going to composed of freshwater species, such as carp and catfish (FAO, 2020). The aquaculture sector's rise to global significance has seen an increased of interest in its potential to stimulate economic growth and reduce poverty in developing countries. Aquaculture activities provide greater income to fish farming for small-scale commercial aquaculture (Filipski and Belton, 2018).

Aquaculture is projected to be the main supplier of fish in Indonesia and the main driver behind fish supply growth in Indonesia in recent years. Indonesia is currently known as the 3rd fish producing country in the world after China and India (FAO, 2020). An annual growth rate of the aquaculture sector is about 7.7% per year. The projection of Indonesian aquaculture production in 2030 for the export market will increase by 47.9% and for the domestic market to increase by 70.3%. Production for catfish is projected to increase by 2.3 to 2.8 times (Tran *et al.*, 2017).

Increasing population and urbanization have significantly contributed to land conversions for aquaculture activities in urban area. Consequently, it requires proper aquaculture management based on technology and a business approach for its development. Urban aquaculture is a future aquaculture paradigm along with increasing population development and the urbanization level in cities which

impact on economic, social, and environmental sustainability. Therefore, it requires sustainable fish farming which promotes high productivity, water and land efficiency, well- maintained aquaculture quality, costs efficiency, supply chain efficiency, and profitability to produce healthy products. The modern methods like closed recirculatory aquaculture system and formulated fish feed help to enhance the fish production.

Closed Recirculating Aquaculture Systems (CRAS) are used in home aquaria and for fish production where water exchange is limited and the use of biofiltration is required to reduce ammonia toxicity. Other types of filtration and environmental control are often also necessary to maintain clean water and provide a suitable habitat for fish (Summerfelt and Vinci, 2004 a, b). The main benefit of CRAS is the ability to reduce the need for fresh, clean water while still maintaining a healthy environment for fish. To be operated economically commercial CRAS must have high fish stocking densities, and many researchers are currently conducting studies to determine if CRAS is a viable form of intensive aquaculture (Martins *et al.,* 2010; Bendik *et al.,* 2013; Kabir *et al.,* 2014). Hence, designing such CRAS facility is to achieve semi-commercialized results like to achieve optimal performance, health and welfare of farmed fish during research (Vandeputte and Reuver, 2011; Michael and David, 2014). In addition, the research facility had to be accurately dimensioned, and its performance documented, such that good experimental designs can be developed in research projects. Furthermore, the growth rate of the studied fish species, at control group conditions, should be higher or at least comparable to growth rates obtained in the aquaculture industry (Carlos and Daniel, 2019).

The aqua-feed technology is moving in tandem with the aquaculture growth with usage of formulated feed for the improvement of overall fishery production (Chang and Wang, 1999; Alina *et al.,* 2013). In commercially available formulated fish feed contain synthetic hormones, antibiotics and several other chemicals which have been tested as growth promoters, antibacterial and for other purposes in aquatic animals (Adelizi *et al.,* 1998). But their excess use causes the residual effects in the muscle of fish. Plants are natural sources of safer and cheaper chemicals. The beneficial effects of bioactive plant substances in animal nutrition may include the stimulation of appetite and feed intake, growth promotion, the improvement of endogenous enzyme secretion and activation of immuno-stimulation and antioxidant actions in aquaculture practices (Joshi, 2017; Daniel, 2018).

Wheatgrass (*Triticum aestivum*) refers to young grass of the common wheat plant, which belongs to Poaceae family. Wheatgrass is a source of potassium, dietary fiber, vitamin A, vitamin C, vitamin E, vitamin K, thiamin, riboflavin, niacin, vitamin B6, pantothenic acid, iron, zinc, copper, manganese and selenium. Wheatgrass is also a source of protein. Plant has been shown to have anti-inflammatory, antioxidant, anticarcinogenic, immunomodulatory, laxative, astringent, diuretic, antibacterial, antihemolytic and anti-aging properties as well improve reproductive health. Its use in acidity, colitis, kidney malfunctions, atherosclerosis and swelling has been shown to be beneficial (Sharma *et al.,* 2016; Johri and Khan, 2017). These potential varieties of wheatgrass suggested the effective utility in production of fish feed pellets (Butle *et al.,* 2019).

Channa punctatus, the spotted snakehead, is a species of snakehead. Its natural habitats are swamps, ponds and brackish water systems. It is a fish of high food value and has little value as aquarium fish. *Channa punctatus* normally grows to around 15.0 cm (5.9 in) in length, but males up to 31.0 cm (12.2 in) have also been captured. The spotted snakehead is listed as Least Concern in IUCN, due to lack of major threats to these species populations. The species is mainly a carnivore. Favourite food of this species is other small fish yolk flies and fish larvae. In its natural habitat, it consumes crustaceans, molluscs, insects, small fishes, semi-digested materials and sometimes plants. Its feeding habit changes seasonally. The intensity of feeding is low in mature fishes during the spawning period. Juvenile fish has

constant habit of food (Bhuiyan *et al.,* 2006). This fish delicious and rich in nutrients hence have high market demand. So commercial-oriented *Channa punctatus* farming activities plays an important role in increasing community income, creating jobs, food security, and supporting development policies on limited land with a small business scale in urban areas

Channa punctatus farming has long been carried out by local farmer implementing the traditional methods. However, limited availability of land and water, especially for urban aquaculture encourage people to apply closed recirculatory aquaculture system and feed formulation technology. The aquaculture systems are considered profitable and feasible to further develop in current situation and near future. Therefore, it is very important to understand the production performance and economic performance of the fish farming activities for the sustainability of the business. The objective of this study is to analyze the production performance, financial feasibility and sensitivity in *Channa punctatus* farming through utilizing closed recirculatory aquaculture system and wheatgrass based formulated feed.

Material and methods

The study was conducted for duration of 12 months in fish farm developed at Jalgaon (Jamod) town in Vidarbha Region of Indian state Maharashtra. It is located between 21.0486°N 76.5344°E

Experimental preparatory

- **Experimental diets:** For the experiment, both the formulated feed containing 15% wheatgrass powder and the locally available commercial feed were used. The wheatgrass based feed formatted with the ingredients mentioned in Chapter 4, Table 4.1.The proximate composition of feed were estimated by using the Association of Analytical Chemists (AOAC, 1995) methods with some modifications (Mohammad *et al.,* 2019). The composition of experimental diet is given in Table 1.

Table 1: Proximate composition of the experimental feeds (on % basis)

Contents	Commercial feed	Wheatgrass (15%) based feed
Moisture	7.46	3.67
Crude protein	24.27	39.63
Crude lipid	5.75	6.18
Crude fibre	15.11	25.87
Crude Ash	16.99	9.51
NFE	17.94	15.14
Gross energy (kj/g)	13.48	18.60

- **Experimental fish and feeding:** *Channa punctatus* is commonly known as the spotted snakehead murrel. For experiment, the specimens were collected from the local sources. They were disinfected with 0.1% $KMNO_4$ solution to avoid fungal infection. These collected fishes were acclimatized for 2 weeks and maintained in specially designed closed re-circulating system tanks in groups. During acclimation, fish were fed the control diet to satiation twice a day at 09:00 and 15:00 hours. After acclimation, fish were fasted for one day; batch weighted and randomly distributed. During the experiment, fish were fed on experimental diet to satiation third a day at 08:00, 12:00 and 16:00 hours.
- **Experimental system:** The closed recirculation aquaculture system was used for the experimental trailer. The culture system composed of different tanks with specific volumes. System primarily composed of rearing tanks of 200L volume of each. The fish were maintained in these tanks. The rearing tank also aerated by air pump for supply of oxygen to individuals. The drain settled in tanks is collected by drainage pipe is transferred to filtration unit. The filtration unit composed four different chamber settling tank, gravel filter, sand filter and bio-filter of 250 each.
- **Water quality standards**: Water quality was maintained during the feeding trial with light: dark cycle of 12:12 h during study. The water analysis is performed according

to APHA (2000). The water composition and characteristics were maintained within the effective range (Bhatnagar and Devi, 2013). During the experimental period, water temperature was 28.5±2.5^{O}C; pH 8.1±0.5; total dissolved solids 240.5±19.5 mg/L; dissolved oxygen 4.42±0.24 mg/L; biological oxygen demand 1.70±0.20 mg/L; free Co_2 13.4±1.3 mg/L; alkalinity 65.3±5.0 mg/L; hardness 123.20±16.76 mg/L; ammonia 0.55±0.01 mg/L; nitrate 0.136±0.28 mg/L; nitrite 11.39±0.37 mg/L; salinity 0.3±0.1 ppt in the experimental tanks.

Experimental procedures

The following method suggested by Diatin *et al.* (2021) were use for estimation of productive performance, financial feasibility and sensitivity analysis

- ***Production performance analysis:*** The variable of total production, productivity and viability were calculated to analyzed the production performance. Total production was calculated from the total biomass of harvested catfish. Productivity was calculated from the total production per unit area. Survival was calculated using the formula

$$SR\ (\%) = Nt/N0 \times 100,$$

Where N0 and Nt are the initial and final number of fish, respectively.

- ***Financial feasibility analysis:*** The calculation of cost structure and financial feasibility analy- sis in catfish farming includes investment costs (I), fixed costs (FC), variable costs (VC), total costs (TC), total revenue (TR), profit (TR- TC) and R/C ratio (TR/TC). The calculation of financial feasibility analysis used cost-benefit analysis (CBA) including Net Present Value (NPV), Benefit Cost Ratio (BCR), Internal Rate of Return (IRR) and sensitivity analysis.

Net Present Value (NPV): The NPV is defined as the present value of the net benefit stream. NPV is calculated using formula as a follow:

$$NPV = \sum_{n}^{t=1} \frac{(Bt - Ct)}{(1+i)^t}$$

In which: Bt = benefit in year t, Ct = cost in year t,

n = length of cu ture in years, r = discount rate.

Benefit-Cost Ratio (BCR): The net benefits of a period were the benefits minus the costs in that particular period. BCR was a comparison between the total present value of the net profits obtained in the year with the net profits were positive and the net profits were negative. This value was obtained using the following formula:

$$B/C = \frac{\sum_{n}^{t=1} \frac{(Bt - Ct)}{(1+i)^t}}{\sum_{n}^{t=1} \frac{(Ct - Bt)}{(1+i)^t}}$$

Internal Rate of Return (IRR): It is the interest rate obtained from the present value of total costs equal to the present value of total revenues. A business can be said to be feasible to do when the IRR value is greater than the opportunity cost of capital. In the present study, the IRR was calcu- lated using the following formula:

$$IPR = 1 + \frac{NPV}{(NPV' - NPV'')} x\ (i' - i'')$$

where: I' = discount rate resulted from NPV positive, I" = discount rate resulted from NPV negative, NPV' = NPV in interest level I' , NPV" = NPV in interest level I" .

- ***Sensitivity analysis:*** The sensitivity analysis commonly performed to analyze the economic feasibility reflecting the change of the situations or conditions. In our case, sensitivity analysis was performed on changes in the amount of production, namely the survival value of each fish farming system and technology.

Statistical analysis

The data obtained from this study were then tabulated using Microsoft Office Excel 2010 and Represented as Mean ± SD.

Results and discussion

Production performance analysis

The production performance of fish farming using commercial and wheatgrass base formulated feed in Table 2. The survival of fish, total yield and productivity of the two systems showed differences in results, with the lowest yield happen with the commercial fish feed. Both the system utilized similar of rearing time of 70 days of rearing time. From these two systems, the highest total production and productivity obtained from the wheatgrass based feed while the lowest occurred from commercial feed. This finding was supports the previous study conducted by Oke and Goosen (2019) and Baganz *et al.* (2020) on fish reared in an extensive system. The success of aquaculture production highly depends on the volume of production. It is affected by aquatic environment, growth performance and stocking density (Andrade *et al.,* 2015). Emerenciano *et al.* (2017) suggested that water quality that is measured as temperature, pH, dissolved oxygen content, total ammonia nitrogen, nitrite, nitrate, alkalinity, and suspended solid also influenced the fish production (Gallardo-Collietal *et al.*, 2019).

Financial feasibility analysis

The components of investment in fish farming can be seen in Table 3. The main investment in fish farming came from the construction of closed recirculatory aquaculture system, while the rest was for aquaculture equipments. The operational cost structure analysis consists of fixed costs and variable costs, shown in Table 4. The allocation for fixed costs in both the systems in the study was similar while the allocation for variable costs was high in system using commercial fish feed than wheatgrass based feed. It is evident from present data that this low cost is due to price difference in commercial and wheatgrass based fish feed. The size of the total revenue was influenced by the total production (Table 5). In presented fish farming with, the revenue value were higher sytem using wheatgrass based feed. This lower revenue in commercial fish feed caused by the low growth performance and survival of fishes.

Financial feasibility analysis was used as an indicator of the sustainability of a business in presented fish farming (Table 6). Based on the results of financial analysis, the lowest value obtained in the fish culture using commercial fish feed. The results showed that the lowest profit value in system using commercial feed was low. Average production cost of fish was observed to low in system using wheatgrass based formulated feed. However, the resulting R/C value was almost high in system using wheatgrass based formulated feed. This financial feasibility analysis suggested that the fish farming business was feasible to be developed. Nonetheless, the fish farming with commercial feed produces the lowest financial feasibility value.

Table 2: Production performance comparison of farming *Channa punctatus* fed on commercial and wheatgrass based formulated fish feed in CRAS

Item	Commercial fish feed	Wheatgrass based fish feed
Rearing duration (days / cycle)	70	70
Total cycles (cycles/ year)	5	5
Stocking densities (fish/tank)	250	250
Survival (%)	83.6±2.4	91.4±3.7
Total yield (kg)	612.2±16.8	704.7±13.4

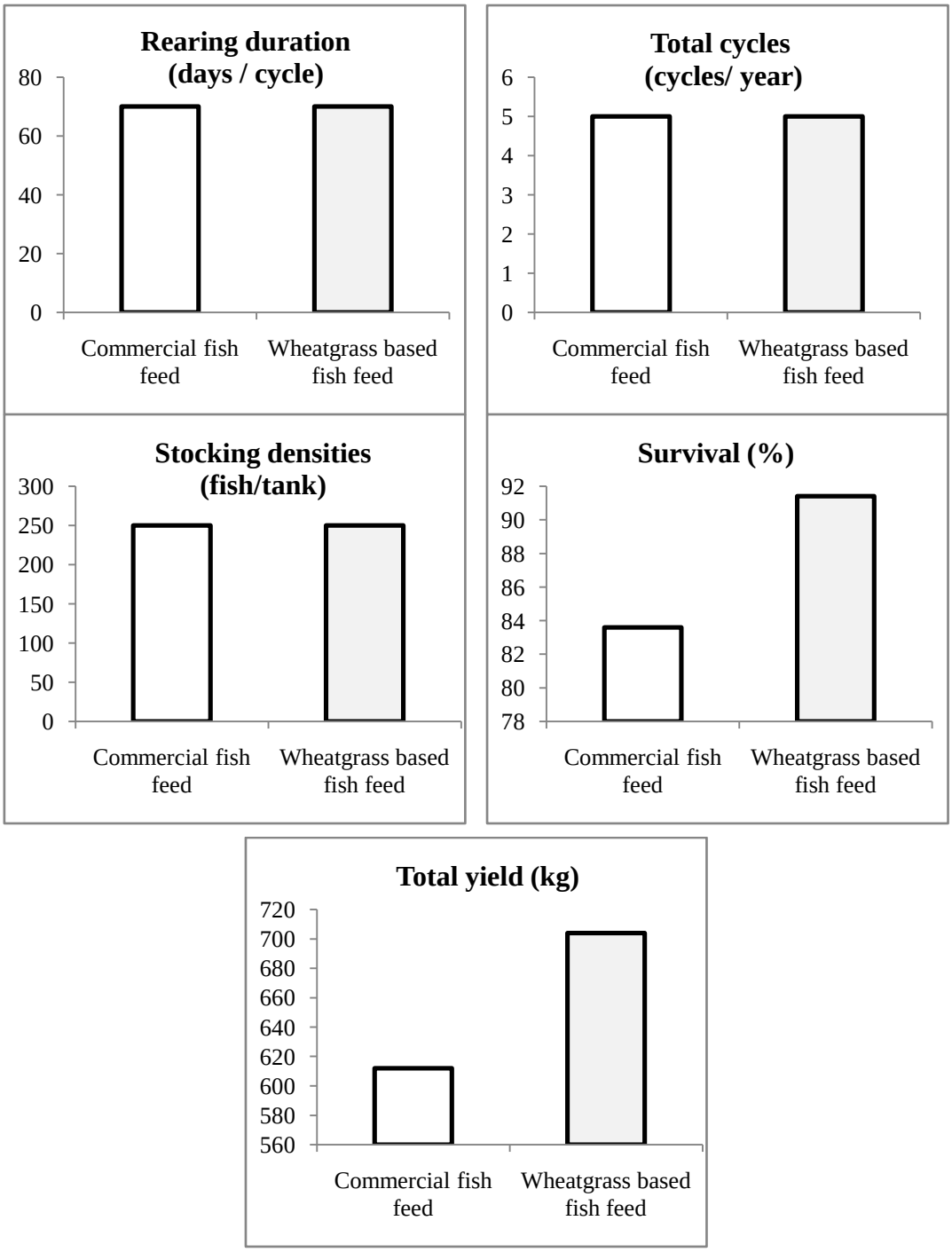


Figure 1: Production performance comparison of farming *Channa punctatus* fed on commercial and wheatgrass based formulated fish feed in CRAS

Table 3: Investment comparison (INR) of farming *Channa punctatus* fed on commercial and wheatgrass based formulated fish feed in CRAS

Item	Commercial fish feed	Wheatgrass based fish feed
Aquaculture system	18000	18000
Supportive Equipments	7000	7000
Total Investment	25000	25000

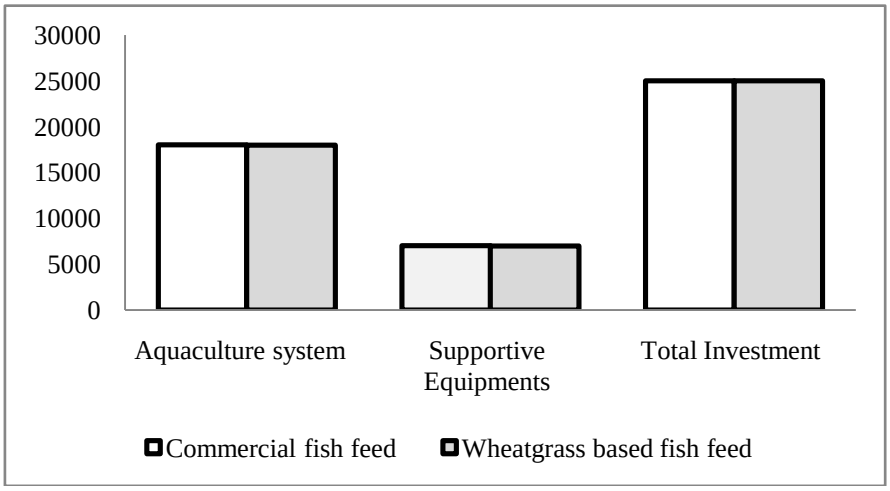


Figure 2: Investment comparison (INR) of farming *Channa punctatus* fed on commercial and wheatgrass based formulated fish feed in CRAS

Table 4: Operational cost structure (INR) of farming *Channa punctatus* fed on commercial and wheatgrass based formulated fish feed in CRAS

Item		Commercial fish feed	Wheatgrass based fish feed
Fixed cost	Electricity	18000	18000
	Labour	109500	109500
	Depreciation	25000	25000
Variable cost	Fingerlings	5000	5000
	Feed	22526	14420
Total cost		180026	171920

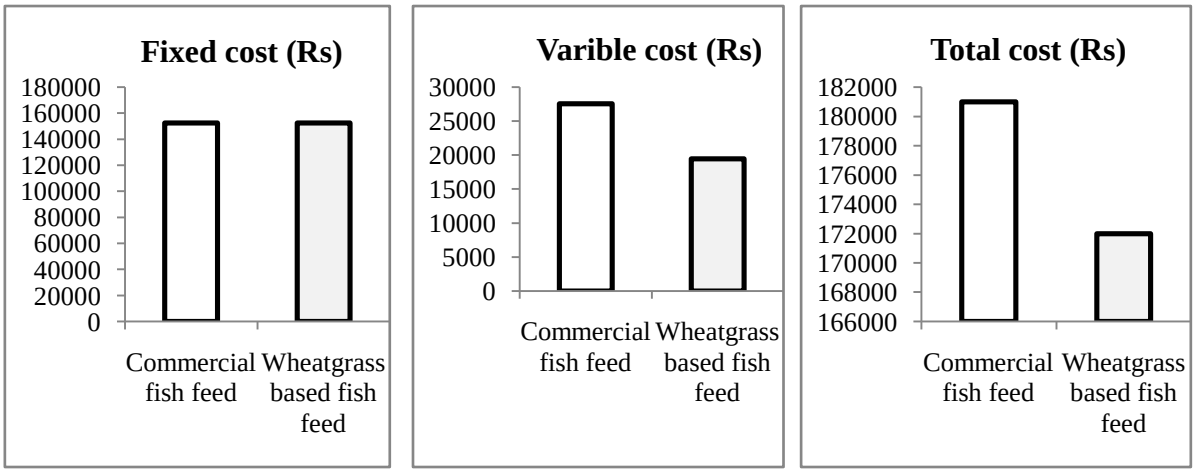


Figure 3: Operational cost structure (INR) of farming *Channa punctatus* fed on commercial and wheatgrass based formulated fish feed in CRAS

Table 5: Annual profit of farming *Channa punctatus* fed on commercial and wheatgrass based formulated fish feed in CRAS

Item	Commercial fish feed	Wheatgrass based fish feed
Yield (kg)	612.2	704.7
Average Price /kg	500	500
Total revenue (INR)	315000	365000

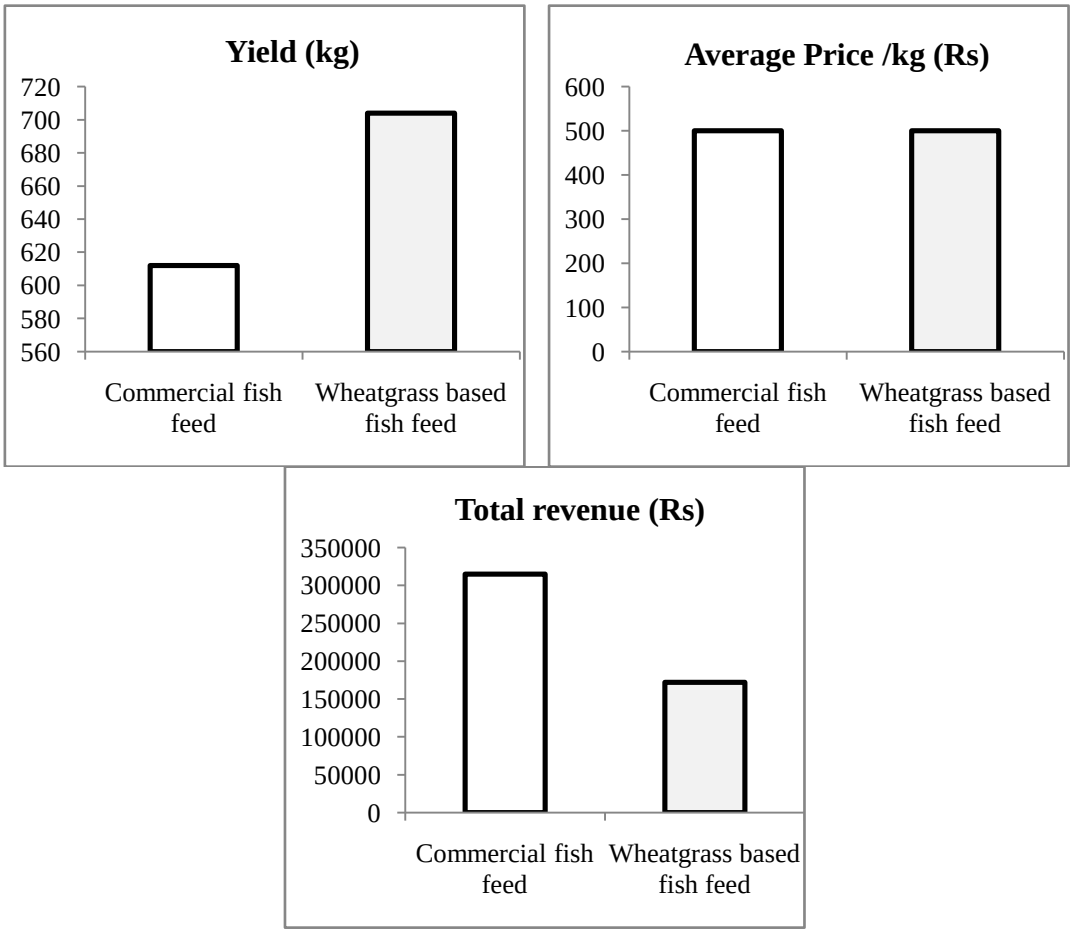
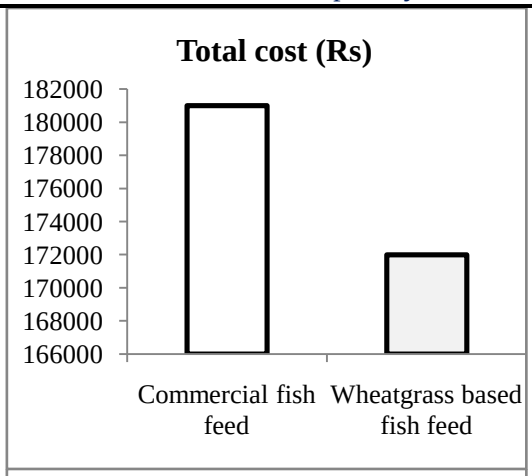
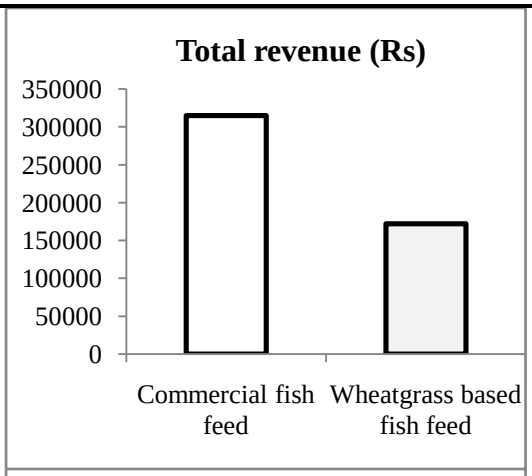


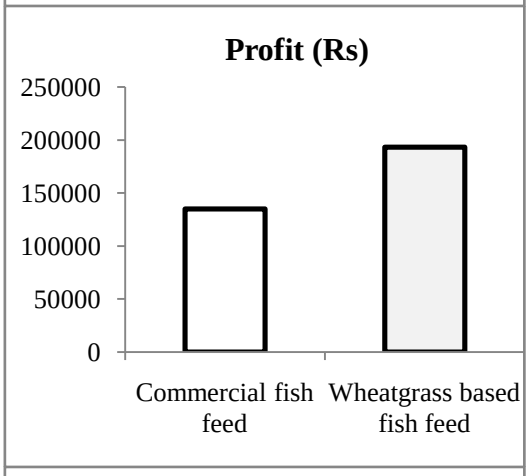
Figure 4: Annual profit of farming *Channa punctatus* fed on commercial and wheatgrass based formulated fish feed in CRAS

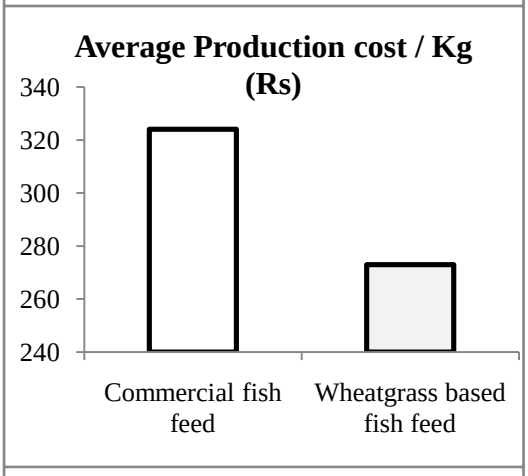
Table 6: Financial feasibility analysis of farming *Channa punctatus* fed on commercial and wheatgrass based formulated fish feed in CRAS

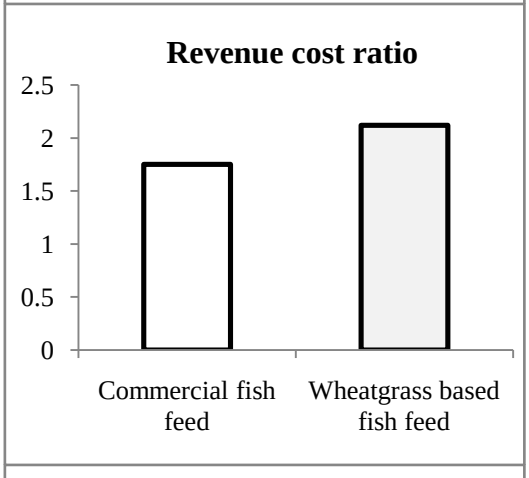
Item	Commercial fish feed	Wheatgrass based fish feed
Total Investment	25000	25000
Fixed cost	152500	152500
Variable cost	27526	19420
Total cost	180026	171920
Total revenue	315000	365000
Profit	134974	193080
Average Production cost / Kg	323.76	272.71
Revenue cost ratio	1.75	2.12
NPV (INR)	184728	226719
BCR	7.38	9.07
IPR (%)	206.55	239.44

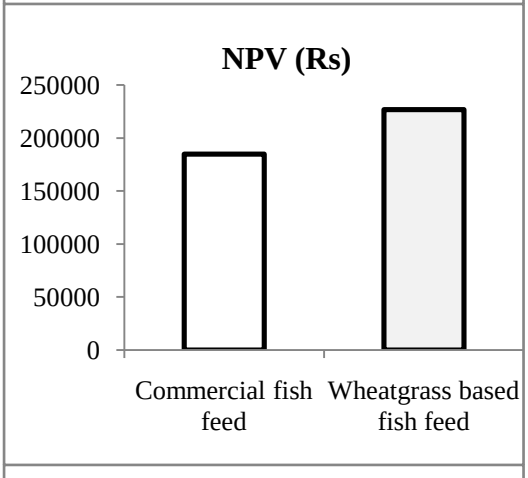

Total cost (Rs)
182000
180000
178000
176000
174000
172000
170000
168000
166000
Commercial fish feed
Wheatgrass based fish feed

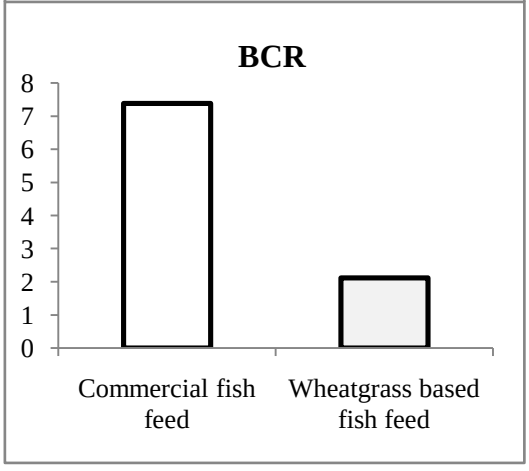

Total revenue (Rs)
350000
300000
250000
200000
150000
100000
50000
0
Commercial fish feed
Wheatgrass based fish feed


Profit (Rs)
250000
200000
150000
100000
50000
0
Commercial fish feed
Wheatgrass based fish feed


Average Production cost / Kg (Rs)
340
320
300
280
260
240
Commercial fish feed
Wheatgrass based fish feed


Revenue cost ratio
2.5
2
1.5
1
0.5
0
Commercial fish feed
Wheatgrass based fish feed


NPV (Rs)
250000
200000
150000
100000
50000
0
Commercial fish feed
Wheatgrass based fish feed


BCR
8
7
6
5
4
3
2
1
0
Commercial fish feed
Wheatgrass based fish feed

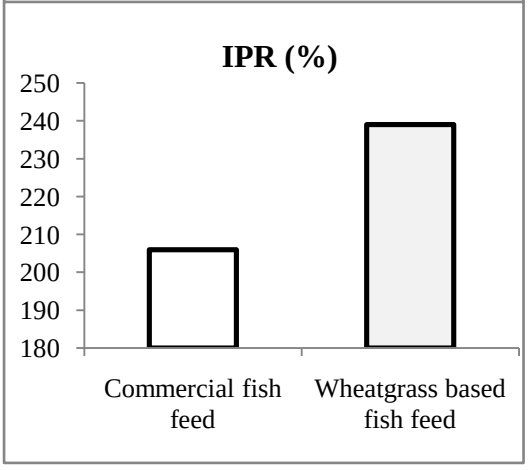

IPR (%)
250
240
230
220
210
200
190
180
Commercial fish feed
Wheatgrass based fish feed

Figure 5: Financial feasibility analysis of farming *Channa punctatus* fed on commercial and wheatgrass based formulated fish feed in CRAS

Table 7: Sensitivity analysis of farming *Channa punctatus* fed on commercial and wheatgrass based formulated fish feed in CRAS

Survival (%)	Commercial fish feed			Wheatgrass based fish feed		
	NPV (INR)	BCR	IPR (%)	NPV (INR)	BCR	IPR (%)
90	184728	7.38	206.55	226719	9.07	239.44
85	128283	5.34	149.67	171756	7.08	187.06
75	68672	3.18	89.03	165488	6.87	181.39
70	10383	1.07	30.65	61945	3.05	80.62
Threshold (%)	60			70		

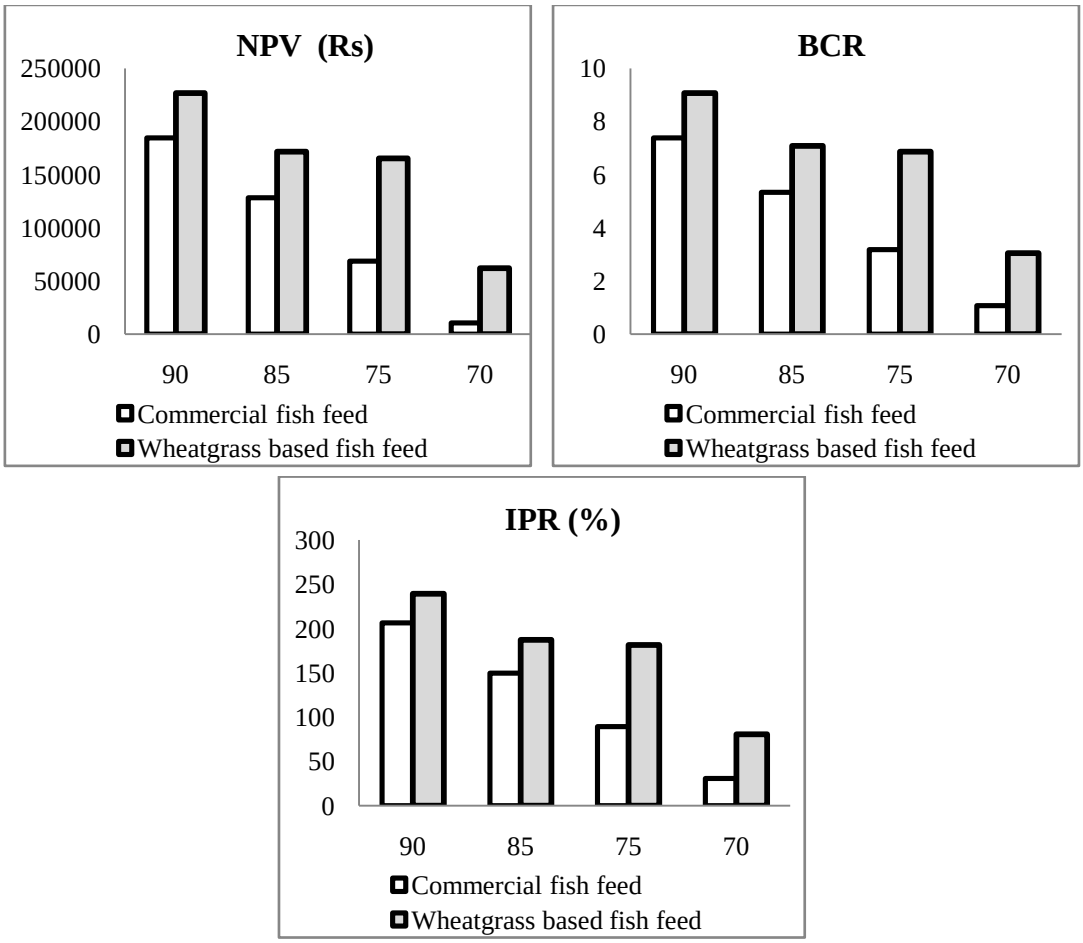


Figure 6: Sensitivity analysis of farming *Channa punctatus* fed on commercial and wheatgrass based formulated fish feed in CRAS

The fish farming business requires several investment costs and operational costs. The size of the cost incurred affects the profit of fish business (Kumar *et al.*, 2020). Highly variable costs allocate for feed costs. Feed is very important component in aquaculture business, which affects the production and profits (Jia *et al.*, 2016; Bosma *et al.*, 2017; Kumar and Engle, 2017; Kumar *et al.*, 2018; Oke and Goosen, 2019; Baganz *et al.*, 2020; Diatin *et al.*, 2020).

Therefore, the fish farming is sensitive to changes in feed prices (Kumar *et al.*, 2020). Savings in feed costs can increase the profits of fish farming. Limbu (2020) stated that the use of feed through the manufacture of feed with the right formulation can reduce the feed costs by 30% and increase the profit index by 1.5

times. Reduction of feed costs can be done by increasing feed efficiency through the use of easily available additives according the procedure. The consumption of formulated feed helps in reducing feed conversion ratio (FCR) and a decrease of feed costs (Emeka and Oscar, 2016; Emerenciano *et al.,* 2017; Akinwole *et al.,* 2020).

Based on the calculation of revenue and business analysis showed that the fish farming business is profitable and all of the profit values obtained are positive (Oke and Goosen, 2019). The R/C values obtained in fish farming using closed recirculatory aquaculture system and formulated fish feed. Similarly, the R/C of present farming was high in system using wheatgrass based formulated feed. The financial feasibility analysis showed that the fish farming business was feasible to be developed. Nonetheless, the fish farming with commercial feed produces the lowest financial feasibility value. Therefore, the pre sent study finding is more profitable and feasible to be developed. Since the BCR obtained on two systems is greater than one, this value is financially profitable. These views are in well agreement with previous studies of Bosma *et al.,* (2017) and Aheto *et al.,* (2019).

Sensitivity analysis

The change in fish production performance is the most important factor in total production. The most important factor in fish farming is the amount of production performance. This affect the number of fish that are sold, then it will affect the value of profit by farmers. The amount of production is influenced by the survival of fish, so it is necessary to analyze changes in the survival of fish. Therefore, the changes in the survival of fish are needed to be considered. The results of the sensitivity analysis of *Channa punctatus* farming were shown in Table 7.

Sensitivity analysis on the changes in important factors of aquaculture was carried out. The total production is influenced by the survival of fish. The threshold for survival in water exchange system, form system using commercial and wheatgrass based feed were 60 % and 70 % respectively. In other word, the *Channa punctatus* farming business is feasible and recommended. Sensitivity analysis suggested that fish farming is sensitive to feed selection that causes the changes in total production. The *Channa punctatus* production business with the widest tolerance to changes in the survival of fish is selection of feasible and nutritious feed. Several sensitivity analyses have been documented on fish farming with different components of change such as selling prices, investment costs, feed prices (Tokunaga *et al.,* 2015; Kumar and Engle, 2017; Kumar *et al.,* 2018)

The *Channa punctatus* farming with closed recirculatory aquaculture system and formulated fish fees are prospective investment opportunities for fish farmers due to its high financial value. Nonetheless, the future of aquaculture system should be more efficient in using water resources due to limited water resources. The closed recirculatory aquaculture system is known to more efficient than natural water resources. The development of modern techniques provides many benefits to fish farmers, including efficient use of water through recycling of nutrients and waste, feed efficiency. It can reduce feed costs, and economically profitable with additional yields in the form of vegetables (Love *et al.,* 2015; Khan *et al.,* 2018; Palm *et al.,* 2018).

The present study demonstrated that it is possible for a *Channa punctatus* farming with closed recirculatory aquaculture system with wheatgrass based formulated feed to be carried out by farmers. The wheatgrass based formulated feed can be an alternative for the commercial feed for development of fish farming in the near future. The wheatgrass based formulated feed investment and increase profit. According to De Schryver and Verstraete (2009) and Dauda *et al.* (2018 a), the supplementary diet acts as a source of protein for fish growth and also reduces the feed cost. The aquatic environment provides optimum water quality, optimum growth performance and high survival of fish (Bakar *et al.,* 2015; Dauda *et al.,* 2018 b; Chen *et al.,* 2020). The important thing for *Channa punctatus* farmers to consider is the measurement of water quality. With this study,

farmers recommended to measure the temperature, pH, alkalinity, dissolved oxygen, orthophosphate, ammonia, nitrate, nitrite etc. (Emerenciano *et al.,* 2017; Yildiz *et al.,* 2017; Diatin *et al.*, 2021).

Conclusion

The productivity and financial feasibility analysis of farming *Channa punctatus* (Bloch, 1793) with using closed recirculatory aquaculture system and wheatgrass based formulated feed were analyzed in the present study. Financial feasibility analysis used cost-benefit analysis and sensitivity analysis was carried out on changes in the amount of production based on the survival value. The results showed that the best productivity and financial feasibility of *Channa punctatus* was obtained with formulated wheatgrass based fish feed. The sensitivity analysis shows that the increased survival value in *Channa punctatus* culture with wheatgrass based fish feed as compare to commercial fish feed. Hence fish farmers are recommended to use closed recirculatory aquaculture system and wheatgrass based formulated feed for *Channa punctatus* (Bloch, 1793) culture.

References

1. Adelizi PD, Rosati RR, Warner K, Wu YV, Muench TR, White MR, Brown PB, 1998. Evaluation of fish-meal free diets for rainbow trout, Oncorhynchus mykiss. Aquacult. Nutri., 4(4): 255–262.
2. Aheto DW, Acheampong E, Odoi JO, 2019. Are small-scale freshwater aquaculture farms in coastal areas of Ghana economically profitable?. J. Aquac. Int., 27:785–805.
3. Akinwole AO, Dauda AB, Ogunkunle VO, 2020. Growth performance, nutrient utilization, survival and body indices of African catfish (Clarias gariepinus, burchell 1822) reared on maggot meal based diet. FUDMA J. Sci., 4(2): 53–59.
4. Alina A, Victor C, Iulia RG, Sndina I, Mirela M, 2013. The Influence of Rosemary, Sea Buckthorn and Ginger on Oxidative Stress at Oreochromis niloticus Reared in a Recirculating Aquaculture System. Bulletin UASVM Animal Science and Biotechnologies, 70(1): 110-116.
5. Andrade T, Afonso A, Perez-Jimenez A, Oliva-Teles AO, de Las Heras V, Mancera JM, Serradeiro R, Costas B, 2015. Evaluation of different stocking densities in a Senegalese sole (Solea senegalensis) farm: imlication for growth, humoral immune parameters and oxidative status. Aquaculture, 43(8): 6–11.
6. AOAC, 1995. Official Methods of Analysis of the Association of Official Analytical Chemistry. 16th Edn., AOAC International, Washington, USA., 1141 pp.
7. APHA, 2000. Standard methods for examination of water and waste water. 21st edition. American Public Health Association, Washington DC, USA. 1268 pp.
8. Asamoah EK, Nunoo FKE, Osei-Asare YB, Addo S, Sumaila UR, 2013. A production function analysis of pond aquaculture in Southern Ghana. Aquac. Econ. Manag., 16:185–201.
9. Baganz G, Baganz D, Staaks G, Monsees H, Kloas W, 2020. Profitability of multi-loop auaponics: Yearlong production data, economics scenarios and a comprehensive model case. Aquac. Res., 51(7): 2711–2724.
10. Bakar NSA, Nasir NM, Lananan F, Hamid SHA, Lam SS, Jusoh A, 2015. Optimization of C/N ratios for nutrient removal in aquaculture system culturing African catfish (Clarias gariepinus) utilizing bioflocs technology. Int. Biodeterior. Biodegrad., 10(2): 100–106.
11. Bendik F, Steven TS, Ståle N, Yngve U, Svein O, Britt K, Roger S, Jelena K, Per B, Grete B, Harald T, Arne HK, Torbjørn A, 2013. Design, dimensioning, and

performance of a research facility for studies on the requirements of fish in RAS environments. Aquacultural Engineering, 54: 49– 63.

12. Bhatnagar A, Devi P, 2013. Water quality guidelines for the management of pond fish culture. International Journal of Environmental Sciences, 3(6): 1980-1996.
13. Bhuiyan AS, Afroz S, Zaman Y (2006). Food and feeding habit of the juvenile and adult snake head, Channa punctatus (Bloch). J. Life Earth Sci. 1(2): 53–54.
14. Bosma RH, Lacambra L, Landstar Y, Perini C, Poulie J, Schwaners MJ, Yin Y, 2017. The financial feasibility of producing fish and vegetables through aquaponic. Aquac. Eng., 78: 146–154.
15. Butle SS, Gulhane RA, Joshi PS, 2019. Evaluation of Phytochemical and Antioxidant Potential of Aqueous Wheatgrass Extract for fish feed formulation. Vidyabharti International Interdisciplinary Research Journal, 9(2): 65-70.
16. Carlos AE, Daniel M, 2019. Recirculating Aquaculture Technologies In book: Aquaponics Food Production Systems. Springer, 149 pp.
17. Chang YK, Wang SS, 1999. Advances in Extrusion Technology: Aquaculture Animal Feeds and Foods. Technomic Publishing Company, Lancaster, PA. 1-222.
18. Chen X, Luo G, Tan J, Yao M, 2020. Effects of carbohydrate supply strategies and biofloc concentrations on the growth performance of African catfish (Clarias gariepinus) cultured in biofloc systems. Aquaculture, 51(7):1-9.
19. Daniel N, 2018. A review on replacing fish meal in aqua feeds using plant protein sources. Int. J. Fish. Aqua., 6: 164–179.
20. Dauda AB, Romano N, Chen WW, Natrah I, Kamarudin MS, 2018b. Differences in feeding habits influence the growth performance and feeding efficiencies of African catfish (Clarias gariepinus) and lemon fin barb hybrid (Hypsibarbus wetmorei x Barboides gonionotus) in a glycerol-based biofloc technology system versus a recirculating system. Aquac. Eng., 82: 31–37.
21. Dauda AB, Romano N, Ebrahimi M, The JC, Ajadi A, Chong CM, Karim M, Natrah I, Kamarudin MS, 2018a. Influence of carbon/nitrogen ratios on biofloc production and biochemical composition and subsequent effects on the growth, physiological status and disease resistance of Clarias gariepinus cultured in glycerol-based biofloc systems. Aquaculture, 48(3): 120-130.
22. De Schryver P, Verstraete W, 2009. Nitrogen removal from aquaculture pond water by heterotrophic nitrogen assimilation in lab-scale sequencing batch reactors. Bioresour. Technol., 100(3): 1162–1167.
23. Diatin I, Dadang S, Nurul H, Sholihah M, Ilmi M, 2021. Production performance and financial feasibility analysis of farming catfish (Clarias gariepinus) utilizing water exchange system, aquaponic and biofloc technology. J. Saudi Soc. Agri. Sci., 20: 344–351
24. Diatin I, Effendi I, Taufik MV, 2020. The production function and profitability analysis of Gracilaria sp. seaweed polyculture with milkfish (Chanos chanos) and black tiger shrimp (Penaeus monodon). Biodiversitas, 21(10): 4747–4754.
25. Emeka AI, Oscar EV, 2016. Comparative Study of Growth Performance, Food Utilization and Survival of the African Catfish Clarias gariepinus (Burchell, 1822) Fingerlings Fed Live Maggot (Musca domestica) and Coppens Commercial Feed. IJSRSET, 2(2): 379–386.
26. Emerenciano MGC, Martinez-Cordova LR, Martinez-Porchas M, Miranda-Baeza A, 2017. Biofloc Technology (BFT): A Tool for Water Quality Management in Aquaculture. Water Quality. Intech., Croatia., 17: 91–109.

27. FAO, 2016a. Food and Agriculture Organization of the United Nations- The state of world fisheries and aquaculture. Contributing to food security and nutrition for all. Food and Agriculture Organization of the United Nations. Rome, 204 pp.

28. FAO, 2020b. Food and Agriculture Organization of the United Nations, The state of world fisheries and aquaculture. Sustainability in action. Food and Agriculture Organization of the United Nations. Rome, 210 pp.

29. Filipski M, Belton B, 2018. Give a Man a Fishpond: Modeling the Impacts of Aquaculture in the Rural Economy. World Dev., 110: 205–223.

30. Gallardo-Collietal A, Perez-Rostro CI, Hernandez-Vergara MP, Perez-Legaspi IA, 2019. Microeukaryote community and the nutritional composition of the biofloc during Nile tilapia culture in water-reusing biofloc systems. Aquac. Int., 27: 381–398.

31. Jia B, St-Hilaire S, Singh K, Gardner IA, 2016. Farm-level return and cost of yellow catfish (Pelteobagrus fulvidraco) aquaculture in Guangdong and Zhejiang provinces China. Aquac. Rep., 4: 48–56.

32. Johri S, Khan N, 2017. In vitro Antioxidant and Antihaemolytic Potential of Triticum aestivum Grass. Int. J. Compl. And Alt. Med., 9(5): 1-5.

33. Joshi PS, 2017. Dietary garlic induced growth performance, whole body composition and survival in Clarias batrachus (Linn.). Proceeding of National Conference on Recent Advances in Biological Science, 17: 36-37.

34. Kabir MA, Robert BI, Francis ON, 2014. The design of prototype recirculating aquaculture system and its use to examine the histology of hybrid catfish fed practical diets. International J. of Fisheries and Aquatic Studies, 1(5): 242-249.

35. Khan AQ, Aldosari F, Hussain SM, 2018. Fish consumption behavior and fish farming attitude in Kingdom of Saudi Arabia (KSA). J. Saudi Soc. Agric. Sci., 17: 195–199.

36. Kobayashi M, Msangi S, Batka M, Vannuccini S, Dey MM, Anderson JL, 2015. Fish to 2030: The role and opportunity for aquaculture. Aquac. Econ. Manag., 19: 282–300.

37. Kumar G, Engle C, 2017. Economic of intensively aerated catfish ponds. J. World Aquac. Soc., 48(2), 320–332.

38. Kumar G, Engle C, Hanson T, Tucker C, Brown T, Bott L, Roy L, Boyd C, Recsetar M, Park J, Torrans E, 2018. Economics of alternative catfish production technologies. J. World Aquac. Soc., 49(6): 1039–1057.

39. Kumar G, Engle C, Hegde S, Senten J, 2020. Economics of U.S. catfish farming practices: Profitability, economies of size, and liquidity. J. World Aquac. Soc., 51(4): 829–846.

40. Limbu SM, 2020. The effects of on-farm produced feeds on growth, survival, yield and feed cost of juvenile African sharptooth catfish (Clarias gariepinus). Aquac. Fish., 5: 58–64.

41. Love DC, Fry JP, Li X, Hill ES, Genello L, Semmens K, Thompson RE, 2015. Commercial aquaponic production and profitability: Findings from an international survey. Aquaculture, 43(5): 67–74.

42. Martins C, Eding E, Verdegem M, Heinsbroek L, Schneider O, Blancheton J, d'Orbcastel E, Verreth J, 2010. New developments in recirculating aquaculture systems in Europe: A perspective on environmental sustainability. Aquacultural Engineering, 43(3): 83–93.

43. Michael C, David T, 2014. Global diets link environmental sustainability and human health. Nature, 515: 518–522.

44. Mohammad ABB, Mohammad IH, Mohammad AH, Mohammad ASJ, Jakia H, Akter S (2019). Determination of the proximate composition of available fish feed ingredients in Bangladesh. Asian J. Agric. Res., 13: 13-19.

45. Oke V, Goosen NJ, 2019. The effect of stocking density on profitability of African catfish (Clarias gariepinus) culture in extensive pond systems. Aquaculture, 50(7): 385–392.

46. Palm HW, Knaus U, Appelbaum S, Goddek S, Strauch SM, Vermeulen T, Jijakli MH, Kotzen B, 2018. Towards commercial aquaponic: a review of systems, designs, scales and nomenclature. Aquac. Int., 26: 813–842.

47. Sharma R, Nair A, Harak S, Patil T, Shelke S, 2016. Wheatgrass Juice: Nature's Powerful Medicine. World J. Pharma. Pharmac. Sci., 5(7): 384-391.

48. Summerfelt S, Vinci B, 2004a. Avoiding water quality failures: Part 1 – Carrying capacity and water flow in intensive aquaculture systems. World Aquaculture, 35: 6–8.

49. Summerfelt S, Vinci B, 2004b. Avoiding water quality failures: Part 2 – Recirculating systems. World Aquaculture, 35: 9–11.

50. Tokunaga K, Tamaru C, Ako H, Leung P, 2015. Economics of small scale commercial aquaponic in Hawaii. J. World Aquac. Soc., 46(1): 20–32.

51. Tran N, Rodriguez UP, Chan CY, Phillips MJ, Mohan CV, Henrikson PJG, Koeshendrajana S, Suri S, Hall S, 2017. Indonesian aquaculture futures: An analysis of fish supply and demand in Indonesia to 2030 and role of aquaculture using the Asia Fish model. Mar. Policy., 79: 25–32.

52. Valenti WC, Kimpara JM, Preto BL, Valenti PM, 2018. Indicators of sustainability to assess aquaculture systems. Ecol. Ind., 88: 402–413.

53. Vandeputte M, Reuver M, 2011. AquaExcel: aquaculture infrastructures for excel- lence in European fish research. In: Aquaculture Europe Proceeding, Rhodes, Greece, 11:1136–1137.

54. Yildiz H, Robaina L, Pirhonen J, Mente E, Dominguez D, Parisi G, 2017. Fish Welfare in Aquaponic: Its Relation to Water Quality with an Emphasis on Feed and Faeces—A Review. Water, 9(13): 1–17.

CURRENT STATUS OF PISCICULTURE IN YAVATMAL TALUKA: TO CHECK THE SUSTAINABILITY

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ABSTRACT

The present study focus on the current status of pisciculture in Yavatmal taluka and the sustainability of it. We studied the fish production in 13 minor water bodies or talavs present in Yavatmal taluka, where the fishery activity occurs mainly under government supervision, named Dudhana lake, Ghatana lake, Manpur lake, Arjuna lake, Salod lake, Kharad lake, Lakhmapur lake, Jamwadi lake, Umarda lake, Kolambi lake, Varud (Yevati) lake and Takali lake, Borgaon dam and also checked the sustainability of it. We found that, total 36.30 metric tons of fish production from the above water bodies during 2020-22, generating an income of Rs. 18,15,000 which is quite sustainabile for the stakeholder of fisheries. During 2020-21, the fishes production is greatly affected by Corona pandemic. The study is still going on to cover the other remaining talukas of Yavatmal. Hopefully, the pisciculture in Yavatmal will be better, enriching the new parameters of sustainability in upcoming years.

Keywords: *Pisciculture, Fresh water Fish culture, Inland fishery, fish stocking, fish production, sustainable, rural development, Yavatmal taluka*

Introduction

Pisciculture in Inland fisheries are important for poverty alleviation, food security. The national average in productivity of fishes in community ponds is of 2200kg/ha/year and the national average in productivity of fishes in reservoirs is of 48 kg/ha/year. The potential yield of reservoirs at national level is 250 kg/ha/year (DAHDF, 2017). According to the report of MAFSU, the Yavatmal district has 24 % of aquaculture ponds and 14% reservoirs in Vidarbha region. According to the report of the Akola Irrigation Division, Yavatmal district has a total of 05 major water bodies, 10 medium water bodies and many minor water bodies. Yavatmal Taluka has 10 water bodies with a spread area more than 250 ha and nearly 107 water bodies with spread area less than 250 ha. Out of 16 talukas in Yavatmal district, we studied the 13 minor water bodies or talavs of Yavatmal taluka. According to the Government of Maharashtra's 'Performance Budget- 2022-23' of the Fisheries department, fish production of inland fisheries has not grown so far. In present study, we will check the sustainability of pisciculture of Yavatmal taluka along with the production of fish.

Review of Literature

- Bhendarkar MP, Brahmane MP, Singh NP in 2018, studied Farm pond based aquaculture model in perspective of doubling farmers income
- Bhendarkar MP, Brahmane MP, Singh NP in 2018, studied the Farm ponds and the production of fishes in it with their expenses and income
- B K Bhattacharjya, K Barman, S Yengkokpam, D Debnath, P Das, N Sharma, S R Pegu, A K Yadav, S Borah, K K Sarma, P Gogoi, A Kakati, D K Sarma, B P Mohanty and B K Das in 2017, studied Recycling of commercial piggery wastes in semi-intensive carp polyculture under rainfed pond environment in Assam: An economic analysis
- Chirashree Ghosh, in 2004 studied Integrated Vermi-Pisciculture - An alternative option for recycling of solid municipal waste in rural India.
- Farm Sector Policy Department, NABARD, Mumbai, in 2018, published a Sectoral Paper on Fisheries and Aquaculture and described in detail the overall problem faced in aquaculture
- HandBook on Fisheries Statistics, Government of India, Ministry of

Agriculture Department of Animal Husbandry, Dairying and Fisheries Krishi Bhavan, New Delhi 2014, 145

- Hiren kumar Bose published an article in Village square in 2017 and described, how rearing fish in small ponds is helping farmers boost income in Maharashtra
- Kanta Das Mahapatra, J N Saha, K Murmu, A Rasal, P Nandanpawar and M Patnaik, in 2017 studied "Jayanti" rohu- A promising fish variety for improving aquaculture production
- Matthias Halwart, Simon Funge-Smith and John Moehl in 2005 published his study on the role of aquaculture in rural development
- Mohamed Shaalan, Magdy El-Mahdy, Mona Saleh & Mansour El-Matbouli in 2017 studied Aquaculture in Egypt and focused on the constraints that threaten fast growing and sustainable development of aquaculture industry, such as production costs, availability of feed and seed, lack of current technologies for feed production and domestic regulations. Also, the future perspectives with regard to overcoming these obstacles are presented.
- Paliwal G.T., Bhandarkar S.V. and Bangadkar M.K. in 2020, in their study highlighted various issues and concerns in Freshwater Fisheries of Vidarbha.
- S. Girriappa. Role of fisheries in Rural Development, Daya Books- 1994, This Book Attempts To Evaluate Marine Fisheries And Aquaculture And The Role Of Institutions And The Actors In Sustaining The Required Fish Productivity Level
- Sachin W. Belsare and his Project team of MAFSU, Nagpur in 2016 developed an Action Plan on Development of Fisheries and Aquaculture in Vidarbha.
- Simon Funge- Smith and Abigail Bennette in 2019, studied inland fisheries and their role in food security and livelihoods

Research Work

Study Area-

Yavatmal district lies in the eastern region of Maharashtra and the coordinates of Yavatmal district are; North latitudes: 19.26’ to 20.42’ and East longitudes: 77.18’ to 79.9’. Wardha and Penganga are the chief rivers of the Yavatmal district and thus the water bodies of Yavatmal taluka are come under Godavari-Penganga basin.

Number of waterbodies in Yavatmal Taluka-

Yavatmal Taluka has 10 water bodies with a spread area more than 250 ha and nearly 107 water bodies with spread area less than 250 ha. Out of 16 talukas in Yavatmal district, we studied the 13 minor water bodies of Yavatmal taluka. They are Dudhana lake, Ghatana lake, Manpur lake, Arjuna lake, Salod lake, Kharad lake, Lakhmapur lake, Jamwadi lake, Umarda lake, Kolambi lake, Varud (Yevati) lake and Takali lake, Borgaon dam.

Period of study and Method-

The data of Pisciculture collected annually, keeping in mind the fish farming activity across the year in Yavatmal taluka, in selected 13 water-bodies by administering a pre-tested interview schedule to collect data from the members of the primary Fisheries Cooperative Societies, progressive farmers, seed producers and others according to the need of study in various period of time.

Result and Discussion

In Yavatmal district, there are three fish seed production centres. The centres are Isapur, Arunavati and Bembala, in which Bembala is not active now. In 2020-21, the actual seed produced by Isapur was 22.66 lakhs, whereas that of Arunavati was 15.10 lakhs. The following table indicates the particulars of the fish seed farms operation in Yavatmal district. (Table 1)

Sr. No.	Name of Fish seed production centre	Total water spread area (Ha)	Fish seed production (in lakhs) 2020-21 (Actuals)	Fish seed production (in lakhs) 2021-22 (Anticipated)	Fish seed production (in lakhs) 2022-23 (Estimated)
1	Isapur	12.00	22.66	36.00	40.00
2	Arunavati	04.70	15.10	06.88	16.00
3	Bembala	04.60	-	-	-

Table 1: the particulars of the fish seed farms operation in Yavatmal district

Similarly, there are two fish seed rearing units in Yavatmal district, named Saikheda and Pus, in which the fish seed rearing unit in Pus is not working yet. In 2020-21, the fish seed rearing unit in Saikheda reared 13.72 lakhs seed of fish. The following table indicates the particulars of the Fish seed Rearing units in Yavatmal district. (Table 2)

Sr. No.	Name of Fish seed Rearing unit	Total water spread area (Ha)	Fish seed production (in lakhs) 2020-21 (Actual)	Fish seed production (in lakhs) 2021-22 (Anticipated)	Fish seed production (in lakhs) 2022-23 (Estimated)
1	Saikheda	02.04	13.72	03.00	15.00
2	Pus	01.39	-	-	15.00

Table 2: the particulars of the Fish seed Rearing units in Yavatmal district

After studying the fish production in selected thirteen water bodies of Yavatmal taluka, we came to notice that, Umarda has highest fish production of 7.302 metric tons during 2022-21 and Manpur has no fish production in previous 3 years. Takali and Lakhmapur have 6.38 and 5.22 metric tons of fish production respectively and have 2nd and 3rd highest fish production respectively in taluka during 2020-21. Jamwadi and Dudhana have 4.481 and 3.45 metric tons of fish production respectively and have 4th and 5th position in fish production respectively in taluka during 2020-21. During same year (2020-21), Borgaon, Kharad, Kolambi, Yevati, Salod, Ghatana, Arjuna have 2.688, 2.3, 1.3, 1.3, 0.57, 0.5, 0.4 metric tons fish production respectively. Irrespective of the fish production, Takali has highest fish production per hectare i.e. 0.9329167 M.ton/ha. Dudhana has 2nd highest fish production per hectare i.e. 0.2222917. Then after, it comes the Umarda, Lakhmapur and Jamwadi with 0.1520714, 0.1296078 and 0.1267387 M.ton/ha respectively. The following table indicates the fish production in the following selected water bodies of Yavatmal taluka. (Table 3)

Sr. No.	Name of water body or talav	Average Spread area of water body (ha)	Optimum fingerling storage (lakhs)	Actual fingerling storage (lakhs)	Expected fish-production (metric tons)	Actual fish production in 2018-19 (Metric tons	Actual fish production in 2019-20 (Metric tons)	Actual fish production in 2020-21 (Metric ton)	Fish production per hectare (Metric ton)
1	Dudhana	16	0.80	1.00	24.00	2.82	4.40	3.45	0.2222917
2	Manpur	17	0.85	0	25.50	0	0	0	0.0000000
3	Kharad	22	1.04	1.80	31.20	1.5	1.7	2.3	0.08333

4	Ghatana	28	1.16	1.30	34.80	0.7	0	0.5	0.0142857
5	Arjuna	28	1.16	0.30	34.80	0	0.8	0.4	0.0142857
6	Salod	29	1.18	0.18	35.4	1.24	0.57	0.57	0.0273563
7	Lakhmapur	34	1.28	2.20	38.4	3.5	4.5	5.22	0.1296078
8	Jamwadi	37	1.34	1.125	40.2	4.751	4.836	4.481	0.1267387
9	Umarda	42	1.44	0.3205	43.2	4.225	7.634	7.302	0.1520714
10	Kolambi	42	1.44	0.30	43.2	0.29	1.125	1.3	0.0215476
11	Varud Yevati	49	1.58	0.64	47.4	0	0.062	1.3	0.0138980
12	Takali	64	1.84	0.01	55.2	16.39	8.84	6.38	0.9329167
13	Borgaon	184	3.04	3.5	91.2	2.016	2.695	2.688	0.0134040

Table 3: the Fish production in the following selected water bodies of Yavatmal taluka

According to the Fishery department's Performance Budget 2022-23, the following Reference table indicates the categories of water spread area of tanks and optimum stocking capacity in Maharashtra, (Table 4). It is studied that, water bodies with less water spread area have more fish production as compare to the large waterbodies and the fish production decreases as the spread area of water body increases.

Sr. No.	Category of water bodies according to area in Ha	Estimated fish production in kg (Metric Tons)
1	0 to 20 Ha	09935.8950
2	20.1 to 60 Ha	53132.8440
3	60.1 to 200 Ha	30877.2150
4	200.1 to 500 Ha	13348.1730
5	500.1 to 1000 Ha	07342.6715
6	1000.1 to 2000 Ha	04707.0900
7	Above 2000 Ha	09437.0250

Table 4: Reference table for categories of water spread area of tanks and optimum stocking capacity in Maharashtra.

Sustainability

From the above study, it is observed that the annual fish production of above talavs/ water body is not upto the mark as mentioned in optimum/estimated fish production column. There is no exploitation of water body as the actual fish production is less as compared to the optimum fish production. The total fish production per year in studied water body during 2020-21 is 36.30 metric-ton which is slightly less as compared to the previous year's (2019-20) annual production of 37.162 metric-ton and which again slightly less as compared to the 2018-19's annual production of 37.432 metric-ton. If we consider Rs. 50 per kg, the earning would be 50 × 36.30 × 1000 = 18,15,000 Rs during 2020-21 and 50 × 37.20 × 1000 = 18,60,00 Rs during 2019-20. Similarly,

the earning would be 18,71,500 Rs during 2018-19, which is quite sustainabile for the stakeholder of fisheries.

Conclusion

During 2020-21, total fish production in Yavatmal taluka from above talavs are 36.30 metric ton, generating 18,15,000 Rs of income, which is less as compared to the previous two year annual fish production. The fish production in above studied talavs has not met the mark of expected or annual fish production/year/ha, instead it seems declining slightly every year. There can be many reasons for low fish production per year, Corona pandemic could be a big reason. Even though the pisciculture in Yavatmal is sustainable, there is an urgent need of development regarding this. The study is still going on to cover the other remaining talukas of Yavatmal. Hopefully, the pisciculture in Yavatmal will be better, enriching the new parameters of sustainability in upcoming years.

References

1. Akola Irrigation Division's report on Current status of Yavatmal Irrigation dams: District Book (June 2011)
2. Bhendarkar MP, Brahmane MP, Singh NP (2018), Farm pond based aquaculture model in perspective of doubling farmers income; Poster 147
3. Bhendarkar MP, Brahmane MP, Singh NP (2018), Shet Tadyatil Masemari, Uttpannachi Hami Bhari, Shetkari; 44-47
4. B K Bhattacharjya, K Barman, S Yengkokpam, D Debnath, P Das, N Sharma, S R Pegu, A K Yadav, S Borah, K K Sarma, P Gogoi, A Kakati, D K Sarma, B P Mohanty and B K Das (2017), Recycling of commercial piggery wastes in semi-intensive carp polyculture under rainfed pond environment in Assam: An economic analysis; JOURNAL OF THE INLAND FISHERIES SOCIETY OF INDIA- Vol 49
5. Chakrabarty KS (1993), Factors relating to underdevelopment of pisciculture in Birbhum district. Occasional paper.
6. Claude E Boyd, Louis R D'Abramo, Brent D Glencross, David C Huyben, Lorenzo M Juarez, George S Lockwood, Aaron A McNevin, Albert G J Tacon, Fabrice Teletchea, Joseph R Tomasso Jr, Craig S Tucker (2020), Achieving sustainable Aquaculture: Historical and current perspectives and future needs and challenges; 02-03
7. Chirashree Ghosh (2004), Integrated Vermi-Pisciculture - An alternative option for recycling of solid municipal waste in rural India. Bioresource Technology - Volume 93, Issue 1; 71-75
8. DAHDF (Department of Animal Husbandry Dairy and Fisheries) Annual Report 2016-17. Government of India. New Delhi, 2017.
9. Government of Maharashtra's report on Fisheries' 'Performance Budget 2022-23'
10. Government of Maharashtra's Fishery department's report on water bodies of Amravati division and fish production, 2021
11. HandBook on Fisheries Statistics, Government of India, Ministry of Agriculture Department of Animal Husbandry, Dairying and Fisheries Krishi Bhavan, New Delhi 2014, 145
12. Hiren kumar Bose (2017), Article published in Village square. 'How rearing fish in small ponds is helping farmers boost income in Maharashtra'.
13. Kanta Das Mahapatra, J N Saha, K Murmu, A Rasal, P Nandanpawar and M Patnaik (2017), "Jayanti" rohu- A promising fish variety for improving aquaculture production. JOURNAL OF THE INLAND FISHERIES SOCIETY OF INDIA- Vol 49
14. Matthias Halwart, Simon Funge-Smith and John Moehl (2005), The role of aquaculture in rural development; 41-44
15. Mohamed Shaalan, Magdy El-Mahdy, Mona Saleh & Mansour El-Matbouli (2017), Aquaculture in Egypt: Insights on the Current Trends and Future Perspectives

for Sustainable Development, Reviews in Fisheries Science & Aquaculture; 01, 08-09
16. Paliwal G.T., Bhandarkar S.V. and Bangadkar M.K. (2010), Freshwater Fisheries of Vidarbha: Issues and Concerns; 43-63
17. S. Girriappa, (1994). Role of fisheries in Rural Development, Daya Books, This Book Attempts To Evaluate Marine Fisheries And Aquaculture And The Role Of Institutions And The Actors In Sustaining The Required Fish Productivity Level
18. Sachin W. Belsare and his Project team of MAFSU, Nagpur (2016), Action Plan: Development of Fisheries and Aquaculture in Vidarbha; 01-14
19. Simon Funge- Smith, Abigail Bennette (2018), A fresh look at inland fisheries and their role in food security and livelihoods, Review of the State of World Fishery Resources: Inland Fisheries; 02-04
20. Website: http://fisheriesmaharashtra.gov.in Department of fisheries Maharashtra on dated 13th Nov. 2017.
21. Website: http://fisheriesmaharashtra.gov.in Department of fisheries Maharashtra on dated 13th Nov. 2017.

FISH DIVERSITY IN THE EARLY MONSOON SEASON FROM THE BORGAON WATER RESERVE OF YAVATMAL DISTRICT (M.S), INDIA

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ABSTRACT

Present study was carried out during the period between June to August 2022 to find out the fish diversity in the monsoon season in Borgaon Reservoir of Yavatmal District, which is located in the offshoots of Yavatmal city, near Madani Town. In this study, we arranged multiple visits in the morning to the reservoir to observe a variety of fishes inhabiting the reservoir which was trapped by the local fisherman. Photographic documentation of fishes revealed the co-existence of 9 species belonging to the 05 orders i.e. Cypriniformes, Perciformes, Anguilliformes, Anabantiformes and Osteoglossiformes and 05 families i.e. Cyprinidae, Cichlidae, Anguillidae, Channidae, Notopteridae. Cypriniformes was found to be more dominating order in this area with a total five species recorded which are Catla catla, Labeo rohita, Cirrhinus mrigala, Puntitus dorsalis and Chela cachius. The remaining all orders have one species each search to continue and hope that in the future the number will increase.

Keywords: *Monsoon season, fish diversity, Borgaon reservoir, Yavatmal district (M.S), India.*

Introduction

The biological diversity of the earth and its origins has long been a source of amazement and curiosity (Joshi et al., 2013). Indian reservoirs hold an enormous variety of fishes that support the commercial fish production, as a major source of food in the highly populous countries like India. Despite such a huge diversity, there are some major conservation threats to this aquatic creature and their population declining in recent years, leading to the loss of species from the fresh water ecosystem of India. While other species are on the verge of extinction with endangered and threatened status identified by IUCN.

The Indian National Biological Diversity Act 2002 defines biological diversity as the variability among living organisms from all sources and the ecological complexes of which they are part and includes diversity with species or between species and an ecosystem. Fish are the best source of nutrition, available all over India. Fisheries in India are one of the growing, dynamic and economically efficient sources of income, and work parallel to other agro-economic business.

New species of freshwater fishes recorded for the first time during the last three decades from India are reviewed. In total 150 new species of freshwater fishes belonging to 5 orders, 22 families and 44 genera have emerged from different localities of India. Cypriniformes was the most dominant order represented by 69 species belonging to 5 family and 17 genera, followed by Siluriformes (58 species belonging to 8 family and 17 genera); Perciformes (19 species belonging to 6 family and 7 genera); Synbranchiformes (3 species belonging to 2 family and 2 genera) and Tetraodontiformes (1 species belonging to 1 family and 1 genera). Maximum number of species emerged from Mizoram (32), followed by Manipur (29), Kerala (28), Arunachal Pradesh (17), west Bengal (14), and Karnataka (13). Of the 150 species, one species belongs to the critically endangered category, 5 to the endangered, 9 to Vulnerable and 2 to Near Threatened. (H. S. Mogarkar, 2015). As far as economic importance is concerned, the scope of fish and fisheries in Maharashtra is of prime interest. In several studies, the freshwater fish diversity, recorded and confirmed, total 165 species belonging to 09 orders, 26 families and 82 genera were recorded from Maharashtra during 2000 to 2014. This data will be utilized as baseline data by respective stakeholders including fishermen, consumers, fish industry producers and researchers (Pawara Ravindra H., 2014). This is the first study, which is targeted to assess the fish diversity from Borgaon Reservoir of Yavatmal District, where

we measure the diversity of fishes found in the Borgaon Reservoir of Yavatmal District during the early monsoon season.

Review of Literature

The fish diversities were documented in several other studies, from the Vidarbha region of Maharashtra, were recorded. SK (2017) conducted a study in Isapur Dam, from Pusad, District Yavatmal, confirmed 17 fish species belonging to 07 orders and 11 families. Study also confirmed the member of order Cyprimiformes and Silariformes, dominated with 04 species. According to Tantarpale (2015), total 36 species belonging to 11 families were documented from Amravati district. These families were Cyprinidae (20), Channidae (03), Mastocembelidae (03), Ambassidae (02), Bagridae (02), Siluridae (02), Gobiidae (01), Notopteridae (01), Saccobranchidae (01), Clariidae (01), and Belonidae (01) were recorded . Study conducted by Takhare (2016) from Washim documented 22 species of fishes belonging to 06 orders, 11 families and 19 genera. Cypriniformes such as *Labeorohita, Catlacatla, Cirrhinusmrigala, Cyprinuscarpio, Labeoboggut, Garramullya, Puntiussophore Cirrhinusreba, Rasboradaniconius (Hamilton Crossocheiluslatius Hamilton) Salmostoma sp*. were found most abundant. In Yavatmal District of Vidarbha, the fish diversities has been recorded previously, from major reservoirs such as Saikheda Dam of TalukaKelapur, Arunavati Reservoir Digras , Isapur dam, from Pusad, Nawargaon Lake In MaregaonTaluka. According to the findings of Kamdi (2018) total fish species belonging to 7 orders, 9 families and 15 genera were recorded from Yavatmal District. This study was conducted to investigate the fish diversity from Borgaon Dam of Yavatmal District.

Material and Method

Study area

The research presented in this paper was carried out in the Borgaon Dam of Yavatmal, which is an earthfill dam built on the local river. The local and popular name of Borgaon dam is “Borgaon Lake or Borgaon Talav". This dam was constructed in 1993 as part of Irrigation Projects by the Government of Maharashtra on a local Nallah River. The nearest city to this dam is Yavatmal, in Yavatmal District of Maharashtra. The storage and irrigation was the major purpose of the dam. The Length of dam is 830 m (2723.1 Feet), while the Height of the dam above lowest foundation is 20 m (65.6168 Feet) with volume content 0.01404 km^3 (0.00337 cu mi) and its gross storage capacity is 0.014040 km^3 (0.003368 cu mi).

Collection of fish sample

The Fishes were collected from Borgaon Dam by local fishermen of the area using traditional methods of fishing net. After collection, fish specimens were transferred to the ice box and morphometric study was performed to identify the species and families of the respective fishes collected from the reservoir.

Figure 1.Satellite photograph and geographical location of Borgaon Dam of Yavatmal District.

Identification of fish sample and study fish diversity

The collected fish specimens were identified up to species level using identification keys available from central or state fisheries departments, and also study agencies (ZSI, FishBase) on the basis of their taxonomic level and diversity of fishes were observed. After successful identification of fishes, baseline data was recorded.

Result and discussion

Current study was conducted to assess the diversity of fishes from Borgaon Reservoir of Yavatmal District, where we visited the reservoir several times with an interval of 2 days in the early monsoon period. The outcome of the study confirmed the existence of 9 species belonging to 5 ordered i.e. Cypriniformes, Perciformes, Anguilliformes, Anabantiformes and Osteoglossiformes and 05 families i.e. Cyprinidae, Cichlidae, Anguillidae, Channidae, Notopteridae. Cypriniformes zoological families (Table 1). Total 9 species were recorded like *Catla catla, Labeo rohita, Cirrhinus mrigala, Puntitus dorsalis, Chela cachius, Tilapia mossambica, Anguilla bengalensis bengalensis, Channa Striata and Notopterus Notopterus* out of which first three are the commercially most important fishes (Table 1). Other potential studies also confirmed the abundance of Cyprinidae families in this region (S.K,2017; Tantarpale 2015; Takhare,2016; Kamdi,2018). The development and the availability of such a nutritive food source from the water reservoir located at the offshoot of Yavatmal, provides economic opportunities to the local fishermen. The information gathered in this study will be useful to fisheries departments to know the present status of fish diversity and their economic success. In coming days, more rigorous sampling in different seasons from the reservoir will provide more detailed information about the fish diversity and their ecology in Borgaon Reservoir of Yavatmal District.

Table 1. Taxonomical classification of fish diversity.

Order	Family	Species
1. Cypriniformes	Cyprinidae	*Catlacatla*
		Labeorohita
		Cirrhinusmrigala
		Puntitusdorsalis
		Chela cachius
2. Perciformes	Cichlidae	*Tilapia mossambica*
3. Anguilliformes	Anguilidae	*Anguilla bengalensisbengalensis*
4. Anabantiformes	Channidae	*ChannaStriata*
5. Osteoglossiformes	Notopteridae	*NotopterusNotopterus*

Conclusion

This study is a preliminary base study on fish diversity of Borgaon Reservoir. In this study we focused only on the early monsoon fish diversity in Borgaon Reservoir, Yavatmal, for that we had visited multiple times in the reservoir. After visiting the reservoir, we found various species of fishes on a preliminary basis, from this species *Catlacatla*, *Labeorohita* is the most dominant species in that reservoir and those species are mostly used for consumption and also these are commercially important fishes in Yavatmal district. This study will continue in further seasons and we hope to increase the number of species from reservoirs in other seasons.

Figure 2.Photographic evidence of Fish Diversity in early mansoon season

Catla catla

Cirrhinus mrigala

Labeo rohita

Notopterus notopterus

Channa striata

Tilapia mossombica

Anguilla bengalesis bengalensis

Puntitus dorsalis

Chela cachius

References

1. A.G. Thakare, S. J. (2016). Diversity Of Fresh Water Fishes From The Washim District Of Maharashtra, India. Indian Streams Research Journal, 6 (5), 1-13.
2. H.S.Moga/ekar, P. J. (2015). REVIEW ON NEW RECORDS OF FRESHWATER FISHES from india with ote on distribution and conservation status. Journal of Aquaculture in the Tropics, 30, 211-232.
3. Joshi P. S., V. T. Tantarpale and K.M. Kulkarni. (2013). Fishing Methods Commonly Employed In Buldhana District and Neighborhood, Maharashtra State (India) Bioscience Discovery, 4(1): 54-57.
4. Kamdi, S. K. (2018). Fish Biodiversity Of Saikheda Dam Wetland Area Of Lingti Village In Kelapur Taluka, Dist.-Yavatmal (M.S.), India. International Journal Of Researches In Biosciences, Agriculture And Technology, 1 (vii), 17-22.
5. Kamdi, S. K. (July 2017). Studies On Fish Biodiversity Of Nawargaon Lake In Maregaon Taluka, District Yavatmal, (M.S.) India. International Journal Of Researches In Biosciences, Agriculture And Technology, v (2), 863-866.
6. Kumar, S. T. (2014). Fish Diversity in Selected Stretch of the River Mahanadi in Odisha and the. International Research Journal of Biological Sciences, Vol. 3(8), 98-104.
7. Mandal, B. A. (2021). Diversity of freshwater fishes in the eastern part of Purba Medinipur district of West Bengal. International Journal of Fisheries and Aquatic Studies, 9 (1), 153-158.
8. Nishi Kumari,(2017). Study on the Collection and Types of New Fishes in Bhusara Maun of Muzaffarpur Bihar. RESEARCH REVIEW International Journal of Multidisciplinary, 2(8).107-109.
9. Paliwal G.T., Bhandarkar S.V. Bangadkar M.K. (2020). Freshwater Fisheries of Vidarbha: Issues and Concerns,ResearchG (Kamdi, FISH BIODIVERSITY OF SAIKHEDA DAM WETLAND AREA OF LINGTI VILLAGE IN KELAPUR TALUKA, DIST.-YAVATMAL (M.S.), INDIA., 2018)ate, 43-63.
10. Pawara Ravindra H., P. N. (2014). Review on fresh water fish diversity of. Journal of Entomology and Zoology Studies , 358-364.
11. Sanjay Deosthale, Anant Shinde, Pratibha Rohankar, Dinesh Dabhadkar (2012). Study of seasonal representation of fishes in Arunavati Reservoir, Digras, District Yavatmal, Maharashtra State. Multilogic in Science, an International Refreed & Indexed Quarterly Journal, 1(1), 58-60.
12. SK, P. (2017). Fish diversity in relation to fish economics of Isapur dam, from Pusad, Yavatmal District (Maharashtra), India. Int. J. of Life Sciences,5, 133-136.
13. Sobhage S.S., D. D. (2018, March). Fish Diversity in Nijamabad District,Telangana. Aayushi International Interdisciplinary Research Journal , 515-519.
14. Tantarpale,V. R. (2015). Ichthyological Fauna Of Amravati District (M.S.) India. (D. N. Shinde, Ed.) International Multidisciplinary Research Journal, 5 (2).
15. Tanay Vyas1, S. M. (2020). Ichthyofaunal Diversity of the Mahi Bajaj Sagar Reservoir, District Banswara, Rajasthan, India. International Journal for Research in Applied Science & Engineering Technology , 8 (xii).

A STUDY ON BUSINESS STRATEGIES FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

India is agrarian country. The growth and development of Indian Economy is depending on Business strategy. Business is game changer part of development. Sustainable development is good business in itself. It creates opportunities for suppliers of 'green consumers', developers of environmentally safer materials and processes, firms that invest in eco-efficiency, and those that engage themselves in social well-being. These enterprises will generally have a competitive advantage. They will earn their local community's goodwill and see their efforts reflected in the bottom line. In this paper, Researcher described the concept of sustainable development and how management system and leadership support to sustainable development.

Keywords: *Business, Strategy, Sustainable Development*

Objectives of Study

- To study management system for sustainable development.
- To understand the management leadership for sustainable development.

Introduction

The concept of sustainable development has received growing recognition, but it is a new idea for many business executives. For most, the concept remains abstract and theoretical. Protecting an organization's capital base is a well-accepted business principle. Yet organizations do not generally recognize the possibility of extending this notion to the world's natural and human resources. If sustainable development is to achieve its potential, it must be integrated into the planning and measurement systems of business enterprises. And for that to happen, the concept must be articulated in terms that are familiar to business leaders. The following definition is suggested: For the business enterprise, sustainable development means adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future. This definition captures the spirit of the concept as originally proposed by the World Commission on Environment and Development, and recognizes that economic development must meet the needs of a business enterprise and its stakeholders. The latter include shareholders, lenders, customers, employees, suppliers and communities who are affected by the organization's activities. It also highlights business's dependence on human and natural resources, in addition to physical and financial capital. It emphasizes that economic activity must not irreparably degrade or destroy these natural and human resources. This definition is intended to help business directors apply the concept of sustainable development to their own organizations. However, it is important to emphasize that sustainable development cannot be achieved by a single enterprise (or, for that matter, by the entire business community) in isolation. Sustainable development is a pervasive philosophy to which every participant in the global economy (including consumers and government) must subscribe, if we are to meet today's needs without compromising the ability of future generations to meet their own.

Enhancing Management Systems

- **Perform a stakeholder analysis**

A stakeholder analysis is required in order to identify all the parties that are directly or indirectly affected by the enterprise's operations. It sets out the issues, concerns and information need of the stakeholders with respect to the organization's sustainable development activities.

- **Set sustainable development policies and objectives**

The next objective is to articulate the basic values that the enterprise expects its employees to follow with respect to sustainable development, and to set targets for operating performance.

- **Design and execute an implementation plan**

It is important to draw up a plan for the management system changes that are needed in order to achieve sustainable development objectives. Translating sustainable development policies into operational terms is a major undertaking that will affect the entire organization. It involves changing the corporate culture and employee attitudes, defining responsibilities and accountability, and establishing organizational structures, information reporting systems and operational practices. These changes are normally so substantial that a three-to-five-year plan with one-year milestones will be needed. Managing this type of organizational change requires leadership from senior management. The board of directors, the chief executive officer and other senior executives must be actively involved in the process. They need to lead by example, and to set the tone for the rest of the organization.

- **Develop a supportive corporate culture**

In order to ensure that the organization and its people give their backing to the sustainable development policies, an appropriate corporate culture is essential. In the process of implementing sustainable development or environmental management policies, many companies have experienced a kind of organizational renewal. The increased participation of employees not only generates practical ideas, but also increases enthusiasm for the programme itself. Most customers and employees enjoy being part of an organization that is committed to operating in a socially responsible manner.

- **Develop measures and standards of performance**

The implementation of sustainable development objectives, and the preparation of meaningful reports on performance, require appropriate means of measuring performance. Management control, as well as external reporting, depends in part on the availability of timely information about company operations. This is needed in order to allow management to assess performance against external and internal performance standards, using appropriate performance measures. Information systems will therefore need to be reviewed, to enable the necessary reports to be provided to management.

- **Prepare reports**

The next step in the process is to develop meaningful reports for internal management and stakeholders, outlining the enterprise's sustainable development objectives and comparing performance against them. Directors and senior executives use internal reports to measure performance, make decisions and monitor the implementation of their policies and strategies. Shareholders, creditors, employees and customers, as well as the public at large, use external corporate reports to evaluate the performance of a corporation, and to hold the directors and senior executives accountable for achieving financial, social and environmental objectives.

- **Enhance internal monitoring processes**

On an ongoing basis it will be important to develop mechanisms to help directors and senior managers ensure that the sustainable development policies are being implemented. Performance monitoring is well established as an important element of the management process. In many areas, it is directly linked to reporting. The key to any system's effectiveness is whether the management monitors operations and outputs on an ongoing basis.

Management leadership

Establishing sustainable development objectives, systems and monitoring mechanisms requires leadership on the part of senior management, and a commitment to continuous improvement.

- **The role of the board**

It is important that corporate sustainable development policies be implemented consistently throughout an organization. Too many business enterprises observe variable

levels of corporate ethics and integrity, depending on the country in which they are operating. This double standard is inconsistent with the concept of sustainable development, and ensuring that it does not prevail is an important role of the directors.

- **Self-assessment**

The first step for businesses in adopting sustainable development principles is to assess their current position. Management should know the degree to which the company's activities line up with sustainable development principles. This requires evaluating the company's overall strategy, the performance of specific operations, and the effect of particular activities. Various self-assessment devices are available to help this process, such as the GEMI and CERES questionnaires, as well as material tailored to specific industries – for example, the North American chemical industry's 'Responsible Care' programme.

- **Deciding on a strategy**

Once managers have gained an understanding of how its own operations shape up, they should gauge the performance of other, comparable organizations. Comparisons against the standards set by other industries and environmental groups can be instructive. This task should be relatively easy if there is reasonable public disclosure, organized industry associations and co-operative sustainable development programmes. However, if these structures do not exist, management could approach other businesses to discuss sharing information and possibly establishing an industry group.

- **Small business and private company considerations**

The road to implementing a sustainable development philosophy will be different for smaller businesses, but with ingenuity, perseverance and cooperation, they can achieve the desired result.

Conclusion

Sound environmental performance is probably a reasonable objective for most businesses, with sustainable development as a longer-term goal. However, this can lead to confusion. In the developed world, the focus is on environmental management, while in developing countries, rapid and sustainable development is paramount. The global economy is coming under growing pressure to pay for the restoration of damaged environments. But this economic engine is being asked to help solve other pressing problems at the same time. The challenge is to solve all of these problems in a sustainable manner, so as to generate continuing development. Despite ambiguities about definitions, there is now widespread support for sustainable development principles within the business community. However, for that support to grow, it will be important to recognize and reward initiatives that are being taken to turn the concept into reality.

Reference

1. Chichilnisky, G. (1997). What is sustainable development? Land Economics, 467-491.
2. Holmberg, J., & Sandbrook, R. (2019). Sustainable development: what is to be done? In Policies for a small planet (pp. 19-38). Routledge.
3. Jabareen, Y. (2008). A new conceptual framework for sustainable development. Environment, development and sustainability, 10(2), 179-192.
4. Rogers, P. P., Jalal, K. F., & Boyd, J. A. (2012). An introduction to sustainable development. Routledge.
5. Mitlin, D. (1992). Sustainable Development: A guide to the literature. Environment and urbanization, 4(1), 111-124.

SYNTHESIS OF ZNO NANOPARTICLE ZINGIBER OFFICINALE EXTRACT AND THEIR ANTIBACTERIAL ACTIVITY

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ABSTRACT

A commercial accessible noble metal such as Silver exhibits essentially distinct chemical, physical and Biological properties. Nano size material of zinc oxides have highly reactive oxygen species are released from surface because of more fascination increase its small size particle dimension, high surface area so it give it give wide scope of utilization in drug. Reactive oxygen species catalytically properties to break down cell wall and cell membrane of bacteria contents causing their death. Zinc ions free from ZnO NPs may attack DNA and proteins of the cell wall, they restrict the growth of these bacteria. We are utilized green route to synthesis Zinc Nano size material of Zingiber Officinale extract by using sohelate extraction methods and collected sample using vacuum rotavapour method and characterization for their application observe in different distinct field.

***Keyword**: Nano materials, Nano particle, Znic oxides, Zingiber Officinale, Green method*

Introduction

Nowadays, research in the field of Nano science rapidly growth, It is multidisciplinary science dealing with all branches of science to manufactured by controlled size and shape of particles due to the unique and significant physical as well as chemical properties(1). The last few decay biosynthesis of nanomaterial particle is seriously intriguing consideration since green way and ecofriendly to blend of nanoparticle. In Biosynthesis technique utilized the plants extract to alternative to high temperature thermal and hazardous chemical synthesis route technique. The food Industry conveyance for human wellbeing the biosynthesis Nano- procedure is promising and applications in the areas supplement and through bioactive nano-epitome, to identify and measure microbes, just as clever assets for the assessment and improvement of newer, safer and effective drug formulations (2-3).

Znic oxides nanoparticles may utilized effectively because of its unique physical and chemical properties that is antimicrobical photochemical ,catalytically activity biocompatibility(4) Znic oxides as impetuses in frightfully specific coatings for retention of sun oriented energy as optical sensors in fabric tailoring and in various therapeutic activity of bactericidal agent (5) Among metal NPs, Znic NPs is gaining tremendous interest in the research community of their wide extent of use in microbial science, chemistry, food innovation, cell science, pharmacology and parasitology (6). The morphology of the Znic oxides is the main consideration their physical and synthetic properties. Essentially, a few strategies such as sol–gel method, hydrothermal method, chemical vapour deposition, thermal decomposition, microwave-assisted combustion method etc., have been utilized for the synthesis of Znic oxides NPs. Recently, bio-genic synthesis of Znic oxides NPs using biomaterials such as plant extract and microbes as reducing agent and their antimicrobial activity is widely investigated(7). In this study, Znic oxides NPs synthesized using synergistic aqueous extracts of the rhizome of Z. officinale and were used for analyzing in vitro antibacterial activity.

2. 2. Materials and methods

2.1. Collection of plant and preparation of extracts

There are different approach for the Synthesis of ZnO NPs , which are Physical , Chemicaland biological. In our work we are prefer biological synthetic root, The rhizome of Z. officinale was gathered from the local of Akola District, Maharashtra, and India. Soil and other surface foreign substances present on fresh rhizome were removed utilizing regular tap water followed by distilled water. Further, the rhizome was air dried and makes a fine

powder. The 10 g of mixed rhizome powder of the Z. officinale was added into 250 mL of distilled water and boiled for 30 min. After cooling to room temperature, the extract was centrifuged at 5000 rpm, and filtered using Whatman number-1 filter paper. Filtered extract was separate was additionally utilized for green synthesis of Znic oxides NPs by using sohelate extraction and vacuum rotavapour technique

2.2. Green synthesis of Znic oxides NPs using rhizome extracts

The ZnO is an Inorganic compound, it is insoluble in aquous solvent but solublen in dilute acids and bases. It has high thermal stability because its melting point is high 1975 0C they are obtained in various shaped like sphere ,flower like sheet like porous nano pyramids ,nano combs , the due to high aspects ratio .

The prepared extract was utilized for the synthesis of Znic oxides NPs. 50 mL of 1 M $ZnSO_4$ solution was added into 80 mL of rhizome extract. Then extract along with optimized ZnNPs was incubated until the colorless solution turns into brownish color,

2.3. Characterization of Znic oxides NPs

UV spectrum analysis was assessed utilizing UV-1800 spectrophotometer (Shimadzu, Japan) with the wavelength range from 200 to 800 nm. Znic oxides NPs were were additionally described utilizing FTIR to identify the functional groups, XRD for elemental composition, and SEM for distinguishing proof of morphology and size of biosynthesized Znic oxides NPs

2.4 Antibacterial activities

Several metal and metal oxides nanopartical are successfully commericialized in the field of electronic ,textile agricultural and health ZnO NPs are one of the most useful nanomaterial ,they are effectively used as antibiotic for pathogen bacteria(9). They have unique physicochemical properties that can affaect biological and toxicological response in microorganisms. The various application of Zno NPs as antibacterial agent in various field.

The antibacterial action of Znic oxides NPs was played out the impact of Znic oxides NPs on the growth of S. aureus, B. subtilis, E. coli, was determined. The antibacterial activity was determined through measurement of bacterial growth at different time points against different concentrations of compounds. The growth of bacteria was determined through measurement of optical density at 600 nm using a microplate reader (BioTek, Winooski, VT, USA). The overnight bacterial culture was diluted 3–10 times; 5 µL of this bacterial suspension was added to media containing different concentrations like 0.05, 0.1, 0.2, 0.4, 0.8., and 1M of Znic oxides NPs were added and incubated for 24 h and followed for 48 and 72 h m of Ag NPs and After that, freshly prepared MTT [5 mg/mL of phosphate buffer solution] was added and incubated at 37 C for 4–6 h incubated at 37 ◦C. The OD600 (optical density) was recorded at different time points ranging from 0–8 h. The graph of OD600 vs. time was plotted to evaluate the effects of Znic oxides NPs on the growth of microorganisms

3. Results and discussion

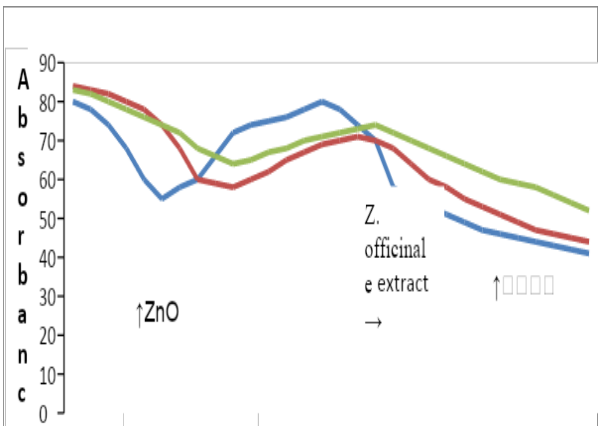
3.1.Visible analysis of Znic oxides NPs

It was seen that NPs synthesis was initiated once the synergistic aqueous extracts of Z. officinale added in the 1 mM ZnSO4solution. The color of Znic oxides NPs and Z. officinale aqueous solutions was dynamically modified from gray to brownish color which reveals the Znic oxides NPs formation. The color transformation during the synthesis of Znic oxides NPs is related to the excitation effect of surface plasmon resonance (7). The current study examination that Znic oxides NPs were synthesized using rhizome extracts and the phyto compounds in the extracts of Z. officinale have potential for acting as a reducing agent.

3.2. UV–visible spectroscopy analysis

UV–visible spectroscopy was utilized to observe the Znic oxides NPs formation by the reduction of Zn ions through the exposure of plant extracts .UV–Visible spectroscopy indicated the surface plasmon resonance (SPR) sharp peak at 350–430 nm wavelength, which corresponds to the Znic oxides NPs production. AgNPs were absorbed radiation at 400 nm wavelength due to the transition of electrons. Colloidal Znic oxides NPs exhibit absorption wavelength at 382–420 nm (3). In our study,

the spectrum analysis peak data[Figs. 1] showing that the silver synthesized product is only Znic oxides NPs. The, ZnNPs were effectively synthesized, the Z. Officinale even at higher concentrations, and NPs are steady UV–Vis absorption spectra of green synthesized Znic oxides NPs.



Figs. 1. UV–Vis absorption spectra of green synthesized Znic oxides NPs

3.3. FTIR analysis

FTIR analyzed data of Znic oxides NPs Z. officinale, rhi-zome extracts are shown in [Figs. 2]. FTIR characterization was used to examine the possible functional molecules, FTIR spectrum of the Z. officinale rhizome extracts showed a major absorption peak at 1387 cm-^{1}in the synthesis of Znic oxides NPs (10). A report revealed that the presence of absorption peak at 1055 cm^{-1}, which may have been attributed to vibration and amine (NAH) groups (8). The absorption peak appeared at 1459 cm-^{1}was specific for the vibration of proteins being a stabilizing agent through free amine groups or cysteine groups (11). In another study, FTIR spectra results identified the presence of amide groups in the fruit shell extract and they were found to be involved in the reduction of silver ions to Znic oxides NPs.

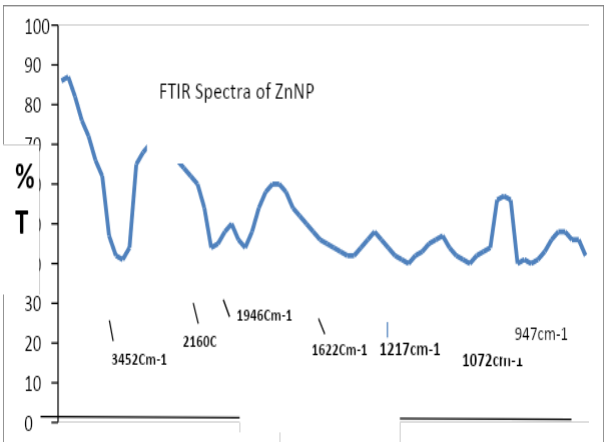


Fig -2. FTIR analyzed data of Znic oxides NPs Z. officinale, rhi-zome

3.4. SEM analysis

SEM image provides morphological characteristics and size measurement of synthesized Znic oxides NPs (Figs. 3,) .The SEM size was examined the range of 41.91to 60.91 nm (8). A study reported that ZnNPs synthesized using Z. officinale extracts were in spherical shape and size of 30–50 nm (9). These size variations might be the presence of biomolecules from the rhizome extracts, which were the caping surface of Znic oxides NPs. It was observed that Znic oxides NPs have a uniform crystalline structure and relatively spherical. Accumulation of NPs was induced by solvent evaporation during the sample production. In a study, SEM analysis of NPs synthesized using possess that the synthesized nanoparticle metals are spheri- shape of the Znic oxides NPs is spherical, with ranged from 20 to 48 nm.

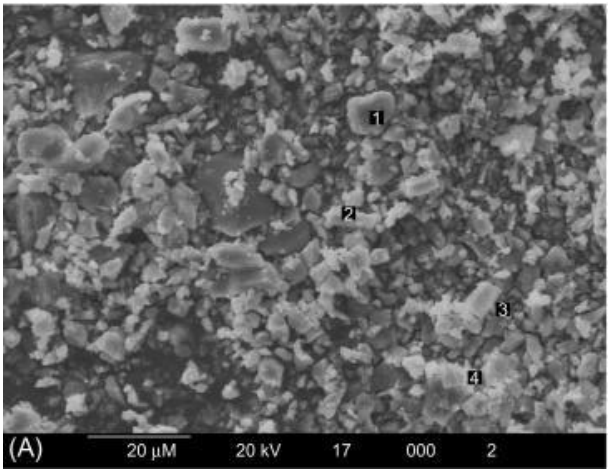


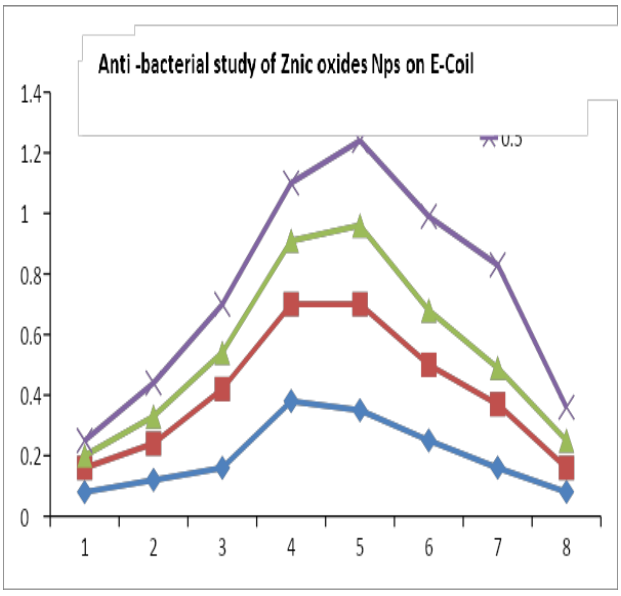
Fig 3. SEM image provides morphological characteristics Znic oxides NPs

4. The antibacterial activity Mechanism -

ZnONPs kill bacteria by several way it puncture the cell wall as well attack DNA. The Zn^{2+} ions released from ZnONPs attached to bacterial cell wall and damage it , It also break layer of sugar, proteins and lipids of the bacterial cell membrane, the attack of disables DNA which hinder the growth of bacteria and die the bacteria(12). The synthesized Znic oxides NPs using different conditions was assessed through the disc diffusion method against Gram-positive S. aureus and Gram-negative E. coli. The antibacterial activity was clearly observed in the $ZnSO_4$solution (a positive control) and Znic oxides NP samples. Conversely, the sterile DI water, which was used as a negative control, showed no antibacterial activity as shown by no inhibition zone . As presented in Figures , the inhibition zones of the synthesized Znic oxides NPs .These results clearly indicated that the synthesized Znic oxides NPs using RB extract exhibited more effective antibacterial activity against Grampositive bacteria than against Gram-negative bacteria,

In addition, it could be noted that the smaller size of Znic oxides NPs provided the larger inhibition zone as obviously shown in Figure Because Znic oxides NPs would attach to the bacterial cell membrane and release silver ions to penetrate and interact with biomolecule and DNA, the smaller size of NPs, the higher surface area to volume ratio of NPs could lead to more attachment and stronger binding to the cell membrane, resulting in the higher efficacy. This phenomenon may be caused by the different membrane structure of the microorganism. Due to the thick layer of peptidoglycan in Gram-positive bacteria, it makes them more rigid and makes them less permeable for the Znic ions to get inside the cells (5-7). However, the opposed antibacterial susceptibility of Znic oxides NPs on Gram-negative and Gram-positive bacteria could be affected by the different physicochemical properties of Znic oxides NPs, which played a critical effect on their antibacterial potential including shape, size, surface charge, and concentrations. In addition, Znic oxides NPs in the spherical shape were effective against both Grampositive and Gram-negative bacterial than the rod shape as shown by the lower minimum inhibitory concentrations. Because Znic oxides NPs in the spherical shape has larger effective specific contact area as compared to the rod shape, they could achieve closer contact with bacterial cell and causes more damages So, the antibacterial efficacy of light assisted Znic oxides NPs using RB extracts was based on the bacteria strain and the size of Znic oxides NPs. Apart from effective inhibition of susceptible bacteria, Znic oxides NPs could inhibit the formation of bacterial biofilm, which is one of the virulence factors of resistant bacteria. Therefore, their antibacterial activity of Znic oxides NPs on multidrug resistant bacteria in both standard and clinical isolates, and antibiofilm formation are deserved for further investigation

Fig 4. Antibacterial activity against Grampositive bacteria and against Gram-negative bacteria, E. coli.



5. Conclusion

In this study, synergistic aqueous extracts of rhizome of Z. officinale have been used for the green synthesis of Znic oxides NPs. The spectral vibration of carboxyl and amine groups in the Z. officinale extracts might be involved in the synthesis of Znic oxides NPs. SEM results revealed that Znic oxides NPs are in a spherical or some crystalline shape with the size ranging from 42 to 61 nm,. The antibacterial study reveals that Znic oxides NPs had shown good antibacterial activity against Gram-positive S. aureus and Gram-negative E. coli. However, the toxicity/antibacterial activity of Znic oxides NPs(from 0.05 to 1.0 ug/ml conc) increased with increasing concentrations of GE used in their preparation, which can be a result of the increased solubility of the resultant Znic oxides NPs due to the better stabilization of NPs at higher concentrations of the extract but in this study 0.8 ug/ml conc gives better result solution for Znic oxides Nps.

References

1. Chhangte V., Samuel L., Ayushi B., Manickam S., Bishwajit C. and Samuel L. R ; Green synthesis of silver nanoparticles using plant extracts and their antimicrobial activities: a review of recent literature, Royal Society of Chemistry RSC Adv., 2021, 11, 2804-28037.
2. Alaa H. A. , Hessah A. A. , Mujeeb K. , Merajuddin K., Abdullah A. , Musaed A. , Aws A., Hamad Z. A, and M. Rafiq H. S. Ecofriendly Synthesis of Silver Nanoparticles Using Aqueous Extracts of Zingiber o_cinale (Ginger) and Nigella sativa L. Seeds (Black Cumin) and Comparison of Their Antibacterial Potential j. www.mdpi.com/journal/sustainability Sustainability 2020, 12, 10523 1-15.
3. Pimsumon Jiamboonsri 1 and Sompit Wanwong, Photoassisted Synthesis of Silver Nanoparticles Using Riceberry Rice Extract and Their Antibacterial Application; HindawiJournal of Nanomaterials Vol. 2021, , 1- 18 .
4. Zhang, K.; Gao, H.; Deng, R.; Li, J. Emerging Applications of Nanotechnology for Controlling Cell-Surface Receptor Clustering. Angew. Chem. Int. Ed. 2019, 58, 4790–4799.
5. Moza_ari, S.; Li, W.; Dixit, M.; Seifert, S.; Lee, B.; Kovarik, L.; Mpourmpakis, G.; Karim, A.M. The role of nanoparticle size and ligand coverage in size focusing of colloidal metal nanoparticles. Nanoscale Adv. 2019, 1, 4052–4066.
6. Kim, M.; Lee, J.H.; Nam, J.M. Plasmonic photothermal nanoparticles for biomedical applications. Adv. Sci. 2019, 6, 1900471
7. Anderson, S.D.; Gwenin, V.V.; Gwenin, C.D. Magnetic functionalized nanoparticles for biomedical, drug delivery and imaging applications. Nanoscale Res. Lett 2019, 14, 1–16.
8. Azharuddin, M.; Zhu, G.H.; Das, D.; Ozgur, E.; Uzun, L.; Turner, A.P.; Patra, H.K. A repertoire of biomedical applications of noble metal nanoparticles. Chem. Commun. 2019, 55, 6964–6996.
9. Dhand, C.; Dwivedi, N.; Loh, X.J.; Ying, A.N.J.; Verma, N.K.; Beuerman, R.W.; Lakshminarayanan, R.; Ramakrishna, S. Methods and strategies for the synthesis of diverse nanoparticles and their applications: A comprehensive overview. RSC Adv. 2015, 5, 105003–105037
10. Asimuddin, M.; Shaik, M.R.; Fathima, N.; Afreen, M.S.; Adil, S.F.; Siddiqui, R.H.; Jamil, K.; Khan, M. Study of Antibacterial Properties of Ziziphus mauritiana based Green Synthesized Silver Nanoparticles against Various Bacterial Strains. Sustainability 2020, 12, 1484.
11. Khan, M.; Shaik, M.R.; Adil, S.F.; Khan, S.T.; Al-Warthan, A.; Siddiqui, M.R.H.; Tahir, M.N.; Tremel, W. Plant extracts as green reductants for the synthesis of silver nanoparticles: Lessons from chemical synthesis. Dalton Trans. 2018, 47, 11988–12010.
12. Alkhalaf, M.I.; Hussein, R.H.; Hamza, A. Green synthesis of silver nanoparticles by

Nigella sativa extract alleviates diabetic neuropathy through anti-inflammatory and antioxidant e_ects. Saudi J. Biol. Sci. 2020, 27,2410–2419

13. Venkatadri, B. , Shanparvish , E.,. Rameshkumar M.R, Mariadhas V. A., Naif A. A, Vinoth K. Ponnusamy d, and Agastian P. Green synthesis of silver nanoparticles using aqueous rhizome extract of Zingiber officinale and Curcuma longa: In-vitro anti-cancer potential on human colon carcinoma HT-29 cells Saudi Journal of Biological Sciences 27, 2020, 2980–2986.
14. Alessio Becheri, Maximilian Du¨rr,, Pierandrea Lo Nostro and Piero Baglioni. Synthesis and characterization of zinc oxide nanoparticles: Application totextiles as UV-absorbers J Nanopart Res (2008) 10:679–689.
15. Kalyani Ghule, Anil Vithal Ghule, Bo-Jung Chen and Yong-Chien Ling Preparation and characterization of ZnO nanoparticles coated paper and its antibacterial activity study, The Royal Society of Chemistry Green Chem., (2006) 8, 1034–1041.
16. Mohd Yusof et al. Microbial synthesis of zinc oxide nanoparticles and their potential application as an antimicrobial agent and a feed supplement in animal industry: a review Journal of Animal Science and Biotechnology (2019) 1 -22.