

**DNA BARCODING – A WAY TOWARDS SUSTAINABLE DEVELOPMENT****Nikhil B. Choukhande<sup>1</sup> and P.P.Umale<sup>2</sup>**<sup>1</sup>Asst. Professor, Department of Botany, Shri Shivaji College of Arts, Commerce & Science Akola<sup>2</sup>Professor, Department of Botany, Shri Shivaji College of Arts, Commerce & Science Akola**ABSTRACT**

*This is the Review based study on DNA Barcoding. We have investigated Fabaceae Family using sequence data from the *rbcl*, *matK*, and *ITS2*, regions as DNA barcodes. Now a days DNA barcodes have provided a new biological tool for biologists to increase their understanding about species identification. Over the last decade three plant DNA barcode markers, *rbcl*, *matK*, and *ITS2*, have been developed, tested, and used to address basic questions in systematics, ecology, evolutionary biology and conservation, including community assembly, species interaction networks, taxonomic discovery, and assessing priority areas for environmental protection. DNA barcode sequences have the potential to improve investigations of the mechanisms underlying community assembly and functional trait evolution. Therefore, We analysed a species from Fabaceae family with the help of DNA Sequences by using *rbcl* as a DNA Barcode Marker. Therefore, we suggest that the DNA barcoding should be used as a tool a step towards Sustainable Development.*

**Keywords:** DNA Barcoding, Fabaceae, NCBI, Rbcl, Species Identification.

**Introduction:**

Legumes (Fabaceae) make up the third-largest flowering family comprises 770 genera and over 19,500 species, which broken up into three widely accepted sub-families: the Caesalpinoideae, the Mimosoideae and the Papilionoideae. The high-quality protein source from the legumes can be substituted to dietary animal protein (Anderson et al. 1999). Wide range of secondary metabolites from legumes have been utilized as nutraceuticals and various by-products have also been developed for industrial application including biofuels (Lewis et al. 2005). Moreover, legumes were playing an important role in sustainable agriculture: managing soil fertility via symbiotic nitrogen fixation and used to grown as a rotation crop with cereal and vegetable (Arianoutsou and Thanos 1996; Velazquez et al. 2010).

Recently, several DNA barcoding loci have been recommended to identify the plant species (Chen et al. 2010). DNA barcoding can be performed easily in any molecular biology laboratories and does not require plant morphological information. Many recent studies on DNA barcoding in plants focused on multiple loci, including nuclear (*ITS*) and plastid regions (*psbA-trnH*, *rpoC1*, *matK* and *rbcl*).

A reliable identification method at the species level is utmost importance. Mostly the plant

species identification has been done with morphological traits. However, for the plant phenotypic characterization, a well-qualified botanical taxonomist or highly trained technicians need to be considered. Numerous molecular markers have been reported for plant species discrimination; the most used DNA markers were RFLP (Beckmann and Soller 1983), RAPD (Williams et al. 1998), AFLP (Vos et al. 1995), ISSRs (Zietkiewicz et al. 1994) and SSRs (Becker and Heun 1995).

Protocol:

DNA Barcoding using universal primers of RBCL.

**DNA isolation using NucleoSpin<sup>®</sup> Plant II Kit (Macherey-Nagel):**

About 100 mg of the tissue/mycelium is homogenized using liquid nitrogen and the powdered tissue is transferred to a microcentrifuge tube. Four hundred microlitres of buffer PL1 is added and vortexed for 1 minute. Ten microlitres of RNase A solution is added and inverted to mix. The homogenate is incubated at 65°C for 10 minutes. The lysate is transferred to a Nucleospin filter and centrifuged at 11000 x g for 2 minutes. The flow through liquid is collected and the filter is discarded. Four hundred and fifty microlitres of buffer PC is added and mixed well. The solution is transferred to a Nucleospin Plant II column, centrifuged for 1 minute and the flow

through liquid is discarded. Four hundred microlitre buffer PW1 is added to the column, centrifuged at 11000 x g for 1 minute and flow through liquid is discarded. Then 700 µl PW2 is added, centrifuged at 11000 x g and flow through liquid is discarded. Finally 200 µl of PW2 is added and centrifuged at 11000 x g for 2 minutes to dry the silica membrane. The column is transferred to a new 1.7 ml tube and 50 µl of buffer PE is added and incubated at 65°C for 5 minutes. The column is then centrifuged at 11000 x g for 1 minute to elute the DNA. The eluted DNA was stored at 4°C.

### Agarose Gel Electrophoresis for DNA Quality check:

The quality of the DNA isolated was checked using agarose gel electrophoresis. 1µl of 6X gel-loading buffer (0.25% bromophenol blue, 30% sucrose in TE buffer pH-8.0) was added to 5µl of DNA. The samples were loaded to 0.8% agarose gel prepared in 0.5X TBE (Tris-Borate-EDTA) buffer containing 0.5 µg/ml ethidium bromide. Electrophoresis was performed with 0.5X TBE as electrophoresis buffer at 75 V until bromophenol dye front has migrated to the bottom of the gel. The gels were visualized in a UV transilluminator (Genei) and the image was captured under UV light using Gel documentation system (Bio-Rad).

### PCR Analysis:

|                     |        |
|---------------------|--------|
| 2X Phire Master Mix | 5µL    |
| D/W                 | 4µL    |
| Forward Primer      | 0.25µL |
| Reverse Primer      | 0.25µL |
| DNA                 | 1µL    |

### Primers Used :

| Target | Primer Name | Direction | Sequence (5' → 3')         |
|--------|-------------|-----------|----------------------------|
| RBCL   | RBCL-AF     | Forward   | ATGTCACCACAAACAGAGACTAAAGC |
|        | RBCL-724R   | Reverse   | TCGCATGTACCTGCAGTAGC       |

The PCR amplification was carried out in a PCR thermal cycler (GeneAmp PCR System 9700, Applied Biosystems).

### PCR amplification profile:

#### RBCL

|       |   |        |           |
|-------|---|--------|-----------|
| 98 °C | - | 30 sec | 40 CYCLES |
| 98 °C | - | 5 sec  |           |
| 58 °C | - | 10 sec |           |
| 72 °C | - | 15 sec |           |
| 72 °C | - | 60 sec |           |
| 4 °C  | - | ∞      |           |

### Agarose Gel electrophoresis of PCR products:

The PCR products were checked in 1.2% agarose gels prepared in 0.5X TBE buffer containing 0.5 µg/ml ethidium bromide. 1 µl of

6X loading dye was mixed with 4 µl of PCR products and was loaded and electrophoresis was performed at 75V power supply with 0.5X TBE as electrophoresis buffer for about 1-2 hours, until the bromophenol blue front had

migrated to almost the bottom of the gel. The molecular standard used was 2-log DNA ladder (NEB). The gels were visualized in a UV transilluminator (Genei) and the image was captured under UV light using Gel documentation system (Bio-Rad).

#### ExoSAP-IT Treatment:

ExoSAP-IT (GE Healthcare) consists of two hydrolytic enzymes, Exonuclease I and Shrimp Alkaline Phosphatase (SAP), in a specially formulated buffer for the removal of unwanted primers and dNTPs from a PCR product mixture with no interference in downstream applications.

Five micro litres of PCR product is mixed with 0.5µl of ExoSAP-IT and incubated at 37°C for 15 minutes followed by enzyme inactivation at 85°C for 5 minutes.

#### Sequencing using BigDye Terminator v3.1 :

Sequencing reaction was done in a PCR thermal cycler (GeneAmp PCR System 9700, Applied Biosystems) using the BigDye Terminator v3.1 Cycle sequencing Kit

(Applied Biosystems , USA) following manufactures protocol. The Sequencing PCR mix consisted of the following components:

|                            |       |
|----------------------------|-------|
| D/W                        | 6.6µL |
| 5X Sequencing Buffer       | 1.9µL |
| Forward Primer             | 0.3µL |
| Reverse Primer             | 0.3µL |
| Sequencing Mix             | 0.2µL |
| Exosap treated PCR product | 1µL   |

#### Following Data Obtained From Ncbi (National Centre For Biotechnology Information)

##### Plant Species No. 1

DEFINITION: *Acacia catechu* voucher PS0288MT06 ribulose-1,5-bisphosphatecarboxylase/oxygenase large subunit (rbcL) gene, partial cds;chloroplast. ACCESSION No. GQ436355

#### ORIGIN

```
1 taaagcaagtgttgattcaagctggtgtaagattataaattgacttattatactcc
  61 tgactatgaaaccaaggatagtgatatcttggcagcattccagtaactcctcaacctgg
 121 agttccgcctgaagaagcgggtgccgcggtagctgctgaatcttctactggtacatggac
 181 aactgtgtggaccgatgggcttaccagtcttgatcgttacaaaggacgatgctaccacat
 241 cgagcccgttgctggagaagaaagtcaatttattgcttatgtagcttatcccttagacct
 301 ttttgaagaaggttctgtactaacatggttacttcgattgtgggtaagtatttgggtt
 361 caaggccctgcgcgctctacgtctggaagattgccaatccctccttattctaaaaac
 421 ttccaaggtccgcctcacggcatccaagtgaaagagataaattgaacaagtagggccg
 481 tcccattgggatgtactattaacaaaattggggttatccgcgaagaattacggtag
 541 agcggttatgaatgtctccgtggtggacttgattttacaaagatgatgagaatgtgaa
 601 tccaaccattatgcgttgagagaccgttcttatttgtgccgaagcactttataa
 661 agcacaggccgaaacaggtgaaatcaaaggcattacttgaat
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#### Identification :

ORGANISM *Senegaliacatechu*Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;Spermatophyta; Magnoliopsida; eudicotyledons; Gunneridae;Pentapetalae; rosids; fabids; Fabales; Fabaceae; Caesalpinioideae;mimosoid clade; Acacieae; Senegalia.

#### Plant Species No. 2

Definition: *Acacia nilotica* voucher OM626 ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit (rbcL) gene, partial cds; chloroplast. ACCESSION JF265255

#### ORIGIN :

```
1 agtgttgattcaagctggtgtaagattataaattgacttattatactcctgactat
```

61 gaaaccaaagatagtgatatcttggcagcattccgagtaactcctcaacctggagtccg  
 121 cctgaagaagcaggtgccgcggtagctgctgaatcttctactggatcatggacaactgtg  
 181 tggaccgatgggcttaccagctcttgatcgttacaaaggacgatgctaccacatcgagccc  
 241 gttgctggagaagaaaatcaatatattgcttatgtagcttatcccttagaccttttgaa  
 301 gaaggttctgttactaacatggttactccattgtgggtaattgtattgggttcaaggct  
 361 ctgctgctctactgctgaggattgccaatccctcctcttattctaaactttccaa  
 421 ggtccgcctcacggcatccaagtgagagagataaattgaacaagtacggcgtcccta  
 481 ttgggatgtactataaaccaaaattgggggttatccgctaagaattacggtagagcgggt  
 541 tatgaatgtctt

//

### Identification :

ORGANISM: Vachellianilotica

Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliopsida; eudicotyledons; Gunneridae; Pentapetalae; rosids; fabids; Fabales; Fabaceae; Caesalpinioideae; mimosoid clade; Acacieae; Vachellia.

### Discussion

DNA barcoding with large number of individuals (species/accessions) has provided insights into relationships between species, which also has the ability to precisely estimate the intraspecific heterogeneity. In the present study we have obtained the Data from NCBI (National Centre For Biotechnology Information) records. Therefore, we believe that all of them were based on correctly identified plant species.

The main criterion for a standard DNA barcode is universality, in which the DNA barcode should be easily accessible from plants with a combination of primers (CBOL Plant Working Group et al. 2009). In our study, DNA barcode

sequences were found to be easily amplified using polymerase chain reaction (PCR).

DNA Barcoding data is the basic information to trace evolutionary trend which will also help to formulate sustainable development of biodiversity.

### Conclusion

DNA barcode sequences have the potential to address basic questions in systematics, ecology, evolutionary biology and conservation.

Hence, the present study can be explain the use of DNA Barcoding to develop sustainable environment.

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**BACTERIOLOGICAL STUDIES OF INDIAN TRADITIONAL FERMENTED FOOD – KURDAI BATTER****<sup>1</sup>Ku. Gaytri Duratkar, <sup>2</sup>Dr. Anand Pande and <sup>3</sup>Dr. Rachana Pachori**<sup>1\*</sup>Research Scholar, Post Graduate Department of Microbiology, Rajasthan Aryans Mahavidyalaya, Washim<sup>2\*</sup>Research Scholar, Post Graduate Department of Microbiology, Rajasthan Aryans Mahavidyalaya, Washim<sup>3\*</sup>Assistant Professor and Head, U.G., P.G. and Research Section Department of Microbiology, Rajasthan Aryans Mahavidyalaya, Washim

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**ABSTRACT**

Presence study carried out Bacteriological analysis Indian Traditional Fermented Food. Kurdai Batter is the Indian Traditional Fermented Food prepared from different cereal and grains. In this investigation Streptococcus species was predominantly recorded. This organism was analyzed for antimicrobial activity against the intestinal pathogens. The study indicates that it was found antibacterial *E.coli*, *Shigella*, *Salmonella*, and *Pseudomonas* as well as was found potent in production of enzymes viz. Protease, Amylase, and Phosphatase which are very important for maintaining the gut health by restoring the normal microbiota after antibiotic therapy.

**Keywords:** Fermented Food, Kurdai Batter, Antimicrobial Activity, Enzyme Activity

**Introduction**

Fermented foods are one of the significant stuffs for human diet. These traditional fermented food products are household art prepared by using relatively simple procedures and equipment. Fermented foods like idli, dosa, ambali, kanji, vadai, papad, kurdi, jelabi, kharode etc., are some of the items largely consumed in the Indian Subcontinent. Fermentation, one of the world's most ancient and economical methods of food preparation, is defined as a technology in which the growth and metabolic activities of microorganisms are used to preserve foods (Nuraida 2015; Terefe 2016). Fermented foods are “foods or beverages produced through controlled microbial growth, and the conversion of food components through enzymatic action.” (Marco M.L; *et.al.* 2017).

Fermentation also increases the shelf life of foods, especially highly perishable foods (Nuraida 2015; Terefe 2016), and enhances the organoleptic properties of food, the digestibility of proteins and carbohydrates, and the bioavailability of vitamins and minerals (Altay *et al.* 2013; Hwang *et al.* 2017). Because of these beneficial effects, fermented foods and beverages have been an indispensable part of the human diet since ancient times and they remain essential in many developing countries where they are an integral part of local cultures

and traditions (Ansorena, and Astiasaran 2016; Narzary *et. al.* 2016; Kanwar and Keshani 2016).

Fermentation metabolic process serving for a microorganism to obtain energy through the digestion of simple fermentation sugars, primarily glucose and fructose, etc. Fermenting sugar present in wheat like Fructose, glucose, galactose, sucrose, D-fructose, and maltose. In fermented wheat products, thousands of bacteria viz. species belonging to *Leuconostoc*, *Pediococcus*, *Lactococcus*, and *Streptococcus* genera are present (Hammes; *et. al.* 2004). The *Lactobacillus* strain is most frequently observed in this ecosystem. The study of these beneficial bacteria is very important to know their mechanism and health attributes. Hence taking these into consideration, the present research work entitled “Bacteriological Studies of Indian Traditional Fermented Food – Kurdai batter” is initiated

**Materials and Methods**

The present investigation was carried out at department of Microbiology R.A.College Washim on bacteriological studies of Indian traditional fermented food (kurdai). The bacteriological cultures were tentatively identified up to genus level based on morphological characteristics and physicochemical characteristics. The selected efficient isolates were further examined for the

ability to enzyme activity. The material used in the study, the procedures and the techniques which were adopted are as follows.

### **Preparation of kurdai batter sample**

The grains were sorted by removing broken grains and other unwanted materials. 200 gm of whole wheat was soaked in 250 mL of tap water for 72 hrs. At the end of soaking period, the soaked water was discarded. The grains were rinsed twice with water and the softened wheat grains were ground in electrical grinder (Anjali make, Mumbai, India) at 2500 rpm for 30 sec. Soaked wheat was ground to a rough consistency. The ground slurry was then filtered through muslin cloth and filtered Slurry was further subjected to fermentation for overnight at 30°C to get fermented Kurdai Batter. The ground samples were stored in polythene pouches with proper labeling and used for further investigation. Then microbes were isolates from Kurdai batter.

### **Isolation and identification of bacterial strain from Kurdai batter**

#### **A. Enrichment**

The Kurdai batter enrichment was done by inoculating 1 gram of sample in 100ml of nutrient broth and incubated at 37°C for 24 hrs. The enriched samples were further use for the Selective enrichment.

#### **B. Isolation**

Isolation of bacterial strain from enriched samples was carried out adopting dilution plate technique. (Wollum II, 1982). The isolated colonies were selected as per the colony diversity and further proceed for isolation of pure culture. All the isolated cultures were further subjected for the conventional identification.

#### **C. Identification**

Bacterial isolates were identified on the basis of conventional method according to Bergey's Manual of Determinative Bacteriology (Holt et al., 1994). The isolates were observed for the Colony characters i.e. colour, shape, size, nature of colony and pigmentation etc. Further the morphological characters of isolates were observed by performing the Grams staining & motility. The bacterial isolates were further characterized biochemically by IMViC-

test, sugar fermentations, and test for enzymes etc. The observations were further compared with standard literatures for identifying the probable species. All the isolates were labeled and maintained on Nutrient agar medium at 40°C.

### **Antimicrobial activity of isolated bacteria**

Antibacterial activity of cell-free supernatant (CFS) of isolated bacteria was investigated against four pathogenic bacteria by the disc diffusion method. The antibiotic activity of isolated bacteria was determined by Kirby Bauer disc diffusion technique. The isolated bacteria were separately inoculated in sterile nutrient broth tubes and incubated at 37°C for 3 to 4 hours and the turbidity was compare with 0.5 McFarland standards. The LAB viz .E.coli, Shigella, Salmonella, Pseudomonas, was then spread on the surface of sterile Muller- Hinton Agar plates with the help of sterile ear buds. The discs deep into isolated bacteria then placed aseptically on the surface of seeded agar plates and incubated at 37°C for 18 to 24 hours. After incubation the plated were observed for the zone of inhibition and the diameters of zones were measured using Hi Antibiotic Zone Scale (Jan Hudzicki, 2009).

### **Antibiotic Resistance Testing of isolated bacteria**

Antibacterial resistance of cell-free supernatant (CFS) of isolated bacteria was investigated against four antibiotic by the disc diffusion method. The strains to be tested for antibiotic resistance. The antibiotic susceptibility of isolated bacteria was determined by Kirby Bauer disc diffusion technique. The isolated bacteria were separately inoculated in sterile nutrient broth tubes and incubated at 37°C for 3 to 4 hours and the turbidity was compare with 0.5 McFarland standards. The isolated bacteria spread on the surface of sterile Muller- Hinton Agar plates with the help of sterile ear buds. The antibiotic discs namely Tetracycline (30µg) , Azithromycin (15µg) , Cephalexin (30µg) , penicillin (10µg) were placed aseptically on the surface of seeded agar plates and incubated at 37°C for 18 to 24 hours. After incubation the plated were observed for the zone of inhibition and the diameters of zones

were measured using Hi-Antibiotic Zone Scale.(AggarwalSunita ,et; al : 2021)

### Enzymes Assay

#### Protease Activity

For determining the protease producing ability of bacterial culture was used to inoculate skim milk agar plates. Then incubated at 37°C for 48 hrs. Proteolytic activity was showed by a clear zone around or under the colony (Salarizadehet al, 2014)

#### Amylase activity

For determining the amylase producing ability of bacterial culture was used to inoculate on using starch agar plates. Then incubated at 37°C for 48 hrs. The plates were Flooded with iodine to see the clear zone around each colony against the blue-black background. Appearance of halo indicates the amylase activity (AggarwalSunita ,et; al : 2021)

#### Phosphate Activity

Phosphate Solubilization bacterial isolates was evaluated for the ability to solubilize inorganic phosphate. Pikovskaya's agar medium (Hi-Media, Mumbai) containing calcium phosphate as the inorganic form of phosphate was used in this assay. A loopful of bacterial culture were spot inoculated on plates containing the Pikovskaya's media and kept for incubation at 37°C for 48 hrs. The presence of clear zone around the bacterial colony indicates the solubilization of phosphate. (Yogendra Singh et al; 2013)

## Results and Discussion

### Isolation and identification of bacterial strain from Kurdai batter

The results on isolation and identification are presented in (table 1). From the table it is observed that the bacteria present in Kurdai belongs to *Streptococcus* species which is classified as belonging to Lactic acid bacteria (LAB) group.

**Table 1: Morphological, Cultural and Biochemical Characteristics of Streptococcus**

| Colony characters:            |                              |
|-------------------------------|------------------------------|
| Colour                        | White , grey                 |
| Shape                         | Spherical, slender and cocci |
| Size                          | 0.5 – 2um in diameter        |
| Nature of colony:             |                              |
| Pigmentation                  | White                        |
| Margin                        | Entire                       |
| Surface                       | Smooth                       |
| Opacity                       | Opaque                       |
| Elevation                     | Raised                       |
| Morphological characteristic: |                              |
| Shape                         | Spherical                    |
| Gram stain                    | + Ve                         |
| Motility                      | Non motile                   |
| Biochemical characteristics:  |                              |
| Indol                         | + Ve                         |
| Citrate                       | + Ve                         |
| MR                            | + Ve                         |
| VP                            | + Ve                         |
| Glucose                       | + Ve                         |
| Mannitol                      | -Ve                          |
| Sucrose                       | + Ve                         |
| Maltose                       | + Ve                         |
| Gas                           | -Ve                          |
| Possible species              | Streptococcus                |

+Ve: Positive; -Ve: Negative

### Antimicrobial Activity

The antimicrobial activity of *Streptococcus* bacteria was studied. The inhibitory activity against *E.coli*, *Shigella*, *Salmonella*, and *Pseudomonas* was seen as the zone of clearance in each plate obtained with each organism. The inhibition zones were measured with the help of Zone Reading Scale. The zones of inhibition obtained are presented in table 2. It is found that *Streptococcus species* show increased in zone of inhibition against all the four test pathogens as compare to uninoculated control. Hence, *Streptococcus species* isolated from kurdai batter is found to possess antimicrobial activity against intestinal pathogens and can be consider as probiotics.

**Table 2: Antimicrobial activity of Streptococcus species**

| Pathogens          | Zone of inhibition exhibited by <i>Streptococcus</i> species after 24 hrs |
|--------------------|---|
| <i>E.coli</i>      | 14mm  |
| <i>Shigella</i>    | 16 mm   |
| <i>Salmonella</i>  | 11 mm   |
| <i>Pseudomonas</i> | 9 mm  |
| control            | No zone   |

**Antibiotic Resistance**

Table 3 represents the findings on the antibiotic resistance of isolated *Streptococcus species*. From the table it is observed that all the streptococcus showed resistance against the tested antibiotics viz. Tetracycline(30µg), penicillin(10U), Azithromycin(15µg), and Cephalexin(30µg). In tetracycline, the

minimum zone of diameter(7mm) was exhibited by *Streptococcus species*. Now case of Penicillin, the zone of inhibition (19 mm) was exhibited *Streptococcus species*. In case of Azithromycin, the minimum diameter of zone of inhibition was(13mm) shown by *Streptococcus species*. Similarly, in Cephalexin minimum zone was (18mm) shown by streptococcus. From the above results, it is concluded that the streptococcus species present in Kurdai batter is not affected by antibiotics and hence, it could be utilize to increase the gut immunity of an individual. The results on present studies are in accordance with the experimental findings of most of the research workers enlighten same line of research by Richard and Yitzhak (2014). The Antibiotic zones of Resistance were measured with the help of Zone Reading Scale. The zones of inhibition obtained are as follows in table 3:

**Table 3: Antibiotic Resistance of Isolated Streptococcus Species**

| Isolated LAB  | Tetracycline (30µg) | Penicillin (10µg), | Azithromycin (15µg), | Cephalaxin (30µg) |
|---------------|---------------------|--------------------|----------------------|-------------------|
| Streptococcus | 7mm<br>R            | 19mm<br>R          | 13mm<br>R            | 18mm<br>R         |

R: Resistance

**Enzymes Assay**

**Protease test**

To detect protease activity the isolated *Streptococcus species* was grown inoculated on skim milk agar plates and incubated for 48 h. at 37°C. After incubation it is observed that the isolated *Streptococcus species* showed clear zone around the colony indicating the positive protease activity. Thakkar, *et al*(2015). Proteolytic activity is an essential requirement in the production of good quality fermented dairy products as the peptides and amino acids produced have straight influence on the organoleptic properties of the products. Malo M.S. , *et al* , (2010) Ability to produce β-galactosidase is highly preferred attribute of probiotics.

**Amylase test**

For detection of amylase activity, 24 hrs old cultures of the isolated *Streptococcus species* was inoculated on starch agar plates and

incubated for 48 h at 37°C. The zone of amylase activity was detected by flooding plates with Gram’s iodine. It is observed that the isolated *Streptococcus species* showed clear halo around the colony indicative of amylolytic activity. Tallapragada, P. *et al* (2018)

**Phosphatase test**

For detection of Phosphatase activity, 24 hrs old cultures of the isolated *Streptococcus species* was inoculated on Pikovasky’s agar plates and incubated for 48 h at 37°C. It is observed that the isolated *Streptococcus species* showed clear zone around the colony indicative of solubilization of phosphate clear zone around the bacterial colony indicates the solubilization of phosphate. Phosphatase enzyme helps to preserve the normal homeostasis of intestinal microbiota. It restores the normal microbiota upon termination of antibiotic treatment, thus reducing the antibiotic induced susceptibility to enteric



pathogens such as *Salmonella typhimurium* and *Clostridium difficile*. It functions as an endogenous bacterial growth-promoting factor.

**Table 4: Extracellular enzyme producing ability of the isolated *Streptococcus* species**

| LAB                          | Protease | Amylase | Phosphatase |
|------------------------------|----------|---------|-------------|
| <i>Streptococcus species</i> | +        | +       | +           |

+: positive test

### Conclusion

Kurdai which is one of the traditional fermented foods especially of Maharashtra possess beneficial LAB viz. *Streptococcus species*. The isolated *Streptococcus species* was found to possess antimicrobial activity against the intestinal pathogens. Hence, it protects the gut from enteric infections. The isolated *Streptococcus species* was found to possess resistance against frequently used antibiotics which depicts that antibiotic therapy will not

alter their presence in the gut. The isolated *Streptococcus species* was found possess different enzyme activities viz. Protease, Amylase and Phosphatase which are very important for maintaining the gut health by restoring the normal microbiota after antibiotic therapy.

### Suggestions

The traditional fermented foods should be consumed for acquiring health benefits and to boost up immunity against infections.

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## MICROBES FOR SUSTAINABLE DEVELOPMENT

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### ABSTRACT

Food, cloths, shelter, health are one of the basic needs of human life. However to achieve these human have been highly exploiting the natural resources. Also in this process various types of waste has been generated leading to unstably of nature. Hence to regain the stability in nature many unions and organizations have started few projects in the name of sustainable development. These projects include routes to regain few resources also includes protection or limiting the use of rare resources. Micro-organism having high range of application is found to a great use in these projects. The scope of microorganisms, points to control, methods for their better application and the role of education in succeeding these targets are being discussed. If the society is educated enough about the ways that microbes can affect our lives, and if microbes are used intelligently, then some significant problems being faced by the world today including food, health, well-being and green.

**Keywords:** -natural resources, micro-organisms, sustainable development, organizations.

### Introduction

Sustainable development works on the principle which states that the natural resources and the ecosystem should be maintained while using the resources for the betterment of the society. An important achievement thought in the sustainable development is to provide the regular necessities like food , shelter, health care to every individual (Adenike A. Akinsemolu). The natural resources are continuously being exhausted leading the search for new eco-friendly technologies. The Sustainable Development Goals (SDG) aim at providing these fundamental necessities to everyone through the intelligent use of

sustainable science. The term was first highlighted when the idea of sustainable forest was put forth by the European countries.

Micro- organisms being abundantly present on the surface of the earth provide one of the effective solutions for the above goal. One of the important role microorganisms has in sustainable development is in agricultural production due to their ability to promote plant growth and enhance biotic and abiotic stress resistance, remediate contaminated soils, recycle nutrients, manage soil fertility, and weather and mineralize rocks and other abilities that result in.



Fig. 1 The sustainable development Goals (<https://images.app.goo.gl/t8bGEB3iLf8rdeWo7>)

A microbe plays an important part in sustainable development as it is positively used in food and agricultural field. (Kuhad, 2012). Fungus is used as biofertilizers, natural fermentators, biopesticides, bioherbicides etc. for their positive application in agriculture (Mosttafizet *al.* 2012). Micro-organisms also contribute in the area of food and health sector in the cases of sustainable development such as some fungal proteins like *Calocybe indica* (Milk mushroom), *Cordyceps sinensis* (Insect mushroom, Kirajali), *Lentinula edodes* (Shiitake) are mostly consumed due to presence of different bioactive compounds of medicinal importance. (Noble and Ruaysoongnern, 2010). Recently in our country a protocol has been developed for *L. edodes* cultivation using rice straw as substrate (Kuhad, 2012). The researchers are working on the application of xylanases and phytases in improving the grains and converting keratin substrate with keratinases into feed for poultry and piggery. The work in these areas needs more efforts and government support to transform the R and D into commercially viable technology.

The role of microorganisms as factors in environmental sustainability has long been established (Kuhad, 2012). Since the last century, both bacteria and fungi have been employed in bioremediation of polluted sites with particular reference to hydrocarbons and heavy metals (Dash *et al.*, 2013)

### Soil Microbes For Sustainable Development

Micro-organisms being a major part of soil ecosystem, contributes as a major option toward sustainable agricultural development due to their ability to promote growth of plants, stress resistance sustainability, recycling etc. that result in the reduced use of fertilizers or pesticides in agriculture. Genetically engineered microbes are useful for bioremediation. Sustainable agriculture is essential today to meet our long-term agricultural needs by using natural resources without degrading the environment.

### Projects to attain sustainable development

Various projects are being started towards achieving the goal of sustained developed world such as Harithakeralam Mission which concentrates on increases of Green Spaces in Kerala (TIMES OF INDIA). Also, Solar Panels, Waste-to-Energy Recycling, Water Treatment Plants, Wind Turbines etc. are some of the projects that helps to reach towards the goals.

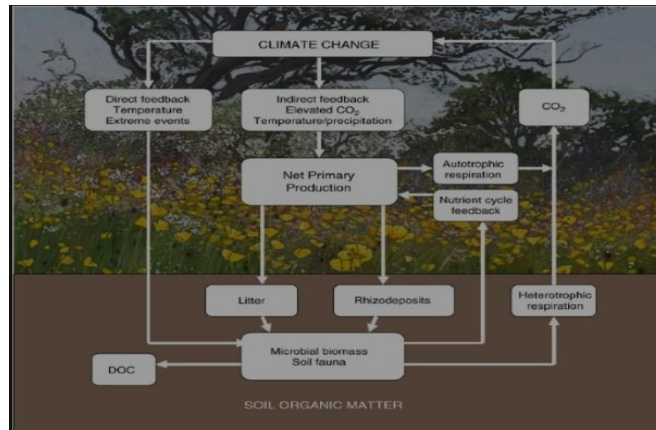
The sustainable community Project envisions a community where: production is green, waste is utilized to generate income and households are well educated on proper waste management. The project is creating a community-driven proper waste management structure through an incentive-based approach.

### Microbes and Climate Change

The ongoing global climate changes caused by increase in greenhouse gases represent one of the biggest scientific and political challenges of the 21st century. As per the information available, the anthropogenic CO<sub>2</sub> production is currently of major concern. Yet it represents only 10 % of the CO<sub>2</sub> produced normally by soil. Sustainable agriculture permits the buildup of humus in the soil in order of 0.3–1.0 tons carbon per hectare per year. This way, about 10 % of all carbon emitted by vehicles can be compensated by applying good agriculture. In addition, the microbial dynamics as a function of temperature and pCO<sub>2</sub> are not yet fully understood. There is quite a possibility that changes in climate and land use can be compensated by the homeostasis of the microbial communities.

Microbes play key roles in the generation of some greenhouse gases as well as in carbon sequestration. The American Academy of Microbiology is making the role of microbes in climate change a major focus of its efforts. The Earth's soil is the largest terrestrial reservoir of carbon, containing 3 times the amount of carbon that is in the entire atmosphere and 4 times as much as all the vegetation on Earth. Farming practices can build soil carbon, which has important outcomes: carbon enriches and stabilizes soil making it more appropriate for crop production and is seized from the environment where it would otherwise end up contaminating air as greenhouse gases.

Investment in microbial systems can lower greenhouse gas emissions and renewable resources into lowcarbon and low-cost electricity, fuels, chemicals and materials.



**Clean Water and Sanitation**

Microbes can reduce pollution in water and thus improve water quality. The presence of certain microbes in water can lead to diseases with high mortality, such as cholera and childhood diarrhea. Soil is the largest water

filter in the world, hence the importance of maintaining its health, integrity and microbial community. Conversely, some microorganisms have a beneficial impact on our water sources such as those that can break down oil or other dangerous toxins.



**Conclusion**

It can be concluded that to receive sustainable development various measures has to be taken. Although many government bodies and private sectors are ready to take the step towards this goal, there is still the need for increase in their productivity. In order to achieve

a more satisfactory relationship between society and its environment, timely provision should be made for the changes that human activities and competition over use of resources may bring about in order to minimize potential conflicts. Microbes can be proved of great help for achieving sustainable development.

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**BIOPLASTIC – AN ECO-FRIENDLY ALTERNATIVE TO PETROCHEMICAL PLASTIC****<sup>1</sup>Ku. Renuka Deshmukh, <sup>2</sup>Ku. Kajal Rathod, <sup>3</sup>Ms. Ashwini Idhole and <sup>4</sup>Dr. Rachana Pachori**<sup>1,2</sup>Research Scholar, PG Department of Microbiology, Rajasthan Aryans Mahavidyalaya, Washim<sup>3</sup>Research Scholar, Microbiology Research Laboratory, Rajasthan Aryans Mahavidyalaya, Washim<sup>4</sup>Assistant professor and Head, U.G., P.G. and Research section, Department of Microbiology, Rajasthan Aryans Mahavidyalaya, Washim

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**ABSTRACT**

Plastic was introduced approximately 100 years ago and today one of the most used materials. Conventional plastic causes hazardous effects on ecosystem. Due to the harmful effect of plastic on the environment or ecosystem there is need to developed alternative for conventional plastic. Bioplastic is the best alternative for conventional plastic. Renewable sources and microorganisms are used for the Bioplastic production. There are various types of bioplastic. Bioplastic are long chain of monomer join with each other by Ester Bond. This bioplastic can be recycle and reuse. Bioplastic are eco-friendly, non-toxic. Bioplastic helps to lowers the emission of greenhouse gases and decreases global warming. In order to verify the benefit of bioplastic in comparison to conventional plastic it is necessary to evaluate the environmental impact derived from the production. This paper is intended to provide information about the alternative of conventional plastic and benefits of bioplastic.

**Keywords:** Bioplastic, ecosystem, plastics

**Introduction**

Solid waste especially plastic is globally present in all the community waste. It is estimated that the annual production of petrochemical plastic exceeds 350 million tons. Plastic is non-degradable and main factor responsible for bioaccumulation in the ecosystem. It adversely affects Earth's environment in various ways viz. decreasing soil fertility, creating suffocation and death of marine animals, causes cancer, birth defects, impaired immunity, endocrine disruption and other serious ailments in human and other animals.

Plastic possesses the advantageous properties viz. light-weight, durable, cheap etc which attracts the people to use it in all fields. As per the Ministry of petroleum and natural gas, plastic consumption in 2022 would be 20kgs annual per capita in India. The polyethylene has more demand (5.3 million metric tons) among all the plastics. Total demand of plastic is reported as approximately 16 million metric tons (Mekonnen *et. al*). Some plastics may even take 400 years or more to completely decompose. Plastic production is cheap; however, it is done using a variety of toxic chemicals and colours. This can cause harm to the environment. The recycling

process for plastic can be very expensive. On the other hand, toxic emissions such as carbon dioxide and methane are greenhouse gases (GHGs) affect the worldwide climate change negatively. (Karana, *Eet.al.*). Extensive use of plastic increases the pollution in the environment. Since most of the waste lands up in the oceans, it is harmful to aquatic life as well. Some plastics may not be able to take heavy loads and may deform or break due to the load. Plastic is combustible in nature. It is also said eating from plastic boxes can cause cancer. The burning of plastic releases toxic materials into the environment. Plastic degrades the quality of the soil. Plastic can cause fire if not disposed of correctly. When the toxic form plastic enter our body via food, water or air it creates a disturbance in our body functions and causes changes in our hormones. Plastic and essentially single use plastic causes environment degradation, loss of aquatic life and fills up our landfills. It contaminates water bodies and releases toxic substances into the air, water and soil.

There is an urgent need to find the solution of this major problem. The bio plastics innovation would be a key to a long-term solution for plastic pollution. because it is biodegradable, nontoxic and eco-friendly. "Bioplastic" are defined as plastics made from renewable

resources such as potato sugar, corn etc. and produce by a range of microorganisms..(Zarate L *et.al.*). There are various types of microorganisms that play an important role in the production of bioplastic. The microorganisms used for bioplastic production includes *Bacillus megatherium*, *Bacillus cereus*, *Pseudomonas aeruginosa*, *Enterococcus Sp.*

The first bioplastic polyhydroxybutyrate (PHB), was produced from *Bacterium megatherium* by Maurice Lemoigne, in 1926. After that number of attempts had been made towards preparing bioplastic. Till date three types of bioplastic are made as Starch-based Bioplastics viz. Simple bioplastic derived from corn starch. Cellulose-Based Bioplastics viz. Produced using cellulose esters and cellulose derivatives and Protein-Based Bioplastics viz. Produced using protein sources such as wheat gluten, casein, and milk. Since Bioplastics is made from renewable sources, it is biodegradable and safe for environment. Even more, biobased plastics reduce dependence on fossil resources whilst improving a product's carbon footprint. Biodegradable plastic allow enhanced end-of-life scenarios for disposal and recycling. This may lessen the burden on our existing waste systems and also the environment. Bioplastics can provide excellent biodegradability, helping the world deal with the increasing problems of litter, particularly in the world's rivers and seas. The sustainable world economy can be achieved by using plant-based bioplastic [9]. The bioplastic is recyclable hence if ends up in

sea can be easily break down without disturbing the sea ecosystem. The bioplastic is degraded within three to six months (BBC Science Focus).

Bioplastics are driving the evolution of plastics. In a mixture with vegetable oil, Avani was able to develop bags that were legitimately biodegradable they rapidly dissolved in warm water and also safe for animals to eat [22, 23] The bioplastics industry is growing exponentially. In fact, its production capacity is expected to increase by 15 % by 2024. Since July 1, 2021, many single-use plastic products have been banned in the EU to help combat plastic waste in the sea. From manufacturing processes that release less global warming related pollution to the ability to biodegrade, bioplastics seem environmentally friendly. However, bioplastics are currently more expensive than standard plastics, and they might not be as eco-friendly as they seem.

### Conclusion

The expansion and development of the bioplastics and their products would lead to the increase in the sustainability of environment and reduction in the emission of greenhouse gases. Day-by-day the use of conventional plastic increases, this conventional plastic causes harmful effect on the ecosystem. This study concluded that food waste could be used for bioplastic production. Bioplastic plays very essential role to reduce the environmental pollution, it can be termed as "eco-friendly product.

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**BIODIVERSITY AND ITS CONSERVATION****<sup>1</sup>Uday Deshmukh, <sup>2</sup>Dhiraj Dhande, <sup>3</sup>Sachin Bhusare And <sup>4</sup>Dr. Rachana Pachori**<sup>1,2,3</sup>Research scholar, PG Department of Microbiology, Rajasthan Aryans Mahavidyalaya, Washim<sup>4</sup>Associate professor and Head, U.G. , P.G. and Research section, Department of Microbiology, Rajasthan Aryans Mahavidyalaya, Washim

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**ABSTRACT**

*Biodiversity refers to the different life forms present on the earth. It includes variety of plants, animals, microorganisms etc. It refers to genetic difference, ecosystem variation, species variation with respect to region of study. Biodiversity is important as most of the communities of organisms are in need of the accessible resources that exist in the diversity. Biodiversity is the life support system it provides the essential elements required for the day to day survival of organism especially humans. Also it helps in maintaining the ecosystem of earth for example Wetlands filter toxins from water, trees reduce global warming by capturing carbon and bacteria along with the fungi deteriorate the biological matter and fertilize the soil. Despite the advantages of biodiversity, in the present day most of the species and ecosystems are being harmed causing its disturbance. This is mostly accomplished by the humans as regular exploitation of resources is carried out for the personal greed. Various methods are being invented, suggested and applied for the conservation of biodiversity.*

**Keywords:** Biodiversity, conservation, genetic, ecosystem, wetlands.

**Introduction**

For a long period, humans had spent a wild life style in the forested region of earth, and were dependent on the natural resources for their survival. Due to this the humans started to exploit the natural resources more than required resulting in the increase stress on the biodiversity. Humans are usually reliant on wild and domestic life of nature such as for food, medicine, clothing and housing, cultural diversity, intellectual and spiritual inspiration. It is, without doubt, the very basis of life. Further that, a quarter of the earth's total biological diversity amounting to 1.7 million species, which might be useful to mankind in one way or other, would be in serious risk of existence over the next 2-3 decades. On realization that the erosion of biodiversity may threaten the very existence of life has awakened man to take steps to conserve it. (Agrawal N.)

Biodiversity can be defined as diverse life forms which include different kinds of animals, plants, fungi and even microorganisms like bacteria. Every species present in the ecosystem is directly or indirectly dependent on each other forming a complex web to maintain the balance of environment. The diversity of the living world can be observed at

different levels i.e. from molecular level to ecosystem level. Genetic level diversity is one of the examples which explain alterations among the genomic resources of organisms. Every specific organism of a given species differs from one another in its genetic makeup. E.g. there are different varieties in the same type of rice, wheat, corn, barley, etc. Also species level diversity includes different types of species are found in a particular geographical region, And Ecological level diversity consist of living and non- living organisms and their interactions with each other. Ecological biodiversity denotes to the variety of plant and animal species that live together and are linked by food chains and food webs. mostly two patterns of diversity of found in the ecosystem (i) Latitudinal and Altitudinal gradient (ii) species area relationship. Latitudinal gradient is the clearest and best-known pattern of biodiversity studies to date. Following this pattern, biodiversity follows a regular pattern as we move from the equator to the Polar Regions. Plant and animal diversity is greatest at the equator and decreases as we approach the poles. There may be an exception in some species, but otherwise it is a general trend to be observed. At the equator we find a rich variety of plants and animals. As been located in the tropic region,

India has a vast diversity. Altitudinal diversity speaks about the diversity change from lowest sea level till the highest peak level on earth. Most of the diversity is seen at the sea level. Species area relationship explains the diversity found in a particular area with respect to the species of animals present in the given region.

Though, the great Amazon rainforests exhibit maximum biodiversity in terms of the amount of species inhabiting this region. It is thought that many species are so far to be revealed and recognized in the Amazon, despite it being the region's most diverse region. The reason for this increased biodiversity in the tropics as per the ecologists is as follows:- Tropical areas have a more stable climate compared to temperate areas. Consequently, the tropics manage to support higher species numbers because species don't have to constantly adapt to a changing season. « The temperate regions have suffered many glaciations in the recent past, giving them a very unstable environment. The tropics, on the other hand, were comparatively stable. Therefore, speciation was favored in the tropics compared to the temperate countries. « The tropical regions are relatively more prone to solar energy. As a result, the plants in this region receive more energy during photosynthesis. This, in turn, transfers more energy to the successive trophic levels in the food chain. Thus, more energy supports more diversity. Special -area relationship: - The great German geographer and naturalist Alexander von Humboldt observed the connection between an area and the biodiversity there. He found that plant and animal diversity increased as he increased the observation area, but up to a certain level.

Loss of biodiversity: about three quarters of the human population live in the tropics, which cover only about a quarter of the total area of the earth. · The tropical rainforests contain 50 percent of the species on earth. The overpopulation is one of the causes that have led to the loss of biodiversity, which has led to rampant exploitation of resources and deforestation. · The destruction of the tropics has led to the damage of normal habitats, which is catastrophic for the entire planet. · Natural calamities such as forest fires, droughts, floods, volcanic eruptions,

earthquakes, etc. cause damage to the flora and fauna of the earth. · Pesticides and other pollutants containing toxic heavy metals and hydrocarbons are destroying the weak and vulnerable species. · Loss of biodiversity in an area can lead to decline in crop production, reduced resistance to environmental influences, increased variability in certain ecosystem developments such as water use, crop productivity, and disease cycles and pests. There are two main types of conservation strategies.

A) In-situ conservation where the organisms are protected automatically when their natural habitat is protected. E.g. Kanha forest as a tiger reserve. In-situ conservation is nothing more than conservation "at home". The ecologist has identified around 34 biodiversity hotspots. Hot spots are the regions with high species richness and high species density. These areas must be strategically protected by spreading legal action from awareness and conservation. In situ conservation also includes the introduction of cultivars to traditionally used techniques in agriculture and horticulture. India has three global biodiversity hotspots: Western Ghats, Indo Burma and Eastern Himalayas. It has been estimated that protecting these species-rich hotspots could reduce the rate of extinction by almost 30%. India currently has 14 Biosphere Reserves, 90 National Parks and 448 Conservation Areas.

Indian culture and traditions are always connected to nature and rituals are established to protect biodiversity. In many cultures, patches of forest called sacred groves have been demarcated and protected in the name of the Almighty. Such sacred groves are found in the hills of Khasi and Jaintia in Meghalaya, in the Western Ghat regions of Maharashtra and Karnataka. Aravali hills of Rajasthan and Bastar and Chanda and Sarguja areas of Madhya Pradesh. 11. Sacred groves are the only chance of survival for some endangered animal and plant species. Tribesmen will not allow a single branch of the Sacred Grove to be felled.

b) Ex-situ Conservation: - When a species is threatened with extinction, special measures have been taken to protect it. It could be protected as one of the protections in captivity.



This is called ex situ conservation. The creatures are kept away from their natural habitats in special environments. Wildlife safari parks, zoological parks and botanical gardens serve this purpose. Animals whose numbers have decreased are allowed to reproduce in captivity to protect them. E.g. Crocodile Bank of Chennai. Seed banks are established to obtain wild varieties of edible grains and vegetables. Nowadays there are modern techniques such as tissue culture, in vitro fertilization of oocytes and cryopreservation. (Low temperature preservation 1960 C) of gametes are used to protect endangered species.

### Conclusion

Biodiversity is one of the important factors of the living earth. Even being vastly diverse many factors are present or are indirectly invented that is being evidenced as a threat to the biodiversity. However many measures are taken to preserve the bio diversity. New concepts are being put forth by the ecologist for the conservation of diversity. However, the diversity conservation requires a huge help from the present generation. It is therefore our moral duty to conserve both biodiversity and our environment. The long-term conservation of species and their management requires collaborative efforts across entire landscapes. To achieve this Biodiversity should be considered as habitat instated of particular species matter.

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## STUDY ON INTENSITY OF INFECTION CAUSED BY *Dendrophthoe falcata* (L.f) ETTINGSH (Loranthaceae) ON VARIOUS HOSTS FROM MELGHAT

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### ABSTRACT

*Dendrophthoe falcata* (L.f.) Ettingsh is a partial stem parasite which occurs on number of host plants belonging to different families. Present paper deals with the study on intensity of infection caused by *Dendrophthoe falcata* (L.f.) Ettingsh on host species which were observed during the rigorous survey. The hosts reported were *Boswellia serrata* Roxb. ex. Coleb and *Buchania lanzan* Spreng. *Madhuca longifolia* (Koen.) Macbr and *Cassine glauca* (Rottb.) Ktze. from Melghat forest.

**Keywords:** Partial stem parasite, *Dendrophthoe falcata* (L. f.) Ettingsh, host species, etc.

### Introduction

The forest of Melghat is mostly of the Dry Mixed Deciduous type and one of the important forests of Vidarbha region of Maharashtra in India. The flora shows much more diversity with the change in topography. The vegetation varies considerably with the change in altitude, soil, temperature, humidity and rainfall. The topography shows steep scarps and slopes, plateaus of higher hills, slopes of higher hills, drier lower hills, inner valleys etc. The average rainfall varies from 1300 mm to 1450 mm, the temperature range varies from 13 to 41 degree celcius and humidity varies from 48 % to 100 %. The soil is also of different types like Alluvial, Lateritic, Gritty-loam and Clayey. The earlier floristic study of Melghat Forests shows 97 families of flowering plants, 398 generas and 648 species of plants. The general floristic figures of Melghat forests includes the plants like 94 tree species, 798 shrubs, 368 small herbs, 66 climbers, 2 species of bamboo, 127 species of grasses. Dhore M.A. (1984)

*Dendrophthoe falcata* (L.f) Ettingsh belongs to family Loranthaceae; comprises about 31 species, among which 7 species are found in India. Two of its varieties are widespread in India viz., var. *falcata* (Honey Suckled Mistletoe) and var. *coccinea* (Red Honey Suckled Mistletoe) distinguished by greenish-white and red flowerings, respectively. The plant is a partial stem-parasite; grows on

around 401 host plants worldwide and 268 in India. It does not have an indigenous rooting system, and is dependent on the host for water and minerals. Taxonomically, it is a large bushy shrub, dichotomously branched, perennial, partial stem parasite, glabrous with grey-smooth bark, having twiggy and woody branches. Leaves thick, sub-sessile, coriaceous, elliptic ovate to oblanceolate, mostly opposite, obtuse, sometimes acute, entire, slightly shining, variable in size and shape, midrib prominent, usually red, secondary nerves obscure, and with attenuated base. Flowers whitish yellow, red, orange-red or yellowish red and sometimes pink, 5-15 cm long, axillary to supra-axillary, unilateral spikes with persistant bract. Calyculus 4 mm. long, glabrous and persistent with 4-5 lobes, stamens 5, filament approximately 3-5 mm long or even upto corolla and epipetalous, glabrous. Style 2.5-3.5 cm long with capitatestigma. Fruit berries 7-11 mm long, bright red, globose to ovoid-oblong, seeds minute and oblong.

Honey suckle mistletoe *Dendrophthoe falcata* (L.f) Ettingsh (Loranthaceae) syn *Loranthus longiflorus* Desr is the most common parasitic plant of trees in India. *D. falcata* is a strongly branched and glabrous shrub. The stem is thick, erect or flattened at the nodes and appears to arise in clusters at the point of attack. This clusters form a dense and bushy growth, which can be easily spotted on the trees. Sometimes, the parasite, instead of confining its attack to one point, produces a

creeping branch, which grows closely along the host stem and forms haustoria at intervals. The flowers are borne in clusters. They are long and tubular, usually greenish white or red in colour according to species. The fruit is fleshy and contains a solitary seed. It is sweet and eaten by birds, cattle and other animals.

The flowers of *D. falcata* are pollinated by the Birds. The flower has a pollination mechanism that causes pollen to explosively spray on the plumage of the visiting bird. The seeds are also dispersed mainly by the frugivorous birds. The berries of *D. falcata* are usually swallowed whole and the seeds are voided after a rapid passage through their gut in about 3-4 min (Murphy et al 1993). The voided seed has a sticky coating and the bird applies its vent to the surface of a suitable perch and may turn around so as to get rid of the seed, which then sticks onto the branch where it may subsequently germinate (Raju and Rao 2004).

The known host range of *D. falcata* is the second largest among all angiosperms, Subsequent addition of hosts observed on host plants like *Chloroxylon swetenia*, *Madhuca longifolia*, *Anogissus latifolia* and rarely on other tree species like *Wrightia tinctoria*, *Terminalia bellerica*, *Buchanania lanzan*, from melghat by Rothe et al (2011). These host plants include many economically important.

### Materials and Methods

A complete survey of Melghat forest for the exploration of this parasite on the tree plants was done in last two years. Data recorded and photographs taken at flowering stage. *Dendrophthoe falcata* (L.f) Ettingsh with its different hosts was collected along with flowers and fruiting conditions. The collected material is dried and herbarium specimens are prepared and deposited in Department of Botany, Shri Shivaji College of Arts, Commerce and Science, Akola. The host plants of *Dendrophthoe falcata* (L.f) Ettingsh on *Boswellia serrata* Roxb. ex. Coleb and *Buchania lanzan* Spreng from Akola region. The plant material and its host specimens was identified by using standard floras like Flora of

Amravati District by Dhore (2002) Flora of Mathawada by Naik (1998), Flora of Maharashtra State by Singh and Karthikeyan (2000), The voucher specimens were preserved in the institute herbarium library.

### Observation and Result

Present investigation is to explore the host species of *Dendrophthoe falcata* (L.f) Ettingsh and its intensity of infection from Katepurna wild life sanctuary from Akola region. The parasitism of *Dendrophthoe falcata*, (L.f) Ettingsh a leafy parasite of Loranthaceae family has been done by various workers from India (Saxena, 1971). They found that *Dendrophthoe falcata* (L.f) Ettingsh shows diffuse type of parasitism and occur on a number of different hosts belonging to Angiosperms. The principle hosts of *Dendrophthoe falcata* (L.f) Ettingsh vary in different parts of the country e.g. *Diospyrous melanoxylon*, *Mangifera indica*, etc. Previous record of the 19 hosts of *Dendrophthoe falcata* (L.f) Ettingsh from the Melghat forest was (Rothe et al., 2011) and 07 by Maheshwari (2017). At different altitudes diversity of host species of *Dendrophthoe falcata* (L.f) Ettingsh varies in the tropical dry deciduous forest. At 1552-2647 ft. Altitude the occurrence and distribution of *Dendrophthoe falcata* (L.f) Ettingsh is common, The previously recorded host species of *Dendrophthoe falcata* (L.f) Ettingsh were *Albizia lebeck*, *Anogeissus latifolia*, *Boswellia serrata*, *Buchanania lanzan*, *Cassia fistula*, *Chloroxylon swetenia*, *Diospyrous melanoxylon*, *Lagerstroemia parviflora*, *Madhuca longifolia*, *Mallotus philippensis*, *Mangifera indica*, *Schrebera sweteniodes*, *Terminalia bellerica*, *Terminalia chebula*, *Terminalia tomentosa*, *Toona ciliata*, *Wrightia tinctoria*, etc. In the present paper four host species of *Dendrophthoe falcata* have been enumerated and shows its intensity of infection with distribution on the host (**Table No. 1**). The wilt symptom was expressed and number of infected twigs on different hosts was recorded.

**Table 1.** Occurrence and Infection of *Dendrophthoe falcata* (L.f) Ettingsh on Different Hosts from Melghat Forest.

| Host species   | No of Infected Host | Number of Infection per Host | Wilted host |
|--|---------------------|------------------------------|-------------|
| <i>Boswellia serrata</i> Roxb. ex. Coleb (Salai)<br>Family - Burseraceae | 20                  | 11-13                        | 04          |
| <i>Buchania lanzan</i> Spreng (Charoli)<br>Family - Anacardiaceae        | 13                  | 6-7                          | 01          |
| <i>Cassine glauca</i> (Rottb ). Ktze<br>Family - Celastraceae            | 06                  | 7-8                          | 02          |
| <i>Chloroxylon swetenia</i> DC Family - Rutaceae                         | 15                  | 8-9                          | 01          |
| <i>Madhuca longifolia</i> (Koen.) Macbr<br>Family - Sapotaceae           | 07                  | 7-8                          | 01          |

### Occurrence

The occurrence of *D. falcata* was observed in different localities /areas including Dhamangao, Bhilkhera, Madki, Bori, Kamapur, Motha. A total number of individual plants infected with *D. falcata* were recorded. Among them, the host plants severely swamped with *D. falcata* was counted. The occurrence of *D. falcata* was systematically recorded, among them the *Boswellia serrata* Roxb. ex. Coleb was severely infected followed by *Chloroxylon swetenia* DC and *Buchania lanzan* Spreng. where climatic conditions play a major role in host-parasite interaction. The fruits of *D. falcata* were berry-like, single seeded, and of different colour depending on species. The seed was either completely surrounded or capped with sticky viscin tissue. The viscin tissue located inside the fleshy outer layer of the fruit was thoroughly eaten by birds. Viscin has both gluing and elastic properties and serves to glue the seeds to branches of a potential host. Birds recorded as the main dispersers of nearly all loranth, often the same birds (flowerpeckers f: Dicaeidae) serve both as pollinators and dispersers. These little birds eat the berries of several loranth and seem always to perch along the branch. This behaviour is an advantage for the parasite since the seeds pass the digestive canal and the dropping are likely to be placed directly on a branch of a potential host. In other cases, the defecated seeds may stick together like rosaries or string of pearls. It has been shown that seeds defected by mistletoe birds have high germination rates, suggesting it is an advantage for the parasite. This cooperation between birds and mistletoe

plants can play a crucial role in the host-parasite interaction.

Mistletoes have unique ecological arrangements with the host plants, they parasitize and the dispersal of seed take place by birds, but the mistletoes often detrimental to their hosts and can even kill them. Mistletoes attract and manipulate the bird vector in ways that are typical of both plants and parasites. Mistletoes are important elements on the landscape that influence the spatial distribution and complex interaction make their biology to understand and their management. Due to selection and occurrence of mistletoes on variety of host, number of medicinal and economically important plants and their branches are weakened. Spreading of mistletoes in the Melghat forest wildlife sanctuary increasing year after year that will dangerous for richness of forest flora.

### Discussion

The study explores that host plants are highly infested with *D. falcata*. The age and height of the host plant, the seed dispersal, the haustorial formation of parasite on host surface, nature of host bark, several agricultural practices and environmental factors influenced the occurrence and spread of *D. falcata*. Predominantly *D. falcata* prefers to grow only on top of the canopy of host to conduct photosynthesis. The plant species *D. falcata* are typically Ornithophilous (pollinated by birds) and also the seeds dispersed by birds, mainly "Flowerpeckers". *D. falcata* was disseminated mainly through its seeds, carried by birds. The birds are attracted by the brilliant colour of the berries, the pulp is sticky and viscous and so



birds easily carry the seeds. The fruit is comparatively succulent, brilliantly coloured and is attractive to birds (Mehrotra 2004). *D. falcata* causes severe damage to host plant by preventing the growth (Singh 1996), *D. falcata* does not have any root system of its own but develops root-like absorbing organs called haustoria, which penetrate deeply into host. The haustorium act as a primary root of the seedlings of *D. falcata* developed on host stem. Through these organs, water and minerals were absorbed by the parasite from the conducting tissue of the host. Hence, there is a continuous drain of nourishment from the host to the parasite will appeared. The point, at which the haustorium penetrates, often swells to form a gall. These galls vary in size according to the

age of the parasite. The host branches infected with *D. falcata* show a gradual reduction in growth and diameter. This mistletoe does not have its own root system and is dependent on its host for water and minerals. Nutrient dynamics have shown a higher level of N, P, K, Mg and Na in the leaves in the mistletoe than the leaves of uninfected and infected hosts which may be due to differential translocation of elements within the host phloem. (Karunaichamy et al 1999). In many cases the branches of the host are killed by *D. falcata* due to the tapping of most of the vascular bundles (Kuijt 1977). Nowadays *D. falcata* was a serious threat to economically valuable fruit trees, flowering plants, forest trees.

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## UTILIZATION OF MICROORGANISMS FOR ENHANCING SOIL FERTILITY: A REVIEW

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### ABSTRACT

Soil is the most important factor of earth ecosystem. Without soil life of human beings is very challenging .Soil provide the foundation for production of plant and support for root and grip the required nutrition for plant growth. However, Due to encroachment of chemicals in agriculture fields, soil fertility has decreased which is responsible for major economic crises. On the other hand, microorganisms have natural ability to increase the soil fertility by playing major role in biogeochemical cycles and contributing the essential elements to the soil as nutrients viz. carbon, nitrogen ,sulphur, phosphorus and other minerals. The present review mainly focusses on the role of microorganisms viz. bacteria, actinomycetes fungi etc. in enhancing the soil fertility and boosting soil and plant health.

**Keywords:** soil fertility, nutrients, biogeochemical cycles, microorganism, soil health.

### Introduction

Soil is one of the inseparable parts of every biotic and abiotic factor present in environment. It is helpful in agriculture for growing crops, provide shelter for microbes and other living creatures, preserves groundwater quality by retaining rain water, running biogeochemical cycles etc. Soil possesses natural ability to provide essential nutrients for promoting plant growth. However, due to indiscriminate use of chemicals fertilizers and pesticides the soil fertility had reduced and gradually the fertile soil becomes barren (Satya *et. al* 2016). The natural causes of soil distraction are natural disasters, such as drainage and forest fire. The soil gets polluted due to acid rain in which molecules loaded with heavy metal drop down or blown from the sterile stockpiles resulted from floating and smelting process. Soil pollution by heavy metals is a prominent problem, which creates the change in soil quality and limits agricultural production because they are incapable to produce healthy food. (Varma NP *et.al* 2017). The effects of soil infertility are directly on the production of crop which is responsible for economic crisis. Soil infertility indirectly affects human, plant and animal health and also causes a various type of disease. A good health of soil provides the necessary nutrients for plants to produced

healthy food with the essential nutrients required for the human health.

Microbes possess ability to enhance soil fertility by making available the nutrients. microbes have ability to turn waste land into fertile soil. These microbes are held in the decking of organic matter. Different microbes support in the decomposition of previous organic matter. They enhance soil productivity by assimilating air, minerals and nitrogenous components. Both bacteria and fungi are able to improve soil productivity and enhance soil fertility. (Safi URQ *et.al* 2018)

In Atharvaveda (1200- 1000), soil is considered as mother which provides food for human society. In ancient time, manure, vermicompost, animal waste, plant ash etc. was used to improve soil fertility (Chakraborty K and Mistri B 2015).

Biological processes of the soil depend on the sufficient number and specific composition of microorganisms and their enzymatic activity. Microorganisms are involved in 80 to 90 % of all processes occurring in the soil. They provide the suitable condition for germination of seed and growth of root systems after plantation, which is very essential for high productivity. Plant secretes the various chemical compound into soil and these secretions are used by microorganisms as a food source. The rhizosphere soil is a habitat

for microorganisms responsible for soil fertility (Furtak *et al* 2017, Y. Zhou *et al* 2017).

Soil microorganisms are present in biogeochemical reactions. They are responsible for mineralization of organic matter, circulation of soil elements for synthesis of protein and nucleic acids as well as transformation of phosphorus. Rhizosphere microorganisms increase plant productivity and can protect against pathogens.

Now- a -days, beneficial microorganisms are widely used to improve plant growth and act as biogeological control agents. Before the invention of agriculturally important microorganisms, especially nitrogen fixing bacteria, farmer used to transfer productive soil from one field to another. Biological nitrogen fixation refers to microbially mediated process by which  $N_2$  in atmosphere is reduced or converted into ammonia ( $NH_3$ ) in the presence of enzyme nitrogenase. This enzymatic activity is found in wide diversity of nitrogen fixing organisms called as diazotrophs viz. Rhizobium, Bradyrhizobium, mesorhizobium, sinorhizobium and all rhizobium (Bargaz A . 2018 , Rebello S. *et . al*

2021). Various diazotrophs are able to fix  $N_2$  either in free living state or associate with plants including endophytic and symbiotic association. This ability of microorganisms is very important in enhancing soil fertility (Abatenh *et.al* . 2017 , Zaou Y *et.al* 2017)

### Conclusion

Microbes present in the soil play important role in the soil fertility. Without microbes the soil productivity will reduced and flora and fauna of soil will get disturb. Fertility of soil has been drastically affected by the excessive regular use of chemical fertilizers. Many regions have lost their productivity with the period of time. As micro-organism present in soil are important in growth of plants, inoculation of active microorganism in the infertile soil may help to regain its fertility. They not only increase the fertility of soil but also shows the decrease in the soil erosion. Micro-organisms also improve the water holding capacity of soil as well as nitrogen fixation capacity of soil. Hence, microbes can be utilized to promote soil fertility.

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## SYNTHESIS AND CHARACTERIZATION OF PVA BASED NANO-SOLID POLYMER COMPOSITE ELECTROLYTE SYSTEM

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### ABSTRACT

Solid polymer electrolyte based on Poly vinyl alcohol (PVA) complexed with ammonium sulphate  $(NH_4)_2SO_4$  at different weight percent ratios were prepared using solution cast technique and characterized by using XRD and FTIR spectroscopic analysis. The UV-sonication method was used to disperse the nano particles. The structural properties of polymer electrolyte films has been confirmed by XRD. The complex formation of salt with the polymer was confirmed by Fourier transform infrared (FTIR) Spectroscopy. Optical properties of PVA and  $(NH_4)_2SO_4$  doped solution were studied with the help of UV Vis spectrophotometer.

**Keywords:** Nano solid Polymer, XRD, FTIR, UV- Sonication

### Introduction

A “polymer” is a large molecule which is formed by repeated linking of small molecules called “monomers” that are covalently bonded together. Polymers can be naturally occurring (e.g.: polysaccharides and proteins) or synthesized in laboratory. PVA is an example of synthetic polymer. There are many applications of polymers in aircraft, aerospace, and sports equipment, 3D printing plastics. [1-2] In the recent years, there has been a tremendous interest in the preparation of polymer electrolytes with high ionic conductivity, good mechanical strength and thermal stabilities. Solid polymer electrolytes (SPEs) have been studied in recent years for application in many electrochemical devices such as rechargeable batteries, fuel cell, sensors, super capacitors [3-5]. The growth in portable electronics devices such as cellular phones and laptop computers during the past two decades has created great interest in compact, lightweight batteries offering high energy densities that show good recharge ability and reliability. In addition, strengthened environmental regulation and a more rational use of available energy resources prompt the development of advanced batteries for electric vehicles [6].

Solid polymer electrolytes (SPEs) fulfill the requirements and overcome the limitations of conventional liquid electrolytes by addressing drawbacks such as electrolyte leakage,

flammable organic solvent, and electrolytic degradation of electrolytes. When compared with gel polymer electrolytes (GPEs), SPEs are typically less reactive toward the electrodes. Additionally, they provide higher safety, prevent the build-up of internal pressure and can be designed in many desirable sizes and shapes. High ionic conductivity, adequate chemical and mechanical strength, extended thermal stability, and low price are the favorable characteristics of polymer electrolyte membranes [8]. In order to enhance electrical conductivity of polymer electrolyte at ambient temperature without affecting their stability properties to an undesirable level, various approaches are currently in vogue such as copolymerization and plasticization. The essence of plasticization is to enhance the conductivity of polymer electrolyte by means of additives of low molecular weight and high dielectric constant. The addition of plasticizers could enhance the conductivity and better contact between the electrolyte/electrode [8]. The role of plasticizer should be enhancement in the fraction of amorphous phase and increasing flexibility in the polymeric segments [9]. One of the most promising ways to improve the morphological and electrochemical properties of polymer electrolytes is by the addition of ceramic fillers [10]. The addition of inorganic fillers, like glasses, silica or other ceramics, to the polymer electrolyte generally improves their transport properties, the resistance to

crystallization and the stability of the electrode–electrolyte interfaces. Whereas the latter two effects are always observed, the conductivity enhancement depends on the filler used and also on the particle dimensions. The increase in conductivity with respect to the corresponding unfilled electrolytes was attributed to the enlargement of the amorphous phase in the polymer matrix [11]. Addition of Si into plasticized solid acid polymer electrolytes has attracted considerable attention due to its enhanced ionic conductivities and electrolyte/electrode interfaces. The increase in conductivity has been found to depend upon the concentration. In this project, We prepared Solid polymer electrolytes based on polyvinyl alcohol (PVA) complexed with ammonium sulphate  $(\text{NH}_4)_2\text{SO}_4$  at different weight percent ratios and characterized by using XRD and FTIR spectroscopic analysis. The structural properties of the polymer electrolyte films was confirmed by XRD. The complex formation of the salt with the polymer was confirmed by Fourier transform infrared (FTIR) spectroscopy.

### Materials and Method

Poly(vinyl alcohol) (PVA), with a degree of hydrolysis more than 99% and average molecular weight of 146000, was procured from Aldrich, USA with dopant ammonium sulphate  $(\text{NH}_4)_2\text{SO}_4$ . PVA is a potential material having high dielectric strength, good charge storage capacity and dopant dependent electrical and optical properties. It has carbon chain backbone with hydroxyl groups attached to methanecarbons/these OH groups can be a source of hydrogen bonding and hence assist the formation of polymer complexes [13]. Polyvinyl alcohol which is a semicrystalline and biodegradable polymer has very important applications due to the role of OH group and hydrogen bonds [14]. Adhesive, and

emulsifying Polyvinyl alcohol has excellent film forming, . It is odorless and nontoxic. Ammonium sulfate is an inorganic sulfate salt obtained by reaction of sulfuric acid with two equivalents of ammonia. A high-melting white solid which is very soluble in water (70.6 g/100 g water at  $0^\circ\text{C}$ ; 103.8 g/100 g water at  $100^\circ\text{C}$ ). Polymer electrolyte membranes complex with  $(\text{NH}_4)_2\text{SO}_4$  were prepared by the solution cast method. It is well known that the preparative routes and their relevant parameters control the phase formation and properties, govern the performance of electrochemical devices. For synthesis of materials, the solution cast technique is preferred due to straightforward process to produce homogeneous and uniform thin film.

First of all deionized water is heated to  $70^\circ\text{C}$  then appropriate amount of PVA is dissolved in it to prepare 0.5 molar PVA solution and continuously stir for approximately 1 hour to obtain homogeneous viscous solution. To this PVA solution 0.5 molar  $(\text{NH}_4)_2\text{SO}_4$  solution were added in different stoichiometric ratio (90% PVA + 10%  $(\text{NH}_4)_2\text{SO}_4$ ) along with continuous stirring (~10 min) to obtain a homogeneous viscous solution. Half of the homogeneous solution of PVA along with  $(\text{NH}_4)_2\text{SO}_4$  was sonicated in UV sonicator (Oscar ultrasonics processors on a pros PR-250 MP) for 10 min at  $40^\circ\text{C}$  with pulse timing of 5 seconds. Both the polymer-salt solutions (with sonication and without sonication) were then poured and casted in petri dishes. The solvent was allowed to evaporate slowly resulting in the formation of solid polymer electrolyte films which were finally dried at room temperature for complete evaporation of water traces it takes nearly 2 days for complete drying process. These solid polymer electrolyte were characterized using various techniques like XRD, FTIR and UV Vis spectroscopic studies.



## Results and Discussion

### 1. X-ray diffraction

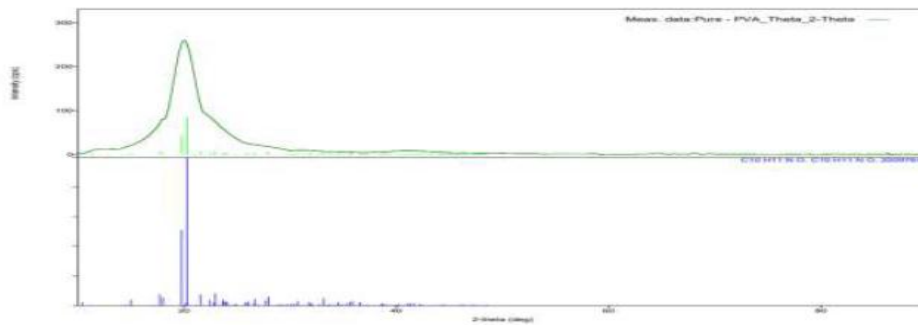


Fig 1.1 X-ray diffraction pattern of Pure PVA

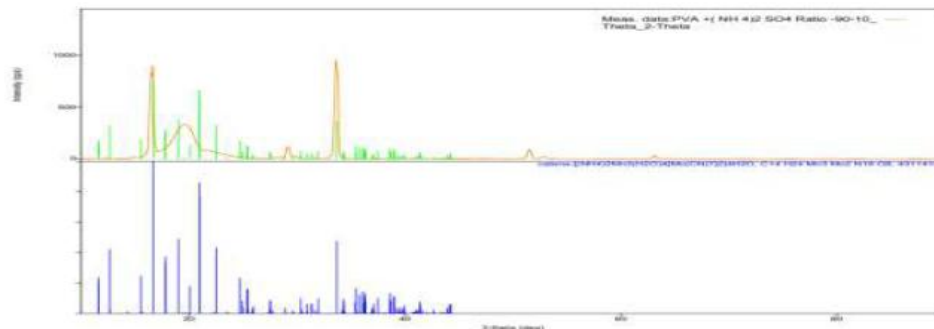


Fig 1.2 X-ray diffraction pattern of(PVA 90% - (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> 10%) without Sonication

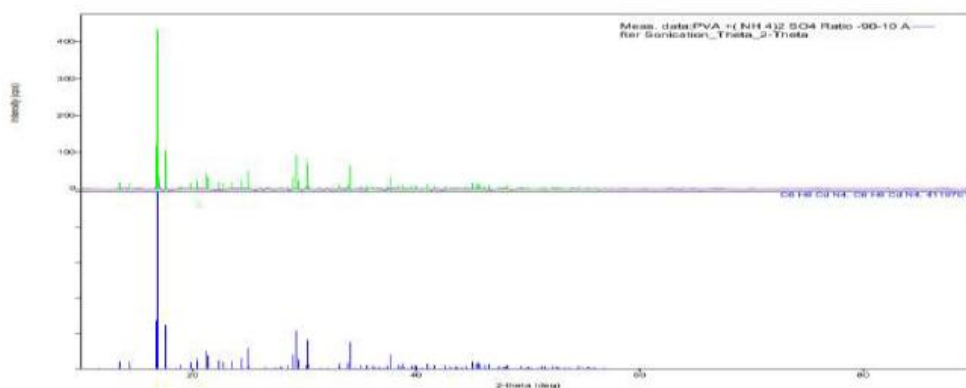


Fig 1.3 X-ray diffraction pattern of(PVA 90% - (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> 10%) After Sonication

The obtained X-ray diffraction patterns for all samples are presented in above Figures. It is clear that the pure PVA sample exhibit a single broad peak around  $2\theta=20$ , indicating the semicrystalline nature. In 90:10 ratio, the area under the pick tends to decrease; this implies to an increase on the degree of amorphousity. Hence, there is significant motion of polymer chain existing in the amorphous phase while the crystalline phase is nonconducting. 10 wt % the intensity of X-ray

shows semilinear increase. This may be due to the doping there are sharp crystalline peak attributed to the change in the crystalline form. There are very small picks in the after sonication graph which confirms that there is a dispersion of particles in the solution due to sonication and we may say that there is a formation of nanoparticles which can be further confirm by SEM (Scanning Electron Microscopy).

## 2. FTIR spectroscopy

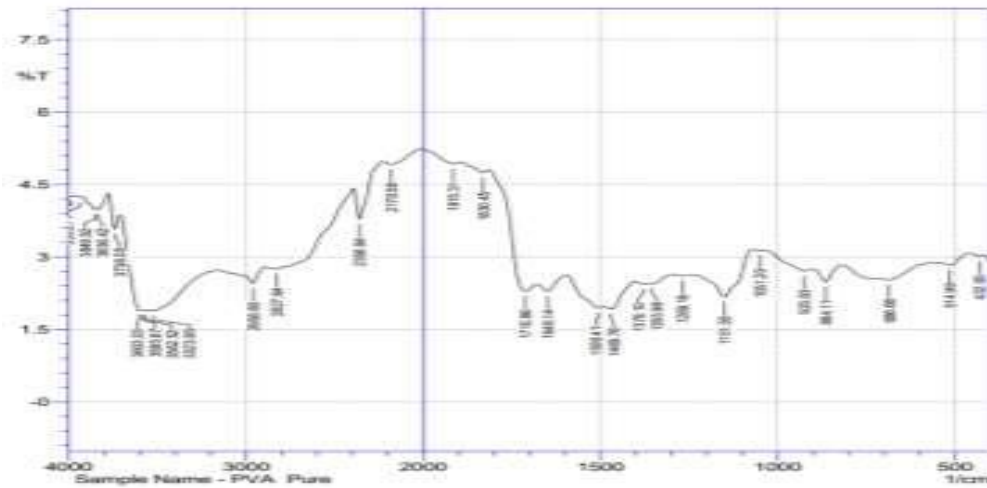


Fig 2.1 Pure PVA

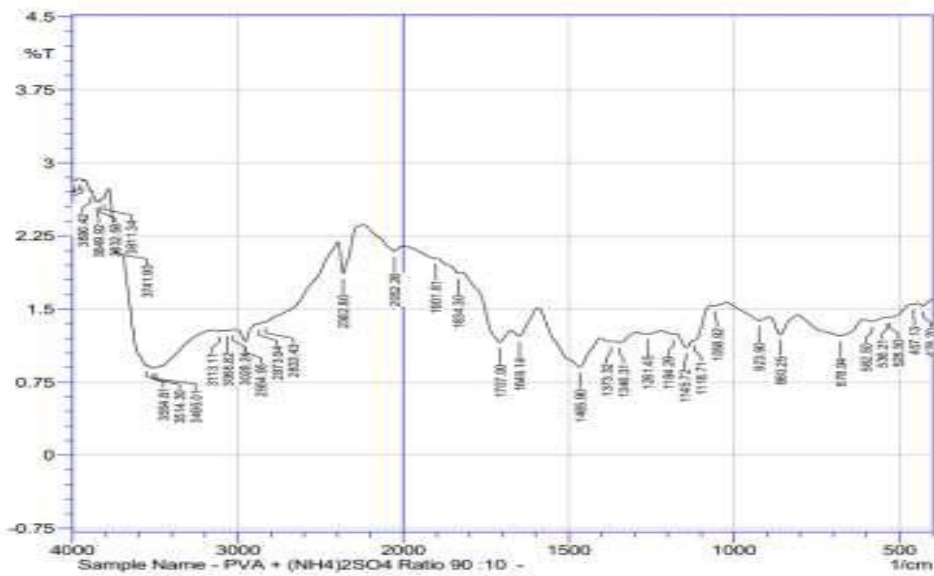


Fig 2.2 (PVA 90% - (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> 10%) without Sonication

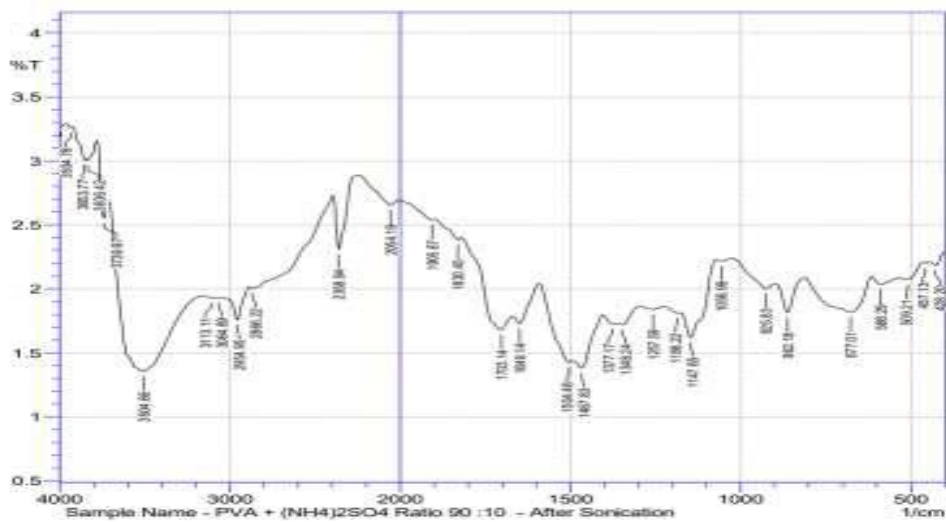


Fig 2.2 (PVA 90% - (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> 10%) After Sonication

The FTIR spectroscopy was used to study the structural change in the samples due to the interactions between the electrolyte atoms and the chains on the ionic conductivity of PVA films. The obtained FTIR spectra in the region 4000–500  $\text{cm}^{-1}$  for all samples are shown in above Figures. It is clear that a very broad and strong band centered at 3504.66  $\text{cm}^{-1}$  which is concerned with the interaction of different O-H groups vibrations. As well as strong peak at 2954.96  $\text{cm}^{-1}$  is the characteristic bands of C-H asymmetric

stretching. In the region 2000–500  $\text{cm}^{-1}$ , the band around 1649.14  $\text{cm}^{-1}$  may be attributed to the glycosidic link in PVA composite, and the other bands which locate less than 1500  $\text{cm}^{-1}$  assignment to PVA polymer formation.

In all samples around approx. 1100  $\text{cm}^{-1}$  the important absorption band was attributed to the hydroxyl C-O stretching. Hence, this band was also a measure of the degree of crystallinity of PVA, this result clearly consistent with the XRD results.

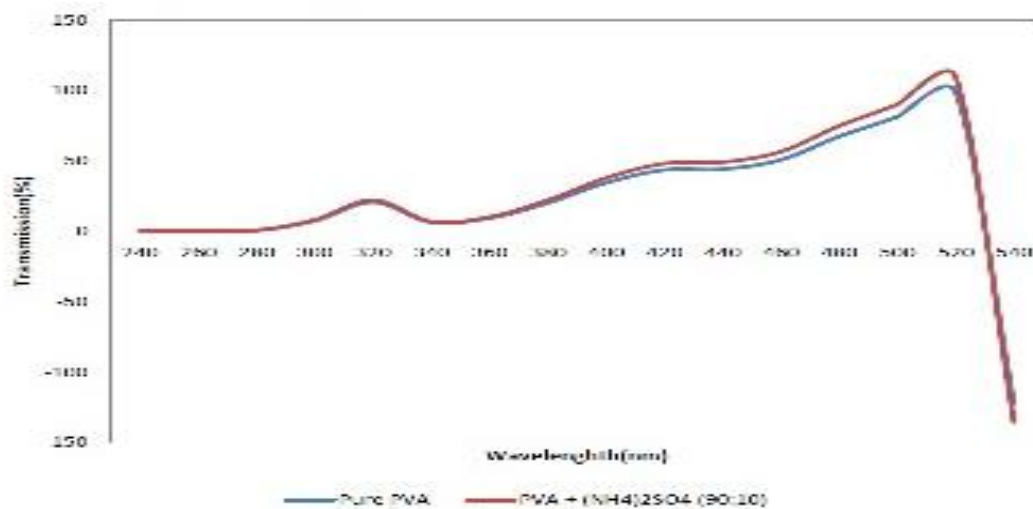


Fig. 3.1 UV Vis spectroscopy

From the UV Vis spectroscopy we have studied the optical properties of the samples. The above transmission vs wavelength graph shows that transmission is higher when PVA is doped with  $(\text{NH}_4)_2\text{SO}_4$  than the pure PVA. And as we know that as the transmission increases absorption decreases and hence emission increases which reveals that after doping of PVA emission increases ( $\lambda_{\text{max}}=320 \text{ nm}$ ). Thus energy band gap can be determined which decreases as dopant percentage increases which shows the material behaves as semiconductor. So we can use it in photo sensors and other light sources.

### Conclusion

Poly(vinyl alcohol) based polymer electrolytes added with ammonium sulphate with different wt% were prepared by solution cast technique. The XRD pattern shows broad (110) peak with

an increase in  $(\text{NH}_4)_2\text{SO}_4$  concentration which suggests semi crystalline nature of polymer. This may be due to the doping there are sharp crystalline peak attributed to the change in the crystalline form. There are very small picks in the after sonication graph which confirms that there is a dispersion of particles in the solution due to UV sonication. The obtained FTIR spectra in the region 4000–500  $\text{cm}^{-1}$  for all samples around approx. 1100  $\text{cm}^{-1}$  the important absorption band was attributed to the hydroxyl C-O stretching. Hence, this band was also a measure of the degree of crystallinity of PVA, this result clearly consistent with the XRD results. The optical properties of the samples was studied by UV-vis Spectroscopy which reveals that after doping of Ammonium sulphate, emission increases ( $\lambda_{\text{max}}=320 \text{ nm}$ ).

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## ENVIRONMENTAL PROTECTION IS MADE EASIER BY GREEN COMPUTING

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### ABSTRACT

*Information technology has incredibly encouraged the world in almost each discipline be it commercial enterprise, training, defence, scientific science and plenty of extra. Inside the ultimate many years researchers and business people are greater targeted on how we can use data technology for growing various benefits for a company. It has been visible that price of power used by the records era departments is about 50% of the overall companies' price but with green statistics era it is predicted that it should decrease the fee and its effect on the surroundings. The concept of inexperienced Computing is the modern-day style that is growing excessive regard. The primary subject of subject in inexperienced computing is to lower the ecological impact of business strategies. Along side the improvement in population bringing about innovative improvements. Inexperienced Computing is an applicable technique that an IT department can use to add to the important thing and strategic company targets. On this paper we have taken into consideration the impact of facts technology on surroundings affecting the human beings at once or not directly. This paper also offers the history paintings on green Computing and contribution of green records generation to make environment extra sustainable and loose from risky materials.*

### Introduction

In the green computing we use pc and its related other resources together with reveal, printer, difficult disk, diskette, networking in very correctly way which has much less impact on the environment. Inexperienced computing is about green use of pc. Green computing is vital for all type of system. it is essential for hand held device to huge scale facts centre[1]. Many IT companies were start the utilization of green computing to reduce the environment effect in their IT operations[2]. Inexperienced computing is that the emerging exercise of the usage of computing and information technology resources extra correctly whilst preserving or enhancing universal performance. The concept identifies the restrictions and benefits of inexperienced computing.

Green computing is an surroundings pleasant approach to control statistics and verbal exchange technology. In lively enterprise to increasing energy correctly, improving statistics management. Designing items and offerings which could be useful for the surroundings.

In destiny, green computing will very commonplace to listen to. Now a day's pc might be very primary need of all human beings. With using computer our existence emerge as very simpler and also keep our time and efforts but the utilization of laptop also

growth the power intake and additionally generate a big quantity of heat.

Large quantity of strength consumption and tremendous heat era growth the greater emission of inexperienced house gases like carbon dioxide (CO<sub>2</sub>) which has very harmful effect on our surroundings and natural sources. Private laptop & statistics centres consume an enormous amount of power due to the fact they use diverse antique technology and additionally don't have cooling machine[3]. and since the result of this we get the polluted environment.

### Literature Survey

To have a sustainable enterprise isn't always only for the big agencies but is likewise critical for the not unusual humans. Waste assets within the form of electricity, cash, paper and time without delay or in a roundabout way affects now not only people related to it but additionally to the not unusual people. Information technologies were a subject of interest for each instructional researchers and business managers within the closing two many years. Opposition via the data technology has usually been difficult. The contrast between aid-based and traditional thinking is well referred to on this paper [1]. The authors also empirically take a look at the version to discover the relationship among IT infrastructure, IT business revel in, courting infrastructure, and depth of organizational mastering. To do this information is collected



via a national mail survey from chief IT executives from 202 production companies and it's far determined that IT infrastructure do now not have any vast impact on competitive advantage however IT business understanding and dating infrastructure do have. Consequently we will say enterprise can survive even if massive infrastructure isn't always available. In fact, so that you can decrease the impact of the excess machines minimum infrastructure have to be used. Displaying the motivations that an organization must have towards the adoption of green Informational generation is nicely explained in [2]. Motivational idea is carried out on the statistics collected from a survey of 176 organizations and the results shows that the eco-performance and eco-effectiveness motives effect the adoption of:

- Technologies that reduce IT emission and complements the electricity efficiency of IT infrastructure
- Such systems that reduce journey and tour associated emissions
- Such rules and practices that give upward thrust to the product supervising with focus on IT lifecycle from beginning to the cease.

This paper additionally shows that the feel of duty for environment predicts green facts technology regulations and information era for green era, decreased cost, and conservation of strength are fundamental motives for inexperienced information technology. The stress of market forces will result in the principle motive for the final results of the green practices to upward push. While we speak of green computing we think of simply the IT vendors and organizations however green records generation also consists of the conduct and obligations of the records technology customers.[3]explains the perception and conduct of statistics era customers in the inexperienced information technology. Based on the idea of Reasoned action and principle of planned conduct, the paper firstly explains that it's the mindset toward inexperienced facts technology which is taken into consideration as the principle motive in the back of the intentions of the data technology users to exercise inexperienced records technology and secondly, the

understood conduct manage closer to the green information technology has maximum impact at the facts technology customers. Commercial enterprise sustainability , firm improvements and of course Informational era has treasured relationship between them and well worth to analyze on however very least studies has been completed up to now on this. The paper on records era-Enabled Innovativeness and inexperienced abilities[4] has analyzed the connection among forms of statistics era sources, businesses green management abilities and innovations. The two varieties of information generation assets as mentioned via the authors are technological information generation and human data era assets. The statistics is obtained from diverse Spanish corporations and the have a look at of this records resulted within the following consequences.

- The centre functionality is the innovativeness that facilitates the company to expand green control abilities.
- The development of innovative environment is directly motivated with the aid of the deployment of technological information technology and human information technology.
- Data era influences on inexperienced coping with skills thru the progressive abilities.

Prior we've got seen within the papers that Informational era can play critical role toward greener growth and sustainable commercial enterprise however very much less studies suggests the adoption and performance of inexperienced information generation within the enterprise at company degree. The study made by way of [5] investigates the elements that affect the implementation in real and outcomes of carried out green data era in terms of electricity conservation and earnings. This look at is primarily based at the survey performed in India of 293 firms and it is determined that the pinnacle management commitment has amazing impact on the significance of green statistics generation. The implication of inexperienced information generation is highly associated with discounts in IT gadget strength consumption and better

profit impact. Every other paper by [6] investigates the numerous additives that has impacted the enterprise agencies in assessing the price of green facts generation. The authors have also proposed a version to expose the relationship among numerous additives and their influences over green data generation. This model may be used by the information era businesses to acquire the goal of environmental sustainability. Environmental issues want should be precedence now not handiest at the end of the product lifecycle however all through the statistics technology machine lifecycle as thoroughly addressed via [7] in his paper. The writer has also noted that simplest by recycling the printing materials and old hardware objects is now not enough for the growing environmental impact of information technology. Environmental problems have to be taken care during the lifecycle of records device which includes the practices regarding the hardware, software and customers. The authors of this paper has provide you with the revised device improvement lifecycle that considers environmental issues at each level of the lifecycle and additionally proposes additional disposal degree as a formal, very last degree in the existence cycle. Growing environmental issues and ability actions are also discussed. In [8] the idea of small cells throughout the operation of cell community which in twentieth century may be viewed as macro or micro cells however are actually percent cells for insurance and local ability extension can extraordinarily growth the potential of cellular networks. Those small cellular networks have ability to comprehend strength financial savings. Additionally the dense deployment of those cells may be extra electricity green than the traditional architecture. It's been visible that value of energy utilized by the statistics era departments is approximately 50% of the general groups' fee but with green information generation it is expected that it must decrease the value and its effect at the environment and [9] awareness on sustainable records technology is essential issues and identifies the set of principles to manual sustainable design.

### Efforts to Implement Green computing

We do no longer want to forestall the usage of laptop device and power to store our surroundings however we should make some effective efforts by adapting green era to promote an eco-friendly computing environment at low cost by reducing electricity consumption. By means of adapting following pointers

We can move inexperienced to make our surroundings healthy:

1. Buy energy megastar labelled products: production of diverse electrical and electronics equipment with strength famous person labelling ensures much less power consumption. Consequently we want to use monitors, air conditioners, refrigerators and different technologies with energy megastar label to go inexperienced.
2. Unplug the electronics home equipment when now not in use: numerous professionals says that most of the plugged in electronics devices makes use of low amount of electricity, but some other electronics devices like laptop systems and television sets consumes quite a few electricity even when they are in standby mode. Therefore we want to unplug various electronics gadgets when they're now not in use to save cash and energy [10].
3. Use flat display video display units in preference to CRT video display units: CRT monitors uses approximate ninety-a hundred and ten watts power whereas liquid crystal display or LED monitors makes use of 35-forty five watts power which is very less as examine to CRT monitors. Therefore we want to use flat display screen video display units like liquid crystal display or LED monitors inside the location CRT monitors so that it will reduce power intake [11].
4. Use soy ink or non-petroleum-primarily based inks for printing: Soy ink is renewable, biodegradable which is prepared from soybean oil that's higher than different ink options which can be prepared from numerous hazardous solvents [12].
5. Buy eco-friendly printing papers: we have to buy surroundings pleasant printing papers which are prepared from more sustainable materials like organic cotton, bamboo and so forth. [13].

6. Avoid the usage of display screen savers: We should forestall using screen savers for decreasing power consumption. Greater over when we use screen saver, it additionally makes use of a few quantity of processor electricity and memory [14].

7. E-waste control: digital waste is responsible for various dangerous effects on our surroundings as it includes diverse unsafe materials like mercury, lead, cadmium and many others. So we need to prevent informal disposing of electronic devices.

8. Recycling: Recycling of waste electronics recovers many precious materials like aluminum, copper and gold etc. From the waste electronic gadgets. As a result of this we are able to manage pollution and store our surroundings[15].

Apart from these steps some extra useful recommendations for implementing green generation are like the usage of double side printed function, the usage of sleep mode feature to save electricity, flip off all gadgets like printer when they're not in use, decrease down the monitor brightness. By way of adapting these helpful hints we will lessen big quantity of strength consumptions and guard our surroundings from the damaging consequences of technologies.

## Conclusion

This paper gives ideas about the want for green Computing, ways closer to inexperienced IT and numerous steps taken to make inexperienced IT a hit. At the same time as IT plays a critical role in making sure nature, it also contributes altogether to its disintegration. On this paper major cognizance is laid on discount of carbon dioxide emissions and reduced energy utilization that can prove beneficial to make IT enterprise move surroundings friendly. To have a sustainable enterprise is not only for the big organizations however is also important for the common humans. We've attempted to illustrate the connection among environmental sustainability and green IT. Literature concerning how inexperienced it could help in surroundings sustainability is also reviewed. This paintings can in addition be prolonged to unique measurement identity and extra revolutionary designs can prove to be useful in going from non-inexperienced to green IT. Also the proposed model can be stronger by means of incorporating the extra factors affecting the surroundings to lessen the risks of IT industries and making the environment greater green and supportable.

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## ECONOMIC DEVELOPMENT BY ENVIRONMENTAL CONSERVATION -A STUDY THROUGH THE SRILANKAN CRISIS

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### ABSTRACT

*Economic expansion of a country is aided by environmental conservation. To have a better present and future, nature and human beings need to cooperate with each other, as they have a high level of interdependence. The island nation of Sri Lanka is currently experiencing an ongoing economic crisis that began in 2019. Since its independence in 1948, this country has seen its worst economic crisis. Unprecedented levels of inflation, a nearly complete depletion of foreign exchange reserves, a shortage of medical supplies, and an increase in the cost of essential commodities are all results of this. The paper aims to study how the economy of a country like Sri Lanka can be revived with the conservation of its environment. Hence, it can be understood that the country will be out of crisis slowly, when it corrects its policies towards trade, environment and finance.*

**Keywords :** Sri Lanka, economic crisis, environmental conservation

### Introduction

Economic expansion of a country is aided by environmental conservation. Human health is improved by clean air and water, wholesome food, and maintained natural areas, all of which produce substantially greater economic benefits than economic costs. To have a better present and future, nature and human beings need to cooperate with each other, as they have a high level of interdependence. Selfishness on part of people becomes detrimental to both humanity and the environment in which we live in. But, there are countries with politicians and business magnates, which turn a blind eye towards the environmental damages that are after effects of their policies towards economic growth. The absence of effective public policy meant to minimise greenhouse gas emissions, rather than a country's economic growth, is what is to blame for the climate problem. With the regulations in place, consideration for environmental sustainability may and will be factored into every decision made by the private, nonprofit, and governmental entities from which we all benefit. In a New York Times piece on the climate and economics discussions at Davos, Mark Landler and Somini Sengupta reported that: "Critics pointed to a contradiction that they said the corporate world had been unable to resolve: how to assuage the appetite for economic growth, based on gross domestic product, with the urgent need to check carbon emissions. "It's

truly a contradiction," said Johan Rockström, director of the Potsdam Institute for Climate Impact Research. "It's difficult to see if the current G.D.P.-based model of economic growth can go hand-in-hand with rapid cutting of emissions," he said."<sup>1</sup>

### Facts about Sri Lanka

Sri Lanka, historically known as Ceylon, is an island nation in South Asia. Its official name is the Democratic Socialist Republic of Sri Lanka and is located in the Indian Ocean, southeast of the Arabian Sea and southwest of the Bay of Bengal. Colombo, is its largest city and financial centre, and Sri Jayawardenepura Kotte, its legislative capital.

As per the 2020 census, its population is 22 million (approx) and is a multinational state, with diverse cultures, languages, and ethnicities. The Sinhalese are the majority of the nation's population. A sizable minority population known as the Tamils has contributed significantly to the history of the island. The other long established groups include the Moors, the Burghers, the Malays, the Chinese, and the indigenous Vedda.

The climate is tropical and warm because of the regulating influences of ocean winds. The rainfall pattern is influenced by monsoon winds from the Indian Ocean and Bay of Bengal. With the exception of birds, Sri Lanka has the most biodiversity per area among Asian nations



for flowering plants and all vertebrate groups. Incredibly many species, including 27% of the 3,210 flowering plants and 22% of the animals, are indigenous to its flora and fauna. Sri Lanka is home to an abundant avifauna of 453 species, including 240 species of birds that are known to breed there. Some ornithologists regard 33 species to be endemic, while others believe that only 27 are, with the remaining six being suggested endemics.

Sri Lanka is a democratic republic and a unitary state with a semi-presidential government that combines a presidential and parliamentary form of government. The oldest democracy in Asia is found in Sri Lanka. A two-thirds majority in parliament is required to modify the majority of the constitution's provisions. At birth, Sri Lankans may expect to live 75.5 years, which is 10% longer than the global average. Both the baby and maternal mortality rates are comparable to those in developed nations. These numbers have been significantly impacted by the nation's adoption of a universal, "pro-poor" health care system. With 33 suicide deaths per 100,000 people, Sri Lanka has the highest rate of suicide deaths among the Southeast Asian nations. The Department of Census and Statistics claims that the primary factors contributing to the high suicide rates are poverty, destructive hobbies, and an inability to handle stressful situations. The World Health Organization declared that Sri Lanka had successfully eradicated measles and rubella before its 2023 target date on July 8, 2020.

Sri Lanka has one of the most literate populations among developing countries, with a literacy rate of 92.9%. Its primary school enrolment rate is over 99%, its computer literacy rate is 35%, and its juvenile literacy rate is 98.8%. Every child must attend school for a minimum of nine years according to the current educational system. There are 17 public universities in Sri Lanka. Major issues for the education sector still include the lack of responsiveness of the educational system to labour market demands, inequities in access to high-quality education, and a lack of a strong connection between secondary and higher education. Private universities that provide degrees have popped up recently to address

these gaps, but the participation rate at the tertiary level of education is only 5.1%. Sri Lanka dropped from 89th to 95th place in the Global Innovation Index in 2021.

### **Crisis and its Impact**

The island nation of Sri Lanka is currently experiencing an ongoing economic crisis that began in 2019 which is the worst economic crisis since its independence in 1948. Unprecedented levels of inflation, a close to complete depletion of foreign exchange reserves, a shortage of medical supplies, and an increase in the cost of essential commodities are the results. According to reports, a number of interrelated reasons, including tax reductions, money creation, a national initiative to switch to organic or biological farming, the 2019 Easter bombings in Sri Lanka, and the COVID-19 pandemic's effects in Sri Lanka, are the reasons that led to the crisis leading to the protests in Sri Lanka in 2022. According to a United Nations study published in September 2022, officials' impunity for violations of human rights and financial crimes is to blame for the economic disaster.

#### *Administration*

State funds are severely drained by state-owned enterprises (SOEs) which resulted in widening of the country's fiscal deficit. State-owned enterprise management was ineffective because the ruling parties employed SOEs for quick political benefits, which paved the way to lose focus on a long-term sustainable strategy. The country's treasury provided SOEs with unrestricted funding, allowing them to borrow money from other state organisations, particularly state banks, which led to imbalance in their budgets.

#### *Tax Reductions*

The budget deficit increased as a result of significant tax cuts, which had an impact on government revenue and fiscal policy. VAT was reduced to 8%, cutting corporation tax from 28% to 24%, eliminating the Pay As You Earn (PAYE) tax, and eliminating the 2% "nation-building tax" that funded infrastructure development. Increased tax-free thresholds caused a 33.5% drop in registered taxpayers.

The International Monetary Fund (IMF) had advised the Central Bank of Sri Lanka to cease printing money, raise interest rates, increase taxes, and reduce spending. Instead, the Central Bank started printing money in record volumes to pay for government spending.

The government declared an economic emergency in September 2021 as a result of the declining value of the national currency, growing inflation as a result of high food costs and pandemic travel restrictions, which further reduced the country's income.

#### *Tourism*

The tourism industry contributed more than 10 percent of Sri Lanka's GDP. The 2019 Easter bombings had a negative impact on the industry, and the COVID-19 epidemic made recovery impossible. In 2018, tourism contributed 5.6% to the country's GDP, but by 2020, this had decreased to barely 0.8%.

#### *Transition To Biological Agriculture*

In June 2021, Sri Lanka banned the use of inorganic fertilisers and pesticides all over the country. The alerts from the scientific and farming critics who warned of a potential collapse of agriculture as well as a financial catastrophe which would lead to devaluation of the national currency were disregarded. The ban on inorganic fertilisers and agro chemical-based fertilisers was made in April 2021. Rice production fell by 20% in the first six months alone, undoing previously attained self-sufficiency and forcing the nation to import rice as a result of the fertiliser restriction. This alone caused economic losses of roughly \$425 million in the tea industry. The state of the tea business was described as critical, with farmers producing half the output and organic production being 10 times as expensive. After rising food prices and many weeks of anti-plan rallies, Sri Lanka gave up on its ambition to establish itself as the first country to use organic farming in November 2021. The crisis had already harmed agricultural productivity by December 2021, with the significant rise in prices. For some crops, the prohibition on fertiliser has been lifted, although urea prices have increased globally as a result of the price of oil and gas.

#### *Russia- Ukraine War*

The consequences of the Russian invasion of Ukraine in 2022 also had an impact on Sri Lanka's already weak economic situation, since Russia is Sri Lanka's second-largest market for tea exports. Also, as the majority of tourists arriving in the country are from Russia and Ukraine, the invasion has made the country's economic woes much worse. As a result, Sri Lanka's economic recovery has been halted, with both the tea and tourism industries suffering significant losses as a result of the Ukrainian crisis.

#### **How can Sri Lanka overcome the Crisis?**

To pay its debts and recover from this crisis stronger, Sri Lanka needs extensive economic reforms for long-term sustainable prosperity. In order to maintain macroeconomic stability and public trust in the local currency, a steady monetary policy is essential. An independent Central Bank is crucial, as demonstrated by the current economic crisis. Sri Lanka is experiencing in order to forbid money from being printed. It may be possible for Central Bank committees to make long-term policy choices on interest rates and reserve requirements without interference from politics, for a fixed duration. The government should establish a method to effectively collect taxes and expand the tax base rather than just raising taxes.

Reform is required to control state spending. Specifically, reforms that relate to governmental agencies that are operating at a loss and passing legislation demanding financial disclosures and independent audits are needed. Financial discipline could be achieved by requiring SOEs to balance their budgets and limiting help from the Treasury.

Additionally, reforms are required to lessen Sri Lanka's long-standing current account deficits. The objective should be to move the nation into an export-driven economy. With a focus on import substitution, Sri Lanka has among of the highest tariff rates in the area, protecting local industry. Attempting to create a large number of goods only in Sri Lanka for the local market results in diminished economies of

scale, which leads to lower quality and/or more expensive items.

More economic supply will be available if the nation focuses on manufacturing and production thereby reducing the unemployment rate gradually. This calls for skilled labour. Skilled labour is a product of change in the educational system which concentrates not only granting degrees but also fostering work skills. Hence, the nation may rely on manufacturing and production income in addition to tourism.

### **Can environmental conservation help Sri Lanka?**

Yes, indeed conserving the environment can serve as an aid to revive the crashed economy of the once developing country like Sri Lanka, in the following ways.

#### *Use of solar energy*

The initial stage in environmental conservation can be the transition from non-renewable to renewable energy. As a result, the country might become less dependent on crude oil imports. This will then help the nation's families get used to using renewable energy sources like solar, wind, thermal, biomass, etc. As the country becomes more dependent on the environment for its daily needs, the need to protect the environment is inevitable. The government can implement policies that initiate people to lead environmentally and morally responsible lifestyles. Sri Lanka's higher frequency of power outages led to lack of lighting in the streets, shops, and homes made it challenging for the people to live their daily lives. Even though the shops had generators, the fuel ran out for the generators. Dependence on electricity can be reduced slowly by people by installing solar panels in their homes and shops. Though solar panels are pricey, they are a one-time investment and have a 30-year lifespan which would benefit the environment, thereby reducing the reliance on crude oil imports. This effort can help the country to save on depleting the country's forex reserves as well. The country can try to create vehicles that don't require gasoline, diesel, or electricity in a world where technology is rapidly

advancing where use of solar-powered vehicles is an option.

#### ***Biomass***

Biomass refers to the process of transforming waste into energy. Electricity and heat are produced using this method of energy production. The Sri Lankan government can encourage the hotel industry to try converting the food waste generated everyday into an excellent source of renewable, clean energy. The hotels and restaurants produce tonnes of food waste like expired food products, vegetable scraps, meat and other items every day. Since waste disposal unethically leads to production of methane that contributes to global warming, hotels may consider recycling of the food waste. Waste products, the primary component of solid biomass, have a significant biogas potential. Anaerobic digestion is a method that hoteliers can use to extract and recover energy from food waste. Another process for converting organic materials, such as animal or food waste, into biogas and biofertilizer is anaerobic digestion. Anaerobic digestion can break down biomass into energy, which hotel owners can use to help solve their energy problems. The operation costs may be reduced and a sustainable energy source is created when the hotel and restaurant wastes are turned into energy, thereby increasing profits. Value for money is achieved for the organisation by minimising waste and maximising resource efficiency. By lowering costs and hazards now, using biogas can help the future. Additionally, it can lower utility costs and help businesses save a tonne of money while also helping society and the environment.

#### ***Bio-Toilets In Trains***

The bio toilet is a mechanised decomposition toilet system that uses high grade bacteria to break down human excretory waste in the digester tank, turning it into water and methane gas as it decomposes. Compared to traditional toilets, a bio toilet is a unique toilet which helps to maintain the station clean and conserves a lot of water. Human waste is treated at the source via biodigester technology. As seed material for the biodigesters, a group of anaerobic bacteria that can

function at temperatures as low as  $-5^{\circ}\text{C}$  and as high as  $50^{\circ}\text{C}$  break down organic human waste into water, methane, and carbon dioxide gases. According to the DRDO's bio-toilet idea, each toilet has a bio-digester tank that is stocked with inoculums containing four different varieties of bacteria. The toilet's water trap system keeps air out of the tank while anaerobic bacteria decompose human waste in seven chambers of the tank, allowing methane gas to escape into the atmosphere. Sri Lanka can try this method of energy to provide electricity to run fans and lighting, fuel for trains or to provide a catering service in the trains. This will to some extent lower the cost

of operation and eventually lessen reliance on imports from other countries.

### Conclusion

Due to the pandemic's devastating effects on Sri Lanka's valuable tourism industry and the remittances sent home by foreign employees, credit rating agencies rushed to downgrade Sri Lanka and virtually shut it out of the global capital markets. Sri Lanka, by its efforts and policy changes can rely on manufacturing and production income in addition to tourism. With adoption of environmental conservation methods like use of biomass, solar energy and bio toilets there is still a huge hope for Sri Lanka to revive its economy.

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**ENVIRONMENTAL IMPACT OF UNCONTROLLED DISPOSAL OF E-WASTES****Dr. Priti P. Gawande**

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**ABSTRACT**

E-wastes consist of discard of electronic appliances such as computers, mobiles and telephones. Major producers of e-wastes are USA, China, Europe and Australia and the total estimate of these products is about 25 million tonnes per year. These countries are forced to adopt the "reuse" procedure to save environment and money flow. However certain e-wastes are having their self-life, which cannot be reuse. Hence, it is essential to recycle or disposal of these with suitable precautions. Uncontrolled disposal and recycling activities generate and release high toxic metals In this current research paper, potential environmental health consequences of these toxic metals and organo compounds are described. The selection of this topic is to evaluate electronic waste (e-waste) pollution and the toxic substances present in the e-waste and their threats to human health.. By developing eco-design devices and collecting e-waste and safe handling the disposal brings clean environment. There is no exact tool to solve this issue.

**Keywords:** Toxic metals; flame retardants; pesticides, E-waste; environmental hazard; Occupational hazard.

**Introduction**

"E-waste" is a popular, informal name for electronic products nearing the end of their "useful life." E-wastes are considered dangerous, as certain components of some electronic products contain materials that are hazardous, depending on their condition and density. The hazardous content of these materials pose a threat to human health and environment. Discarded computers, televisions, VCRs, stereos, copiers, fax machines, electric lamps, cell phones, audio equipment and batteries if improperly disposed can leach lead and other substances into soil and groundwater. Many of these products can be reused, refurbished, or recycled in an environmentally sound manner so that they are less harmful to the ecosystem. This paper highlights the hazards of e-wastes, the need for its appropriate management and options that can be implemented Industrial revolution followed by the advances in information technology during the last century has radically changed people's lifestyle. Although this development has helped the human race, mismanagement has led to new problems of contamination and pollution. The technical prowess acquired during the last century has posed a new challenge in the management of wastes. For example, personal computers (PCs) contain certain components, which are highly toxic, such as chlorinated and brominated substances, toxic gases, toxic metals, biologically active materials, acids,

plastics and plastic additives. The hazardous content of these materials pose an environmental and health threat Thus proper management is necessary while disposing or recycling ewastes. These days computer has become most common and widely used gadget in all kinds of activities ranging from schools, residences, offices to manufacturing industries.. Basel Action Network (BAN) estimates that the 500 million computers in the world contain 2.87 billion kgs of plastics, 716.7 million kgs of lead and 286,700 kgs of mercury. The average 14-inch monitor uses a tube that contains an estimated 2.5 to 4 kgs of lead. The lead can seep into the ground water from landfills thereby contaminating it. If the tube is crushed and burned, it emits toxic fumes into the air .

**2. Effects on Environment And Human Health**

Disposal of e-wastes is a particular problem faced in many regions across the globe. Computer wastes that are landfilled produces contaminated leachates which eventually pollute the groundwater. Acids and sludge obtained from melting computer chips, if disposed on the ground causes acidification of soil. For example, Guiyu, Hong Kong a thriving area of illegal e-waste recycling is facing acute water shortages due to the contamination of water resources. This is due to disposal of recycling wastes such as acids,



sludges etc. in rivers. Now water is being transported from faraway towns to cater to the demands of the population. Incineration of e-wastes can emit toxic fumes and gases, thereby polluting the surrounding air. Improperly monitored landfills can cause environmental hazards. Mercury will leach when certain electronic devices, such as circuit breakers are destroyed. The same is true for polychlorinated biphenyls (PCBs) from condensers

### 3. Management Of E-Wastes

It is estimated that 75% of electronic items are stored due to uncertainty of how to manage it. These electronic junks lie unattended in houses, offices, warehouses etc. and normally mixed with household wastes, which are finally disposed off at landfills. This necessitates implementable management measures. 1E-waste management tips 1. Don't throw the waste cell phones, dumped systems into the landfills. Properly, deliver them to the organizations where recycling is carried out. Get the electronic goods from the vendors who can take back for recycling. . Take care of the lifetime of your hardware equipments and so that e waste can be efficiently decreased .Big Industries may buy recyclers that can be used for long time. . Citizens should turn their interests to use the recycled products 6. Support green engineering

**Production-process modification** Changes can be made in the production process, which will reduce waste generation. This reduction can be accomplished by changing the materials used to make the product or by the more efficient use of input materials in the production process or both. Potential waste minimization techniques can be broken down into three categories: i) Improved operating and maintenance procedures, ii) Material change and iii)Process-equipment modification

#### E-Waste in India

As there is no separate collection of e-waste in India, there is no clear data on the quantity generated and disposed of each year and the resulting extent of environmental risk. The preferred practice to get rid of obsolete electronic items in India is to get them in exchange from retailers when purchasing a new

item. The business sector is estimated to account for 78% of all installed computers in India . Obsolete computers from the business sector are sold by auctions. Sometimes educational institutes or charitable institutions receive old computers for reuse. It is estimated that the total number of obsolete personal computers emanating each year from business and individual households in India will be around 1.38 million. According to a report of Confederation of Indian Industries, the total waste generated by obsolete or broken down electronic and electrical equipment in India has been estimated to be 1,46,000 tons per year.. Being a rich source of reusable and precious material, E waste is also a good source of revenue generation for many people in India. The big portion (rag pickers) of the Indian population earned their livelihood by collecting and selling the inorganic waste-like plastics, polythene bags, glass bottles, cardboard paper, other ferrous metals, etc. In India, most of the operations related to E-waste such as collections, segregation, dismantling, recycling, and disposals are performed manually. In absence of the adequate technologies and equipment, most of the techniques used for the recycling/treatments of E-waste are very raw and dangerous. Figure 1 reveals the trend in growth of E-waste in India that is continuously rising over the years. In 2007 E-waste generation is 332979, but in 2009 it is 69926 MT. more than previous record. In 2011 the production of E-waste is 487515, and it is 84610 more than 2009. So we conclude that the E-waste rising over the year with a healthy pace and it is an alarming signal for Indian environmentalists, planners and administrators.

#### E-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 rudimentary 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.

### 6.0 Management Options to Severity Of The Problem

Considering the severity of the problem, it is imperative that certain management options be adopted to handle the bulk e-wastes. Following are some of the management options suggested for the government, industries and the public.

#### Responsibilities of the Government

Governments should set up regulatory agencies in each district, which are vested with the responsibility of co-ordinations and consolidating the regulatory functions of the various government authorities regarding hazardous substances.

**Responsibility and Role of industries** while handling e-wastes. Some are given below:

Use label materials to assist in recycling (particularly plastics). Standardize components for easy disassembly. Re-evaluate 'cheap products' use, make product cycle 'cheap' and so that it has no inherent value that would encourage a recycling infrastructure. Create computer components and peripherals of biodegradable materials. Utilize technology sharing particularly for manufacturing and de manufacturing.

**Responsibilities of the Citizen** Waste prevention is perhaps more preferred to any other waste management option including recycling. Donating electronics for reuse extends the lives of valuable products and keeps them out of the waste management system for a longer time. But care should be

taken while donating such items i.e. the items should be in working condition. Reuse, in addition to being an environmentally preferable alternative, also benefits society. By donating used electronics, schools, non-profit organizations, and lower-income families can afford to use equipment that they otherwise could not afford. E-wastes should never be disposed with garbage and other household wastes. This should be segregated at the site and sold or donated to various organizations.

### Conclusions

Solid waste management in India, which is already a very problematic task, is becoming more difficult by the attack of e-waste. The complaint is alarming as India generates about 1.5 lakh tones of e-waste annually and almost all of it finds its way into the informal sector as there is no organized alternative available at present. E-waste generated in few cities across the nation show an alarming picture. In India Mumbai is on the top in terms of E-waste generation followed by Delhi with 9730.5 metric tonnes e-waste. Institutional infrastructures, including e-waste collection, transportation, treatment, storage, recovery and disposal, need to be established, at national and/or regional levels for the environmentally sound management of e-wastes. Establishment of ewaste collection, exchange and recycling centers should be encouraged in partnership with private entrepreneurs and manufacturers. An effective take-back program providing incentives for producers to design products that are less wasteful, contain fewer toxic components, and are easier to disassemble, reuse, and recycle may help in reducing the wastes. Hence creating awareness among the e-waste generating sectors is the important task now.

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# THE ROLE OF THE ENVIRONMENT IN ECONOMIC GROWTH IN INDIA

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## ABSTRACT

*Economic environment is one of the most crucial elements of the business environment. In India, the economic environment consists of various macro-level factors that are related to the production and distribution of the organization. These factors have an impact on the wealth of businesses and industries. The economic environment relates to all the economic determinants that influence commercial and consumer compliance. The term economic environment indicates all the external economic circumstances that affect the purchasing practices of customers and markets. Hence, it influences the production of the business. The research article has been written on the basis of secondary information for this research. And based on the information received, important findings of the research have been presented.*

**Keywords:** economic, environment, Gross Domestic Product, Unemployment.

## Introduction

Several external factors have a significant influence on a country's economy. These factors play a huge role in deciding consumer behaviour and financial flow of a country, thereby affecting its economic activities. All these elements together constitute the economic environment definition.

These elements of economic environment are as follows –

### Gross Domestic Product (GDP)

Gross Domestic Product is the total value of all products and services produced in a country. Therefore, the growth of GDP signifies that the economy of a country is stable and improving. It also means that people have more disposable income that, in turn, leads to increased demand for products and services.

It evaluates the financial worth of final goods and services—those that are purchased by the end user—produced in a country over a specific time period (say a year). It includes all of the output generated within the country. GDP also includes non-market production, for example, education services which are provided by the government itself. The GDP growth rate measures the economic reports and amount of a country's economic growth (or contraction). Faster growth in the gross domestic product (GDP) expands the overall size of the economy and strengthens fiscal conditions.

## Unemployment

A high level of unemployment in a country means that such an economy is not using its resources to its full potential. At the same time, it would negatively impact individual disposable income that will result in lower demand. It affects the commercial aspect of an economy significantly. This phenomenon is markedly noticed in the existing economic environment in India.

The individuals not only lose income but also face other hurdles financially as well as mentally. Government expenses extend further than the provision of benefits to the loss of worker output, which eventually reduces the gross domestic product (GDP) which in turn leads to economic issues and then poverty. It will lead to lower GDP growth and fall in tax revenue for the government.

## Inflation

When the overall prices of goods and services increase in a given period, it is known as inflation. It happens when even though the prices of goods and services are rising the general income level of consumers stays the same. Therefore, individuals have less money at their disposal. Small businesses and cottage industries are also affected as prices of raw goods and labour increase, resulting in smaller profit margins.

The propensity for the price level to rise over time is referred to as inflation. Inflation boosts

prices and has the potential to reduce the purchasing power of consumers. People buy more than they need to avoid paying higher costs tomorrow, which drives up demand for products and services. Suppliers are unable to keep up. Worse still, neither can salaries. As a result, most individuals are unable to afford common products and services. Inflation reduces the value of pensions and savings.

### **Government Policy**

Government policies also play a huge role in influencing the economy of a country. Government policy can have a major influence on the economic environment. This can include fiscal or monetary policy. An example of monetary policy is a reduction in interest rates on bank loans which encourages consumers' demand for loans. An example of fiscal policy would be when the government decides to reduce income tax. Both of these policies attempt to gradually increase individual disposable income and encourage consumers to spend more, thus boosting commercial activities.

It can influence interest rate, taxation and a rise, which tends to increase the borrowing cost. Consumers will spend less if the interest is higher but if the interest rate is lower it might attract investments. In general, a government's active role in responding to the economic circumstances of a country is for the purpose of preserving important stakeholders' economic interests.

### **Reforms in the Banking Sector**

The banks are considered to be one of the most crucial aspects of the Indian economy. As a consequence, any reforms in this sector will have a huge impact on the economy.

The banking sector plays a vital role in the betterment of the economy. By boosting the quality of financial services and increasing money accessible, banking sector openness may directly improve growth.

### **Role of the Public and Private Sector**

India has a mixed economy where both the private and public sector plays a significant role. While the public sector plays a valuable

role in carrying out plans and reforms, developing infrastructure and building a strong industrial base, the private sector is responsible for generating employment opportunities. About 80% of the population is working in either organised or unorganised private sectors. The public sector promotes economic development at a rapid pace by filling gaps in the industrial structure. It reduces the disparities in the distribution of income and wealth by bridging the gap between the rich and the poor. Agriculture and other activities like dairying, poultry come under the private sector. It plays an important role in managing the entire agricultural sector.

### **Balance of Trade and Balance of Payment**

Briefly, Balance of Trade (BOT) is the difference between the money value of a country's imports and exports of material goods only whereas Balance of Payment (BOP) is the difference between a country's receipts and payments in foreign exchange. When the exports are greater than the imports, it leads to a favourable trade balance. It means there is a high demand for its goods offshore, and that increases the demand for its currency. On another hand, when the outflow is greater than the inflow, there is a current account deficit. BOT records only merchandise and doesn't record transactions of a capital nature. BOP records transactions relating to both goods and services. BOP is a true indicator of the economic performance of an economy.

### **Consumer Confidence**

The consumer is confident about his purchasing habits or decisions when they know they have income stability, and income is stable when the overall economy of a country is. It also affects the markets. For instance, if manufacturers and retail stores detect weak consumer confidence, they have to manage their inventory and cut back on production. Therefore, the economy will experience a slow down and ultimately, recession. A stable and growing economy usually boosts a consumer's confidence.

The confidence of consumers impacts their economic decision and hence is a key indicator for the overall shape of an economy.



### **Economic environment definition**

The economic environment relates to all the economic determinants that influence commercial and consumer compliance. The term economic environment indicates all the external economic circumstances that affect the purchasing practices of customers and markets. Hence, it influences the production of the business.

As a component of economic reformations, the government of India declared a new industrial system in July 1991. The extensive characteristics of this system were as follows:

1. The government decreased the number of enterprises below mandatory licensing to six.
2. Many of the businesses held for the public sector under the initial policy were justified. The purpose of the public sector was defined only to four industries of vital importance.
3. Disinvestment was conducted in case of many public sector industrial companies.
4. The policies towards foreign funds were expanded. The percentage of foreign equity partnerships was extended. In many ventures, 100 percent of foreign direct investment (FDI) was allowed.
5. The automatic approval was now given for technology transactions with foreign firms.
6. Foreign investment promotion board (FIPB) was established to support and channelise the foreign financing in India.

### **Liberalization**

The economic reforms that were presented were directed at liberalising the Indian business and trade from all the redundant restrictions and limitations. They indicated the end of the licence-permit-quota raj. The liberalisation of the Indian business has taken place with respect to the following:

1. By eliminating the licensing terms in most of the industries, excluding a shortlist
2. By providing freedom in determining the range of marketing activities, i.e., no constraints on the development or consolidation of business pursuits
3. By dismissing the restraints on the transportation of commodities and services

4. By providing freedom in deciding the cost prices of commodities and services.

### **Privatisation**

The new set of economic changes intended at proffering a prominent position to the private sector in the nation-building rule and a diminished role to the public sector. This was a withdrawal of the growth policy attempted so far by the Indian directors. To accomplish this, the administration redefined the role of the public sector in the new industrial policy of 1991, approved the policy of proposed disinvestments of the public sector, and determined the loss-making and weak industries to the Board of Industrial and Financial Reconstruction (BIFR).

### **Globalisation**

Globalisation implies the combination of different economies of the world heading towards the development of a united (closely-knitted) global marketplace. Till 1991, the government of India had followed a course of stringently controlling imports in terms of price and quantity. These laws were with respect to the following:

1. Licensing of imports
2. Tariff limitations
3. Quantitative constraints

The new economic reforms directed at business liberalisation were focused towards import liberalisation, export improvement through rationalisation of the tax structure, and changes with respect to foreign exchange so that the nation does not remain separate from the rest of the world.

### **Objective**

- 1) Studying the relevant elements of the economic environment.
- 2) Presenting its information in respect of LPG policy which came into force in 1991.
- 3) Based on the title of the research and based on the available information, formulate important conclusions.

### **Review of literature**

Mukherji, Rahul(2009)'The State, Economic Growth, and Development in India',India Review,8:1,81 — 106.Concluded that The

Indian state has been more penetrated by social actors than many East and Southeast Asian states. Unlike China, India could neither abolish private enterprise nor could it embrace globalization with the same speed and ferocity. Both complete state-driven nationalization and state-driven globalization would demand a state, which would have much greater command over interest groups like industrialists, farmers and trade unions. Policies favoring economic growth and development in India needed to evolve gradually after building a social consensus on those policies. This is a model of development driven by a relationship between the state and society, where the power of the state, even in its commanding moments, was moderated by the power of social actors.

### **Research Methodology**

The research article has been written on the basis of secondary information for this

research. And based on the information received, important findings of the research have been presented.

### **Limitation**

- 1) The writing of the research article has been done on the basis of secondary information.
- 2) The findings obtained in these research articles have been studied and presented only on the basis of secondary information.

### **Conclusion**

After the policies adopted in 1991 in the Indian economy, a large amount of foreign investment started coming into India. The whole world was also connected to the small rural areas of India. It seems to have had a positive impact on India's economy. The economic reforms that were carried out in developing countries like India had an impact on the development of the economy here.

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## A STUDY OF ENVIRONMENT AND CLIMATE CHANGE AND ITS IMPACT ON HUMAN LIFE AND HUMAN DEVELOPMENT INDEX.

**Prof. Ganesh Shivaji Kiroche**

Environment is the most important factor in life. Ecology has been a tool for the survival of humans on Earth. Julian Steward in his School of Culture Ecology explained the relationship and role of Ecology and Human Development. An important part of Ecology in the modern world is Climate. Climate is the determinant of various aspects of human life, food, shelter, clothes, and various biological and genetic adaptations. Climate for a long has been influencing human development. The modern world today has altered various environmental paradigms including Climate which has pushed the Earth towards degradation. Human development can be understood as qualitative development of human life which includes various facets such as economic, social, psychological. It focuses upon improving the lives of the people in all dimensions rather than simply assuming that economic wellbeing determines the quality of life. Climate change according to Intergovernmental Panel on Climate Change (IPCC) refers to a change in the state of the climate which can be noted using statistical analysis via changes in the average reading of a parameter or the variability of its properties which persists for a long duration like a decade or longer. Human Development and the Climate have been interlinked for a long, however, there has to be a balance between economic developments with environmental protection. Landslides, floods, etc. claim lives and render several human beings homeless. Climate change plays a major role in increasing the frequency of such hazards.

### **\*Impact of Anthropogenic Changes on Environment:**

The relationship between man and his environment is a complex phenomenon because this relationship has changed from time to time. Man has been successful in changing the environment for his benefit. This act of man has rapidly increased since the

industrial revolution. Various impacts produced by these changes can be read below:

\*As per the UN report **The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services:**

- **Nearly 1 million animals and plants are threatened and near extinction** due to these anthropogenic changes.
- **Forest and wetlands have been converted into urban areas at a double rate since 1992**
- **The use of fertilizers has resulted in about more than 300 dead zones in the oceans**
- The ever-increasing population puts pressure on natural resources to address food security, economic security, and other such necessities of life. For example overfishing, extensive use of fertilizers, Land Degradation, etc.
- Mining, deforestation, increase in exotic/invasive species animals and plants and overgrazing have individually as well as collectively affected the land and caused erosion.

### **Climate Change and Human Development**

- Climate Change hampers human development and growth curbing freedom and diversion of human potential towards survival and not growth. Climate change has proved to be a big hurdle in achieving the **Millennium Development Goals (MDG)** and maintaining the human development index.
- Climate change can have a serious impact not only on human beings but also destroy crops, can lead to the submergence of coastal regions due to the melting of icebergs, and also affect various ecosystems like forests, aquatic, etc.

### \*Impact of Climate Change on Human Health:

Climate change is the biggest health threat of the century. It may have direct and indirect effects on human health.

- **Direct Effect on life:** This includes heavy storms, droughts, rise in the sea level, hurricane tornado, and heatwaves. An increase in the heat waves causes mortality and heat exhaustion. Heatwaves due to climate change can cause cardiovascular and respiratory diseases and various diseases .
- **Indirect effects on life** – Airborne and water-borne diseases are caused due to these changes. **It is estimated that by 2039 there will be an increase in 8-11% of diarrhea in the tropics and the subtropics.** Food insecurity, vector-borne diseases (estimates show that the people who will be at risk of malaria will rise from 25 million in 2020 to 50 million by 2080), under nutrition, and forced displacements are also the indirect impacts.

It also impacts the socio-economic system by increasing undernutrition due to lower food supply, especially in the tropics. Climate change creates health threats and New Public Health challenges. It is not only a concern for the future but it's happening now as well. Every year there is an increase in mean temperature and more human beings are affected by climate-sensitive diseases and disasters. The health industry can play an important role in decreasing the greenhouse emission that causes this climate change.

#### \*Impact of Climate Change on India:

As per the Report of Ministry of Earth Sciences titled **Assessment of Climate Change over the Indian region as below**–

- **The Average temperature of India has increased by about 0.7°C in the last 120 years.** This has caused changes in monsoons and the duration of seasons. This impacts the public at large living in the Indian Subcontinent.
- **Sea Surface Temperature in the Indian Ocean region has also risen by about 1°C** which has made disasters like flash floods and cyclones more common and frequent.

- **The South-West Monsoon rains have decreased by about 6%** making the events of drought and heatwaves severe.
- Sea Levels have also risen at an alarming rate to about 3.3mm per year which puts major coastal cities like Mumbai, Chennai, etc. at risk of submergence and displacement of a large number of the population settled there.
- **The Hindu Kush Himalayas has experienced a temperature rise of about 1.3°C coupled** with rapid glacial melting and disasters like landslips and glacial lake outbursts.

Without a robust policy or implementation program, the balance between human development and environmental preservation is not possible. Owing to this realization and the fact that the problem of environmental degradation is a global phenomenon, governments of various countries have come together to prepare a road map where development has been transformed into the concept of sustainable development. Various steps that have been taken to augment sustainable development are:

#### \*Glasgow Summit 2021 organized for the issue of climate change and Env.:-

**United Nations Climate Change Conference (UNFCCC), also known as COP26** was held in the city of Glasgow, Scotland, between 31 October and 12 November 2021.

1. It works on a five-year cycle of climate actions, first since Paris Climate Conference.
2. Signatories needed to announce their Nationally Determined Contributions (NDCs) and adapt to the impact of climate change.
3. Frame a long-term strategy to improve green energy.
4. Developed countries need to urgently scale up their climate finance initiatives.
5. Needs to revise its Nationally Determined Contributions (NDCs) in line with the commitments in the Glasgow Agreements.
6. Need for effective planning catering to every sector and on a priority basis.
7. Need to focus on energy transition from non-renewable to green energy sources.

8. India needs to include climate change in its legislation which it has for protecting the environment.
9. Mitigation – stronger action in the current decade was most critical to achieving the 1.5-degree target.
10. Adaptation – Poorer and smaller countries need to have adaptation in their agendas with financial support from developed countries.
11. Finance – Developed countries need to be accountable for their emissions and have to support others.
12. Accounting earlier failures – Failure in providing the said finance was regretted and countries were asked to provide transparent information about the money being provided by them.
13. Loss and Damage – Robust discussions on loss and damage happened in Glasgow.
14. Carbon Markets – Glasgow Pact as a reprieve has allowed the carbon credits to be used in meeting countries’ first NDC targets for developing countries.
15. To improve green energy.
16. In this way climate change affect to direct human life cycle. And life expectancy is fully depend on environment. So we try to save environment.

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## ROLE OF LIBRARIES IN ACHIEVING SUSTAINABLE DEVELOPMENT GOALS (SDGS) IN INDIA

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### ABSTRACT

*This paper although an opinion paper emphasizes the roles of libraries in achieving the sustainable development goals. Libraries as important resources for achieving these goals must provide relevant and adequate information to the public in an accessible way. This paper, therefore, maps out the roles that library play towards achieving the sustainable development goals. This paper also highlighted the problems militating against libraries towards achieving sustainable development goals and made recommendations. The study proffer recommendations that libraries should regularly organize seminars, Government should ensure that libraries and information centre are fully integrated into the scheme of activities at both the local and national level, government and the parent institution should support the library and information centres financially etc.*

**Keywords:** Libraries, Sustainable development goals, niti ayog.

### Introduction

Vasudhaiva Kutumbakam, an ancient Indian phrase meaning “the world is one family”, concisely captures the spirit of India’s approach to all aspects of life including economic development. The Sustainable Development Goals (SDGs) are, thus, part and parcel of the country’s longstanding tradition and heritage. Indeed, the goals substantially reflect the development agenda of India, as Prime Minister Narendra Modi himself noted in his speech at the United Nations Sustainable Development Summit in September 2015. To quote him, “Much of India’s development agenda is mirrored in the Sustainable Development Goals. Our national plans are ambitious and purposeful; Sustainable development of one-sixth of humanity will be of great consequence to the world and our beautiful planet.” As the fastest growing major economy of the world, today, India is uniquely placed to deliver on its commitments to inclusive and sustainable development. Externally the country has played a key role in shaping the SDGs and ensuring the balance among its three pillars—economic, social and environmental. Internally, it has launched many programs to make progress towards these goals. Notwithstanding its scarce financial resources due to relatively low per-capita income, large population and vast geographical

expanse, India is committed to achieving within a short period such ambitious goals as universal rural electrification, road and digital connectivity for all, massive expansions of clean and renewable energy, sanitation and housing for all and universal elementary school education. Taking cue from the memorable phrase Sabka Saath, Sabka Vikas, translated as “Collective Effort, Inclusive Development” and enunciated by the Prime Minister, stakeholders from various walks of life—central and state governments, industry, civil society, technical experts and academics—are coming together to promote a better future for the country. SDGs can be met only through high standards of governance at all levels. In this respect, India is especially fortunate to have highly committed governments at the centre as well as states. In the spirit of cooperative federalism, the two levels of the government have joined hands to bring about the change India needs. While the central government has sponsored schemes to provide employment, connect villages to cities through roads, build houses for the poor and offer education in the states, various sub-groups of Chief Ministers have come forward to give valuable advice to the central government on such important matters as digital payments, skill development and the Swachh Bharat Abhiyaan (Clean India Campaign). Even as it combats poverty, India remains committed to

protecting the environment. Under its Nationally Determined Contributions, India has ambitiously committed to reducing the emissions intensity per unit of GDP by 33% - 35% by 2030 relative to its 2005 levels. Furthermore, it plans to create an additional carbon sink of 2.5-3 billion tones through additional tree cover. Of course, success of the Paris Agreement requires that other signatories make good on their commitment as well. These latter include the provision of financial resources to the tune of USD 100 billion per year for the developing countries. In the spirit of international cooperation, India is pleased to place its Voluntary National Review (VNR) on record. We hope that just as India has been learning from the experience of other countries, other countries will find India's experience helpful in advancing the SDGs.

### **Role of India in Sustainable Development**

India has played an important role in shaping the Sustainable Development Goals (SDGs). This has meant that the country's national development goals are mirrored in the SDGs. As such, India has been effectively committed to achieving the SDGs even before they were fully crystallized. As one of the forty countries that have volunteered to take part in the Voluntary National Reviews (VNRs) at the High-Level Political Forum (HLPF) 2017, India appreciates the focus on 'Eradicating poverty and promoting prosperity in a changing world'. The memorable phrase *Sabka Saath Sabka Vikas*, translated as "Collective Effort, Inclusive Development" and enunciated by the Prime Minister, forms the cornerstone of India's national development agenda. To fast-track this agenda, NITI Aayog, the premier think tank of the Government of India, has recently released a draft Three-Year Action Agenda covering years 2017-18 to 2019-20. In parallel, work on a 15-Year Vision and 7-year strategy document is in advanced stages. Reflecting the country's long-standing federal tradition, these documents are being prepared with active participation of the sub-national governments. While targeting economic growth, infrastructure development and industrialisation, the country's war against poverty has become fundamentally focused on

social inclusion and empowerment of the poor. Even as it combats poverty, India remains committed to protecting the environment. Under its Nationally Determined Contributions, India has committed to minimising the emissions intensity of GDP as well as creating an additional carbon sink. Reinforcing India's commitment to the national development agenda and SDGs, the country's Parliament has organized several forums to develop policy and action perspectives on elimination of poverty, promoting gender equality and addressing climate change.

### **NITI Aayog and Sustainable development:**

The NITI Aayog, with the Prime Minister as its chairperson, is to provide the overall coordination and leadership. The institution has carried out a detailed mapping of the 17 Goals and 169 targets to Nodal Central Ministries, Centrally Sponsored Schemes and major government initiatives. Most sub-national governments have carried out a similar mapping of the SDGs and targets to the departments and programmes in their respective states. The Ministry of Statistics & Programme Implementation has developed a list of draft national indicators in light of the global SDG indicators. This draft has been placed in the public domain for wider consultation. Several of the Government's programmes would directly contribute to advancement of the SDG agenda. A noteworthy example is the Pradhan Mantri Jan Dhan Yojana (PMJDY) which is the world's largest financial inclusion programme. By leveraging PMJDY, Aadhaar (biometric identity system) and mobile telephony, the Government has disbursed a cumulative amount of INR 1.6 trillion (USD 25 billion) to 329 million beneficiaries through Direct Benefit Transfers. This has helped to significantly enhance the efficiency of Government programmes. While the central government has sponsored schemes to provide employment, connect villages to cities through roads, build houses for the poor and offer education in the states, various sub-groups of Chief Ministers have come forward to give valuable advice to the central government on such important matters as digital payments,

skill development and the Swachh Bharat Abhiyaan (Clean India Campaign).

### **Sustainable development Goals (SDG):**

While reporting about the various facets of the SDGs, this VNR focuses on the progress made towards achieving Goals 1, 2, 3, 5, 9, 14 and 17. These Goals have been agreed upon in the HLPF as focus areas for this year. The nature of SDGs, however, is such that the advancement of one global goal may lead to progress in other goals as well.

**Goal 1:** End Poverty in All its Forms Everywhere There is compelling evidence that the rapid growth India has achieved following the economic reforms initiated in 1991 has led to significant reduction in poverty. Poverty has fallen across all economic, social and religious groups nationally and in all states in the post-reform era. Sustained growth (6.2% from 1993-94 to 2003-04 and 8.3% from 2004-05 to 2011-12) has created gainful employment and helped raise wages thereby directly empowering the poor. The Mahatma Gandhi National Rural Employment Guarantee Act, for instance, has generated over 2 billion person-days of employment during 2016-17 alone, largely for the disadvantaged sections of society. Additionally, initiatives have been launched for providing pension and insurance to workers in the unorganised sector, widows and the differently able. Over 130 million people have accessed life and accident insurance under these programmes.

**Goal 2:** End hunger, achieve food security and improved nutrition and promote sustainable agriculture Significant progress has been made in improving food and nutrition security. For instance, stunting among children less than 5 years has declined from 48% to 38.4% between 2005-06 and 2015-16. During the same period, the percentage of underweight children has declined from 42.5% to 35.7%. The absolute levels of stunted and underweight children, however, remain high.

**Goal 3:** Ensure healthy lives and promote wellbeing for all at all ages India has made significant strides in improving various health indicators. The Infant Mortality Rate has declined from 57 in 2005-06 to 41 in 2015-16. Similarly, Under-5 Mortality Rate has fallen

from 74 to 50 over the same period. This has been enabled, at least partially, by a significant improvement in vaccination coverage for children between 12-23 months of age. Moreover, institutional deliveries have increased from 38.7% in 2005-06 to 78.9% in 2015-16. The country's strategy in health is focused on providing essential services to the entire population, with a special emphasis on the poor and vulnerable groups. The National Health Policy, 2017 has specified targets for universalising primary health care, achieving further reductions in infant and under-5 mortality, preventing premature deaths due to non-communicable diseases as well as increasing government expenditure on health. A composite index is being used to monitor and incentivise improvements in health services delivery across states in the country.

**Goal 9:** Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation All forms of transportation -- roads, railways, civil aviation and waterways -- are being rapidly expanded. Road connectivity and electricity are being brought to all villages. The Bharat Broadband Network Ltd. initiative is aiming to provide high-speed broadband connectivity to all village councils in the country. Over the last five years, there has been a consistent growth in installed electricity generation capacity. The installed capacity in non-fossil-fuel sectors has grown by 51.3% and more than doubled in the renewable energy sector (solar, wind, bio- and small hydro power). Further, India is making efforts to become an Information Technology and manufacturing hub through its 'Make in India' campaign.

**Goal 14:** Conserve and sustainably use the oceans, seas and marine resources A clear agenda has been formulated for promoting the 'Blue Revolution'. For tracking the levels of marine pollution along the coastline, the country has developed the Coastal Ocean Monitoring and Prediction System. Additionally, an oil spill management system has been put in place for responding to emergencies arising out of oil spills. Further, the Integrated National Fisheries Action Plan, 2016 is being implemented to promote the

livelihoods of fishing communities as well as the ecological integrity of the marine environment. Giving new impetus to port-led development, the Sagarmala programme is improving port connectivity, port-linked industrialization and coastal community development.

**Goal 17:** Revitalize the global partnership for sustainable development. While working towards revitalizing the global partnership for the achievement of the SDGs, India reaffirms the principle of common but differentiated responsibilities. Despite significant efforts for domestic resource mobilisation, India is unlikely to gather sufficient revenues for achieving the SDGs. Therefore, India reiterates that the developed countries have an essential obligation to provide financial assistance to the developing countries, especially for global public goods such as climate change mitigation and control of pandemics, so that they can fully achieve the SDGs. India also highlights the need for international cooperation for curbing illicit financial flows, defining aid unambiguously and establishing robust systems for monitoring commitments made by donor countries. A path-breaking tax reform agenda is being readied in the country to optimise domestic resource mobilization. This includes direct tax reforms as well as the Goods and Services Tax (GST), a uniform and simplified form of indirect taxation. An innovative tax like the Swachh Bharat Cess (Clean India Cess) has also been levied for mobilizing resources for the Clean India Mission. Additionally, implementation of the budget responsibility legislation is ensuring predictable and sustainable budgeting as well as long-term debt sustainability.

The quote by Luis Herrera was adopted, which states that:

*“Libraries are more relevant than ever. They are a place for personal growth and reinvention, a place for help in navigating the information age, a gathering place for civic and cultural engagement, and a trusted place for preserving culture”.*

## Types of libraries

**National library:** Is a nation’s reference library. It is where all types of libraries tap into because it has a collection of all reading materials written by citizens of the country in all subject areas, it also has collection written by citizens and non-citizens about the country, and those needing materials produced in the country. Therefore, it is the custodian of the nation’s culture and heritage and makes visible national bibliography on an annual basis (Asamoah-Hassan, 2003).

**Academic library:** This is the heart of any academic institution; this implies that any malfunction of academic library affects other parts of the institution negatively. Therefore, the main aim of their existence is to provide resources to support teaching, learning and research in the parent institution’s specific programmes. The clients of these types of libraries are faculty, students and researchers and in recent times the general public who need specific information. These libraries support the role of the institution in turning out human resources who are the wheel in national development. Research results housed by these libraries fashion out policies that go into various sectors of the economy to improve it.

**Special Libraries:** As the name implies these types of libraries provide resources to support the aims and objectives of parent organizations in research, commercial, financial, industrial, diplomatic or belong to a government ministry, department or agency. They have a specific group of people their services are geared towards and serve few clientele outside these group. Functionally, they store and disseminate specific, atom-level information to people; so much so that what academic or public libraries cannot provide in the minute detail is reserved for the special library.

**Public Libraries:** These are libraries open to children, teenagers, young adults, adults and aged, literate and illiterate, physically challenged and able bodied. The role of the public library is primarily to make literacy a joy rather than a task. The communities where these libraries are situated are engaged extensively, they see the library as part of them, which makes it pertinent. Infact, it is



often referred to as the “poor man’s university” because it is stocked with all kinds of materials to satisfy the information needs of citizens and servicing the reading materials for formal and informal education.

**School Library:** This is the first level that children who grow into adults are expected to come into contact with books, culture of reading, social norms and by extension catching future geniuses. These types of libraries are situated in basic schools and works on fertile minds. The roles of these types of libraries are enormous because it is here the mind is encouraged to accept teaching, learning and reading.

### **Roles of Libraries in Supporting Sustainable Development Goals**

The presence of libraries in different environment and the target they serve is a clear indication that libraries have significant roles to play in supporting sustainable development goals whose 7 factors and targets are also diversified. Libraries can support SDGs through the following activities:

#### **Why Librarian Must Support Sustainable Development Goals:**

As long as access to information is paramount to achieving any types of goal, then librarians are key partners. It is interesting to note that libraries and librarians play very significant roles beyond what is documented about them. This could inform the IFLA Statement on Libraries and Development. The IFLA Statement on Libraries and Development (2013) stated that libraries contribute to the delivery of Sustainable Development in the following ways:

- Libraries provide opportunity for all
- Libraries empower people for their own self-development
- Libraries offer access to the world's knowledge
- Librarians provide expert guidance
- Libraries are part of a multi stakeholder society

The activities of librarians go beyond listing to that of taking charge and delivering to the patrons relevant information to drive and actualize the sustainable developmental goals

is also viewed because of library inclusiveness. Therefore, librarians must well-articulated services they provide, targeted at item by item of the goal according to the mandate of the library and the audience they serve.

In addition, the national library regulating institutions which is the Librarians Registration Council of Nigeria (LRCN) must avail stakeholders like the NLA and its sub-sections taking charge of the different types of library to work in collaboration to ensure that their policies and propose action plans are complete, clear and current as it support the sustainable development goals.

The following may be suggested:

**1. Policy Formulation:** The policies of LRCN and NLA which should serve as convener is expected to articulate each aspect of the SDGs and appropriate line of action as mandate of the respective types of library. Opinions of professionals from diverse perspectives can be cross pollinated to enrich the document. This is also the opinion of Anyaoku (2016) who suggested that SDGs can be achieved through enabling policies.

**2. Introduction of Advocacy Programmes:** The LRCN and NLA should provide platforms on which different themes either through seminars, conferences, road walks, social media technology and others like television and radio interview to sensitize members of the public of the collections in the libraries on SDGs and advocating the use of these resources for knowledge, practice and implementation of the itemize goals for our collective good and prospective future.

**3. Collaboration with NGOs and other Public Sector:** NGOs are fast and successful driving force to meeting the local needs of the inhabitants of a particular area. Libraries can partner with the above group for fund raising, capacity building and enhancing economic and social wellbeing of the less privilege Nigerian (Ekere, Benson and Amaechi, 2016).

**4. Formal and informal training:** The position of the library on the issue of formal and informal training cannot be questioned, however, the capability to distinguish individuals within the two strata is important for librarians so that they can provide service



that are not “just-in-case to “right-on-time” adjudging from the resource request and information carrying capacities of a client. The library during the support facilitates education and continuous training of these categories of client who are also relied upon to actualize the SDGs.

**5. Promoting Open Access Initiatives:** Specialize information gathering by librarians open to all on SDGs would make scholarly publications on SDGs available to the public. This could influence researcher and other stakeholders to take advantage to populate benefits of subscription and supporting the agenda. Kamba and Abdul (2016) itemized the benefits of engaging libraries to support scholarly publications on SDGs to include, gain visibility, network and collaborate with others. Now vital for grants, recognition and prestige among scholars.

**6. Improving Literacy of citizen:** The library will forever be duty bound to improve literacy, this is also numerously repeated as the goal of SDGs. The library and librarian are therefore saddled to continue to support literacy campaigns, implementation and support by pooling together relevant resources to supporting education and training targeted at formal or informal sectors (Aliero, 2016).

**7. Motivation:** Patrons who have distinguished themselves through publications on SDGs, needs support and encouragement to motivate them. This can be done during media charts, road shows and sponsorship of the programmes. The library exhibitions and specialize information provision platforms could be leverage upon to showcase the gains

of subscribing to the SDGs. Other forms of appreciation are gestures; making referral to, giving out awards and making public appreciation were suggested by Segun-Adeniran (2015).

**8. Evaluation:** It is not enough to collate, exhibit and support for the cause of SDGs, it is required that time-to-time there should be an ongoing process consisting of several methods of assessing and analysing the progress of SDG programme promoted by the library. The evaluation shall be based on the set objective and mission, what prospects has been gained when clearly weighted alongside its achievements.

### Conclusion

The numerous submissions by numerous authors, the roles of libraries and librarian who serve in different types of libraries revealed that libraries bridge gaps caused by dearth information, support the extraction of information from pool of sources of information and appropriate services for formal, informal, literate and illiterates, it also include the physically challenged and able bodied. It is imperative of note that the libraries existing in different types can help streamline services that encourages the participation and acceptance of stakeholders through its sharing, collaboration and facilitation platforms and services. As it was pointed out that every sector depends on the library, it could be concluded that the library has all that is required to support the sustainable development goals to be achieve because of its characteristic dependability and inclusiveness.

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**CLIMATE CHANGE ENVIRONMENT AND SUSTAINABLE DEVELOPMENT****A.N. Gawande**Asst. Prof. Smt. K.G.M.M.V. Daryapur, Dist.Amravati (M.S.)  
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From many years the issue of climate change had become very important than other topics. Because this climate change influences every element of this nature living and non living material. The scientists warned the whole world about the severe consequences of this climate change on the living animals and other material. Also they pointed out there is less time to stop such kind of calamity. Climate change together with other natural and human made health stressers influences human health and diseases in numerous ways. Some existing health threats will intensify and new health threats will emerge. Everyone's health is equally at risks. Public health can be affected by disruptions of physical biological and ecological systems including disturbances originating here. This change causes respiratory diseases, injuries, premature deaths, food and water borne illnesses and other infectious diseases. This climate change lead to both higher pollen concentrations and longer pollen seasons causing more people to suffer more health effects from pollen and other allergens. The natural events and human activities are believed to be contributing to an increase in average global temperature. Global warming and climate change refer to an increase in average global temperatures. This is caused primarily by increases in "green house" gases.

Climate change affects all regions around world.. Polar ice shields are melting and sea rising. In some regions extreme weather events and rainfalls are becoming more common while others are experiencing more extreme heat waves and droughts. These impacts are expected to intensify in the coming decades Global warming is projected to have a number of effects on the oceans. On going effects include rising sea levels due to thermal expansions and melting of glaciers and ice sheets and warming of the ocean surface leading to increased temperatures stratification.

Another one impact is altered ecosystems and habitats as climate pattern rapidly shift, habitat on land and in the sea are changing, making them inhospitable for some species, while letting others more in and take over In some case entire ecosystems are of risk of Collapsing.

A range of global environmental changes are altering our planet driven by technological change excessive consumption and rapid population growth These changes are unprecedented in their speed and geographical scale. The best studied from the perspective of health is global climate change which will have wide ranging and mostly adverse consequences for natural and human made systems of particular concern are the risks posed to Earth's life supporting geophysical and ecological systems and processes. These systems are critical for attaining and maintaining of good population health. The health risks of changing climate include direct indirect and diffuse and delayed effects such as adverse health impacts from exposure to extreme weather and climate events vector, water and food born diseases, poor air quality insufficient quality and quantity of food. Health systems need to be modified to effectively address these challenges. In addition to modifying policies and programs new skills technological solutions creativity are needed. It is here pointed out that there is need of overview of health risks on many wordly levels of climate change nationally and internationally Basic strategies for the near term minimization and long term avoidance of health risks via adaptation to the stresses and threats posed by climate change and mitigation of climate change are also discussed.

Natural disasters have always been there since beginning of time. The calamities are showing the earths aging process. But since 21<sup>st</sup> century we have seen dire consequences of humans exploiting the earth's resources NASA claimed

that 2020 was the hottest year ever recorded. The average global land and ocean temperature increased to about 1.2 °C in general. Higher temperature allows more storm fueling water vapour to evaporate from a warmer ocean even as they also pull moisture from the parched landscapes where drought is in play. Even a one degree rise in temperature has the potential to give you a 7 percent increase in the intensity of rainfall. At present earth is warming twice as fast as a century ago.

An environmental effect is defined as any change to the environment whether adverse or beneficial resulting from a facility activity products or services. In other words it is the effect that people actions have on the environment. For example when volatile organic compounds are released into the environment the effect is pollution in the form of smog, in this case being negative. It can go the other way as a person picking up litter can have a beneficial impact on the local environment.

The primary impacts of concern in an energy dependent society often come as a result of our energy use. Burning hydrocarbons like coal and oil to provide us with useful energy results in the emission of carbon dioxide and other pollutants. Other activities causing harm include improper waste disposal to bodies of water and soil, accidental spills of chemicals, increased demand for resources as pollution increases and much more. The impacts that these have on environment have become clear and include Global warming, acid rain, photochemical smog, ocean acidification, extinction of wild life, resource depletion, forests, water, food and other. There are many issues in the world that are causing one or more of these effects.

Atmospheric green house gases such as carbon dioxide and methane that come from the combustion of fossil fuels are changing the Earth's climate to become hotter or colder. While some of these are anthropogenic and some are natural. Carbon dioxide released from energy services is by far the largest contributor to the planet's current changes in climate. This magic change in temperature causes problems for all living

thing. Green house gases mix in the atmosphere and travel around the world. This means that it is a global issue which will affect everyone regardless if they are the sources that emitted green house gases or not. In contrast something like air pollution is more localized. Humans use energy to maintain a high energy society that provides a good quality life. As a result the amount of energy that people use continues to increase to meet this high energy demand. Unfortunately most of the world's primary energy comes from fossil fuels which is why climate change is so hard to stop. There are lots of fossil fuels left. In fact one of the biggest problems the world is facing today is that fossil fuels aren't going to run out. This has resulted in a lack of urgent need to find renewable and sustainable energy sources to replace fossil fuels. There is enough to continue burning these fuels for many decades to come however it will continue to induce problematic global warming and climate change in general. Governments will need to intervene to slow down the effect of climate change however individuals also make choices on their daily energy consumption as well. Climate forcing is the physical process of affecting the climate on the Earth through number of forcing factors. These factors are specifically known as forcing because they drive the climate to change and it is important to note that these forcings exist outside of the existing climate system. The climate system includes the hydrosphere, land surface, cryosphere, the biosphere and atmosphere. Examples of some of the most important types of forcing include variations in solar radiation levels, volcanic eruptions, changing albedo and changing levels of green house gases in the atmosphere. Literally to make new again a renewable resource is one that naturally replenishes with time like the growth of new organisms. Renewable energy is any energy production which uses one of these resources. Renewable resources do not have a fixed quantity more can always be generated. However if the rate of use exceeds the rate of renewable that is the source is used more than its being recreated its continued use will become unsustainable. Generally renewable

energy is taken to mean any of the solar power wind power hydro power. Tidal power and Geothermal Power. The Sun is the major source of energy and vital to life on Earth. Solar power is the electricity generated using the solar radiation from the sun, China, United States and Germany lead the world in total solar energy capacity. The ability to harness sunlight and use that energy to generate electricity is achieved through a variety of methods. Wind power is the generation of electricity from wind. Wind power harvests the primary energy flow of the atmosphere generated from the uneven heating of the Earth's Surface by the Sun. Therefore windpower is an indirect way to harness solar energy. Wind power is converted to electrical energy by wind turbines. The three factors that influence the potential wind resource are wind speed, air density and blade radius. Hydropower extracts mechanical energy from

water transforming it into electrical energy to generate electricity. Water in environment often has both gravitational potential energy and kinetic energy which can generate electricity using a generator. Tidal power harness the energy from water moving from tidal forces in order to generate electricity. Unlike other primary energy flows, it is predictable source of energy because tides occur at expected times. Tidal power is still not a dispatchable source of electricity as it is available when nature provides it, not necessarily when it is needed. In the same way Geothermal energy is extracted from thermal sources that originate deep underground which is a primary energy. It can be used directly for heat or to create electricity. Deep underground the Earth will remain hot for billions of years. So geothermal energy can be used for a long time as a renewable energy source.

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**ENVIRONMENTAL SUSTAINABILITY AND CONTRACT FARMING****Dr. Sanjay R Bhojar<sup>1</sup> and Vasant D Jadhao<sup>2</sup>**<sup>1</sup>Assistant Professor and Head, Department of Mathematics,  
PhulsingNaik Mahavidyalaya, Pusad, dist. Yavatmal MS. (India).<sup>2</sup>Assistant Professor and Head, Department of Mathematics  
drsrb2014@gmail.com and vasantjadhao11@gmail.com**Introduction**

Since the time India adopted economic liberalization, government policies have shifted from domestic-oriented to export/market-oriented strategies, focusing on the promotion of private sector participation (and investment) in the agriculture sector and the withdrawal of public investment. This change is guided by the misplaced notion of the latter 'crowding out', the former. Farmers who depend directly on agriculture as cultivators (more than 85 percent are small and marginal landholders who have less than 3 hectares of land) are placed at the bottom of the global value-chains. As a result, smallholders are unable to access input services and markets for their produce, especially in the case of fruits, vegetables and other high-value crops (cultivation of which involves higher risks). Improving smallholders' access to the market, both locally and internationally, could be one of the important strategies which is needed to enhance agricultural productivity, farmers' profit and to reduce poverty.

Three ordinances were passed in both houses of the Parliament in September in the midst of the COVID-19-lockdown. These are expected to enable farmers to sell their products in a competitive market on the one hand and to enhance the supply of food to the consumers, on the other. These three bills address different aspects of agricultural marketing – one bill relaxes the restrictions on governing procurement and the sale of farm produce; the second relaxes the restrictions for stocking of agricultural products under the Essential Commodities Act (ECA), 1955; and the third introduces a special legislation for facilitating the contract farming schemes. It is important to note here that the parliamentarians have failed to identify and highlight the potential implications of these bills and to redress their

many limitations. While the bills have received presidential assent and are notified in the gazette on 27 September 2020, the actual effects of these ordinances can only be seen after the coming Kharif harvest. However, there is already much skepticism about the usefulness of these ordinances on various accounts.

The present article attempts to examine third bill – *Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020* – from the perspective of agro-processing firms/aggregators and farmers, especially smallholders, and how it may facilitate the smooth implementation of contract farming schemes and its implications for Indian agriculture.

**Contract farming and Farmers Protection Bills 2020**

Contract farming is not a new management practice between primary producers and agro-processors/aggregators in India. It was being practiced during the colonial period when Indian farmers supplied agricultural products like cotton, indigo, and tobacco to English factories. This farming based on a contract agreement extended to sugarcane and seed cultivation in the early 1950s (Deshpande 2005). The dawn of modern contract farming in India, however, could be traced to the Pepsi Food Ltd. installing a tomato processing plant at Zahura in Hoshiarpur district, Punjab in 1989. In recent times, given the conducive policy changes, it has been extended to high-value crops, such as tomatoes, potatoes, gherkins, basmati rice and different type of seeds, including paddy. From the available studies, it is evident that contract farming existed in 100 different schemes for around 25 crops and livestock production. The contracted crops involved mostly annual crops both for the domestic market and exports. Contract

farming is also found in a limited extent in perennial crops for industrial consumption (i.e. oil-palm, jatropha). The contract farming schemes are mostly in three organizational forms – multipartite, marketing contract and intermediary contract.

The Government of India's new bill, the farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Ordinance 2020, is aimed at the efficient implementation of contract farming. The aim of the ordinance is to provide a 'national framework on farming agreements that protects and empowers farmers to engage with agri-business firms, processors, wholesalers, exporters or large retailers for farm services and sale of future farming produce at a mutually agreed-upon remunerative price framework and in a transparent manner'. It allows firms/sponsors to engage with farmers via written contracts, if they choose to use such a contract. In addition, the most important aspect of the bill is that it includes the provision of farm services, that is, the supply of quality seed, feed, fodder, agro-chemical, machinery and technology, advice, non-chemical agro-inputs and other such inputs. It seems that the proposed bill offers a lighter/flexible framework that permits contract farming with minimal obligations from firms and farmers. The bill explicitly excludes land leasing and forbids sponsors from erecting-built structures on farmland, which is very important. The bill also provides for timely payments by the sponsor to the farmer. In addition, it frees downstream players in the supply chain from the state Agricultural Produce Market Committee (APMC) regulations, enabling them to undertake written contracts freely across the country, outside the purview of any State Act. The experience suggests that contract farming schemes be used only for a few niche commodities (high-value commodities) where competitive domestic/local market does not exist and in specific geographies. The agro-processing firms are highly selective of geographies to work in, often choosing areas with better infrastructure, skilled farmers and where highly productive land is available. In addition, the processing firms prefer to work with a few

large farmers<sup>6</sup> rather than a large number of small farmers to reduce the transaction costs (cost incurred in the collection of agricultural produce and provision of input services and advice). Many firms, therefore, prefer to contract with intermediaries/traders, who aggregate products from farmers or procure from APMC *mandis* themselves. Thus, smallholders are most likely to be outside the ambit of contract farming. For this group, the bill is unlikely to lead to an increase in the number of potential buyers. As Indian agriculture is dominated by small landholders, those who have less than three hectares of land and is marked by the lack of agri-infrastructure (cold storage, rural connectivity, irrigation facilities etc.). In rural areas, the bill is less likely to encourage the growth of contract farming. Therefore, it could be argued that the need of the hour is not to facilitate greater participation of the private sector by withdrawing active government intervention but to strengthen the existing public marketing infrastructure. The bill suggests having a farming agreement for a minimum one crop season, or one production cycle of livestock production and a maximum for five years. Experience suggests that the processing firms do not allow a farmer to grow a crop in a particular land for more than three to four years due to the decline in soil quality and productivity. Regarding the environmental aspect of contract farming, the bill proposes to follow good farming practices, and standards for food safety, pesticide residue and social development. However, it is not clear who will monitor the day-to-day farming management under contract farming schemes. It is important to note here that generally, sponsors allow farmers to use high amounts of agro-chemicals to achieve higher land productivity and protect crops from insects. In our study on rice seed and gherkin cultivation in Telangana, we found that the sponsors shift from one farmer to the other when they observed the soil quality has declined. There are similar findings observed by Singh (2002) from Punjab. The clause 4(1) of the bill indicates that the parties entering into a farming agreement may identify and require as a condition for the performance of such agreement, compliance with mutually

acceptable quality, grade and standards of farming produce. Contract farming agreement may be seen as a principal-agent model, where the firm (principal) works with the farmer (agent) to produce or grow a crop. Generally, the firm has an upper hand and so it chooses a farmer rather than the farmer choosing a firm and sets the contract terms and conditions. In addition, the firm initiates the contract, the farmer's participation depends more on the firm's criteria rather than any the farmer's choice. A farmer's interest to grow a crop under an agreement may be declined if the firm exercises its monopsony as well as monopoly power. Once the production begins, the firm uses its monopoly power by rationing the supply of specialized inputs, such as seed, pesticide and fertilizer. It is evident in most of these contract farming schemes, for example, tomato and potato farming in Punjab (Singh 2002; Kumar 2006; Rangi and Sidhu 2000), Oil palm and gherkin cultivation in Andhra Pradesh (Dev and Rao 2005; Swain 2011) that the quantity of the seed and fertilizer supplied to farmers are generally less than required for the agreed acreage. In addition, farmers sometimes face other problems like poor technical assistance, delay in payments, outright cheating in dealings, and the manipulation of norms by the firm. Prices specified in a contract are based on expectations about future market behavior and if the market does not meet the firm's expectation, it tries to renege the contract by reducing the price or by increasing the required quality of the produce. On the other hand, sometimes farmers sell their produce in the open market. Therefore, widespread breach of contracts by both farmers and firms has meant that only a few contract farming schemes survive beyond a few years.

Another significant weakness of the bill is the dispute resolution mechanism. Though the bill has provided a mechanism for resolving the dispute that may arise in contract farming, it is weak and puts the onus, virtually, entirely on the farmers. It provides a two-layer dispute management system – first at the conciliation board<sup>8</sup> and second, at the sub-district magistrate level. If the conciliation board fails to settle the dispute within a period of thirty

days, any party can approach the Sub-Divisional Magistrate who has the authority to decide disputes under farming agreements. In this process, it is very likely that a farmer has to wait for more than sixty days to get his/her payment, stopped due to the dispute. On the other hand, if a dispute arises due to a firm's mistake, it is very unlikely that a farmer will go to the sub-district magistrate level to resolve it.

### Objectives

Contract Farming works towards:

1. Reducing the load on the central and state level procurement systems.
2. Increasing private sector investment in agriculture.
3. Bringing the market focus of crop selection by Indian farmers.
4. Generating a steady source of income at the individual farmer level.
5. Promoting processing and value addition.
6. Generating gainful employment in rural communities.
7. Reducing migration from rural to urban areas.
8. Promoting rural self-reliance in general by pooling locally available resources and expertise to meet new challenges.

### Contract farming - its need

The Instrument of Contract Farming addresses the following challenges of agriculture sector:

1. Fragmented holdings, long chain of market intermediaries.
2. Producer's ignorance about buyers' requirements- marketing concept
3. Low farm mechanization
4. Inadequacy of capital and distress sale
5. Absence of scale economy, corporate management, high transaction costs, vertical integration etc.

### Models of contract farming

#### Centralized model

In this model, a centralized processor is engaged in buying from a large number of small farmers. This model is mainly used in tree crops, annual crops, poultry, dairy, products often require a high degree of processing. It is verticals/ coordinated, with quota allocation and tight quality control, Sponsors' involvement in production varies from minimal

input provided to the opposite extreme where the sponsor takes control of most production aspects.

### **Nucleus estate model**

This is a modified version of the centralized model where the sponsor manages a central estate or plantation. The central estate is usually used to guarantee through output for the processing plant but is sometimes used only for research or breeding purposes. The model can be developed from the centralized or nucleus estate models, e.g. through the organization of farmers into cooperatives or involvement of a financial institution.

### **Informal model**

It is characterized by individual entrepreneurs or small companies involving in informal production contracts, usually on a seasonal basis. It often requires government support services such as research and extension. It is characterized by the greater risk of extra-contractual marketing.

### **A profitable market model**

The sponsor must have identified a market for the planned production and ensure the long-term profitable market. Farmers must find potential returns more attractive than returns from alternative activities. They must find the level of risk is acceptable and the potential returns demonstrated are on the basis of realistic yield estimates. The physical and social environments must be suitable for crop production, utilities and communications must be conducive for both farming and agro-processing units.

### **Government's supportive-cum-regulatory role for contract farming**

The success of contract farming mainly depends on the government's supportive-cum-regulatory role. Suitable laws of contract and other related laws need to be enacted by taking into consideration the interest of all the stakeholders. Governments need to be aware of the possible unintended consequences of regulations and should avoid the tendency for over-regulation.

### **Problems Faced By Farmers**

For farmers, the potential problems associated with contract farming include:

1. increased risk;
2. unsuitable technology and crop incompatibility;

3. manipulation of quotas and quality specifications;
4. corruption;
5. domination by monopolies; and
6. Indebtedness and overreliance on advances.

### **Increased risk**

Farmers entering new contract farming ventures should be prepared to balance the prospect of higher returns with the possibility of greater risk. Such risk is more likely when the agribusiness venture is introducing a new crop to the area. There may be production risks, particularly where prior field tests are inadequate, resulting in lower-than-expected yields for the farmers. Market risks may occur when the company's forecasts of market size or price levels are not accurate. Considerable problems can result if farmers perceive that the company is unwilling to share any of the risk, even if partly responsible for the losses. In Thailand, for example, a company that contracted farmers to rear chickens charged a levy on farmers' incomes in order to offset the possibility of a high chicken mortality rate. This was much resented by the farmers, as they believed that the poor quality of the day-old chicks supplied by the company was one reason for the problem.

### **Unsuitable technology and crop incompatibility**

The introduction of a new crop to be grown under conditions rigorously controlled by the sponsor can cause disruption to the existing farming system. For example, the managers may identify land traditionally reserved for food crops as the most suitable for the contracted crop. Harvesting of the contracted crop may fall at the same time as the harvesting of food crops, thus causing competition for scarce labour resources. Particular problems may be experienced when contract farming is related to resettlement Programme. In Papua New Guinea, for example, people from the Highlands were resettled in coastal areas to grow oil palm and rubber. This required the farmers, who were traditionally sweet potato eaters, to learn cultivation techniques for new food crops and to adapt their dietary practices accordingly.



### **Manipulation of quotas and quality specifications**

Inefficient management can lead to production exceeding original targets. For example, failures of field staff to measure fields following transplanting can result in gross overplanting. Sponsors may have unrealistic expectations of the market for their product or the market may collapse unexpectedly owing to transport problems, civil unrest, change in government policy or the arrival of a competitor. Such occurrences can lead managers to reduce farmers' quotas. Few contracts specify penalties in such circumstances. In some situations management may be tempted to manipulate quality standards in order to reduce purchases while appearing to honor the contract. Such practices will cause sponsor-farmer confrontation, especially if farmers have no method to dispute grading irregularities. All contract farming ventures should have forums where farmers can raise concerns and grievances relating to such issues.

### **Corruption**

Problems occur when staffs responsible for issuing contracts and buying crops exploit their position. Such practices result in a collapse of trust and communication between the contracted parties and soon undermine any contract. Management needs to ensure that corruption in any form does not occur. On a larger scale, the sponsors can themselves be dishonest or corrupt. Governments have sometimes fallen victim to dubious or "fly-by-night" companies who have seen the opportunity for a quick profit. Techniques could include charging excessive fees to manage a government-owned venture or persuading the government and other investors to set up a new contract farming company and then sell that company overpriced and poor quality processing equipment. In such cases farmers who make investments in production and primary processing facilities run the risk of losing everything.

### **Domination by monopolies**

The monopoly of a single crop by a sponsor can have a negative effect. Allowing only one

purchaser encourages monopolistic tendencies, particularly where farmers are locked into a fairly sizeable investment, such as with tree crops, and cannot easily change to other crops. On the other hand, large-scale investments, such as for nucleus estates, often require a monopoly in order to be viable. In order to protect farmers when there is only a single buyer for one commodity, the government should have some role in determining the prices paid.

Drucker suggests that privately managed monopolies under public regulation are preferable to non-regulated private or public monopolies. The greatest abuses do tend to occur when there are public monopolies, where buying prices are set by the government, or where farmers have made long-term investments in perennial crops. In 1999 the Kenya Tea Development Authority experienced serious unrest amongst its growers, reportedly because of the Authority's inefficient extension services and alleged "manipulation" of farmers. There was also discontent in Kenya among sugar farmers because the price set by the government did not change between 1997 and 1999.

### **Conclusion**

Contract-based farming is catching up in many developing countries, especially in India. To increase the private sector participation through contract farming, the Government of India has brought this new bill, which aims at providing a better ecosystem to both firms and farmers for entering into an agreement to grow agricultural produce in a fair and transparent manner. However, it raises various fundamental questions on agricultural development through participation of the private sector on the one hand and the withdrawal of public investment on the other. Developed countries have had a long history of contract farming which strengthens the supply chain system along with sophisticated technology, but the extent of state support to farmers in these countries has been increasing over the years. One should keep in the mind that Indian agriculture is led by smallholders who have less than three hectares of land. Therefore, a model that would work for India



needs to focus on cooperative-led contract farming.

As pointed out here, only a section of farmers having better endowments would participate in contract farming. In the context of inclusive development, local self-government institutions (Panchayat) ought to play an important role in the process of structuring contracts in a more fair and transparent manner. While contracts are essentially between two private parties, the role of the government in protecting the interest of farmers (especially the smallholders) should be emphasized.

The role of the state with respect to contract-farming is much more important than ever before. There are at least two ways in which the government can improve the functioning of

contract farming schemes and its growth. First, the state could regulate the market to ensure that the contracting firms do not abuse their market power and it is crucial to have a regulatory framework for safeguarding farmers' interests with appropriate checks and balances. Second, the state could encourage agribusiness firms to initiate new contracts with smallholders by providing various incentives, such as credit, insurance for crop, improvement of infrastructure facilities. The regulations on leasing land should be relaxed so that small farmers can enlarge their operational holdings. Two major factors have to be addressed—security of tenure for tenants during the period of contract and right of the landowner to repossess the land after the contract is over.

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**BIOSPHERE AND ENVIRONMENT, THE GOLDEN VIEWS OF DR. AMBEDKAR****Dr. Sandip B. Dongare**

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**Introduction**

Sometimes it may seem that humans have altered the earth beyond repair. But our planet is an incredible system in which energy, water, carbon and so much else flow and nurtures life. It is about 4.5 billion years old and has been through enormous changes. We Human beings are part of Nature. What happens in the Biosphere and Environment determines a lot about our survival. Maintaining the Biosphere & Environment is a matter of Justice, Morality, and Development that is Sustainable & Equitable. Since climate change mitigates Human development and leads to inequalities, exploitations, and Human miseries. It also becomes an issue of Human Rights and Universal Humanitarian values. Our Wisdom must lead us to acknowledge the future of our Generations & Mother Earth. Ambedkarism = Humanism = Dhamma which upholds Karuna i.e.love for all human beings and Maitri i.e.love for all living beings [must] be maintained. It Pledges to a Policy a Biosphere & Environment for the creation of a Climate-Smart World which will be a just, moral, sustainable, humane & enlightened world.

**The objective of the research article**

1) To study and analyze the thoughts of Dr. Ambedkar regarding the biosphere and environment.

**Part-I** Golden views of Dr.B.R. Ambedkar: A Humanitarian Philosopher and Environmentalist

1.The prosperity of the agriculturist must depend upon the maintenance of forest belts spread over the country. Without forest belts, a proper degree of rainfall will not be assured and agriculture in India will continue to be the gamble in the rain as it has always been in the past. The Federation would urge more and more forestation of the uncultivable wastelands. (p.393, vol.17, part 1)

2. The attitude of the government in public affairs will be governed by the following

principles: It will insist on the maintenance of liberty, equality, and fraternity and will strive for redemption from oppression and exploitation of man by man, of class by class, and nation by nation. (p.387, ibid).

**Part – II****Problems & Solutions of Biosphere and Environment Recognized by Ambedkarism**

- Current concentrations have reached 380 parts per million (ppm) of Co<sub>2e</sub> (carbon dioxide equivalent) exceeding the natural range of the last 65,000 years. In the 21st century, the average global temperature could increase by more than 50C leading to irreversible & devastating climate change that may reverse human development and bring human miseries by:
  - reduction in agricultural production and food insecurity;
  - increase in water stress and water insecurity;
  - rising sea levels and exposure to climate disasters like drought, flood, storms, cyclones, etc.,
  - change in ecosystem and bio-diversity leading to extension of some species of flora & fauna; and
  - adverse impact on human health by killer diseases like malaria, dengue, and other diseases caused by microorganisms.
- The urgent action on climate change is to reduce CO<sub>2e</sub> gases and maintain the average global temperature rise below 20C than preindustrial temperatures and develop a model of economic & technological growth & development which is ecologically & socially sustainable & equitable by collective international action of the world community – both developed & developing.
- Many measures like climate-smart development policies, spending ½ a percent of GDP on climate insurance, veritable energy revolution, and transformation in the management of land use & forests, shifts in lifestyle, innovation in new technologies and

judicious use of existing technologies, levying of green tax on actions which harm the environment and a global joint action will have to be adopted for a climate-smart world and securing our mother earth for our future generations. This climate-smart world has to be a just, moral, humane & enlightened world.

4. Global CO<sub>2</sub>e emissions by sector: PCCC 2001

- a. Power 26%
- b. Waste & Wastewater 3%
- c. Land-use change and forestry 17%
- d. Agriculture 14%
- e. Industry 19%
- f. Residential and commercial buildings 8%
- g. Transportation 13%

5. We are also entering into an era of uncertainty an age of hyper-future threatening the common destiny of Humankind & Mother earth due to the demiurgic powers of techno science. This will arise due to the invincible development in genetics, microelectronics, bio-electronics, nano-technologies, pico-technologies, and artificial intelligence. The bio/nano & other developing technologies would pose moral, ethical & humane questions like cloning, interbreeding of species creation of supermen viz-a-viz subhumans by genetic engineering and artificial intelligence, etc. A solution to the above may require:

- (i) Education to all;
- (ii) Ethics (social contract, natural contract, cultural contract & ethical contract);
- (iii) Urban policies and
- (iv) Human rights.

Along with this, it will require the policy of Ambedkarism i.e. Equality, Liberty, Fraternity, Justice, Dhamma.

6. Responsibilities to maintain the biosphere & environment, and deal with climate change require internal efforts extending from the areas of technological, economic, trade, political & legal. It also requires People & Community participation.

These responsibilities must take into account the cross-generation liabilities as a Public Policy.

Part III

The policy of Ambedkarism on Foreign Policy, National Security, And Internal Security The government shall adopt a policy on climate change and Biosphere keeping in view the Principles, Values, Ideals, Aims & Objectives. The above Declaration; Part [I] and [II] for the wellbeing of Human beings, all living beings, and Mother Earth.

### Conclusion

The earth will certainly heal but it may take a very long time the best way to start is with everyone doing their part to avoid making the damage any worse.

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**A STUDY ON SUSTAINABLE DEVELOPMENT IN COMMERCE & MANAGEMENT****Dr. Ambadas B. Pande**Asso. Professor & Head, Dept. of Commerce, Smt. Radhadevi Goenka College for Women, Akola, MS.  
abpande12@gmail.com**ABSTRACT**

*There is close relationship between Sustainable Development and Commerce & Management. Because at every corner of globe, these subjects are playing vital role in running Socio-Economic activities. Sustainable Development concept is not new, it has been followed by many cultures over the course of history with an aim of maintaining a balance between man and nature as well as economy. For sustainable development, factors such as preserving and protecting the environment and natural resources along with maintaining social and economic equality need to be followed. As we are growing economy, facing many socio-economic problems. Would we become able to fulfill all the protocols of sustainable development? In this paper, Researcher elaborated the pillars of sustainability and how the sustainable development offers for the growth of society.*

**Keywords:** Commerce & Management, Socio-Economic, Environmental, Sustainability.

**Introduction**

Sustainable development plays vital role in creating a balance between the economic, environmental and social needs. It is a way of organizing and managing the society by which it can exist for a long period without making any compromise on the availability of resources for future generations. We all are living in the era of science and technology, where technology is upgrading in every walk of life and who can survive here or face the competition those who will sustain according to time and situation. Now, we all are well aware about the world, what is happening in the globe, countries are fighting with each other, and it is big question for all of us, how to sustain the resources and nature because ultimately it will become cause of destruction. After all, all the areas are related to management and business and related activities of it. Here, Sustainable development is very important. What is exactly sustainable development? It's simple the development that meets the requirements of the present without negotiating the ability of future generations to meet their own wants. Sustainability brings three elements into harmony: Economy, Society and Environment. The world is moving around these three factors whether it is commerce or management. Whatever we do, for the sack of society and it definitely affects our economy, society and environment.

Business concerns need to face the fact that the boundaries of accountability and responsibility are moving fast. The trend towards sustainable management means that organizations are beginning to implement a systems wide approach that links in the various parts of the business with the greater environment at large.

**Objectives of Study**

- To study the concept of sustainable development.
- To understand the importance of sustainable development in commerce and Management.
- To identify the linkages between Business, environment, society and development.
- To draw inferences on it.

**Research Methodology**

This research paper aims to give a better understanding about the theme of Sustainable Development in Commerce and Management in current scenario. The study is descriptive in nature. The literature and data are mainly based on secondary a source, which has been collected from various publications, magazines, journals and internet sources.

**Meaning and Concept of Sustainable Development**

Sustainable development refers to the developing and implementing public policies and programs by considering environmental,



economic and social objectives. It also involves considering the needs of the present as well as the needs of future generations.

In other words sustainable development can be defined as the application and implementation of sustainable practices by managing available resources in a way that will benefit current and future generations without harming its basic structure. To achieve the sustainable development it is necessary to harmonize three core elements like economic growth, social inclusion and environmental protection. These three elements are well interconnected and all are most crucial for the well-being individuals and societies. It's a way of systematic handling and managing resources without destroying the ecosystem or harming the environment. Hence this concept can be also referred to as environmentally sustainable economic growth.

#### ➤ **Opportunities through Sustainable Development:**

Sustainability offers us for our business or organization in following ways-

- New Market Potential to empower the export policy and reduces import.
- Competitive Differentiation shows a way for how to survive in this technological scenario.
- It also gives a platform for Innovation so as our youth can shows and utilize their hidden qualities and skills to establish start-ups.
- It reduces Energy Bills and Operating Costs.
- It also provides to avoid various kinds of risk like law suits, new environmental regulation and taxes, and market shifts etc.
- It improves the morale of Employees.
- It increases the productivity and reduces Employee Absenteeism.
- It improves Public and Community Relations.

Commerce is basically depending on Business and Enterprises. In each and every field manufacturing is essential without its servicing is not possible. Simultaneously, our country is growing and upgrading economy on the basis of the policy of Liberalization, Privatization and Globalisation. Accordingly, we are also implementing Industry 4.0. In Industry 4.0, brings together Operational Technology and Information Technology. System Integration, Simulation and Virtualization, Internet of Things (IoT), Big Data and Analytics, Cloud,

Cyber security, Augmented Reality, Autonomous Robots, Additive Manufacturing etc. are the frontiers of Industry 4.0. In this regard, Sustainable Development plays vital role.

#### ➤ **Pillars of Sustainable Development:**

There are four pillars of sustainable development. They are human, social, economic and environmental.

#### **Human sustainability**

It aims to maintain the human capital in the society. Growth and development can materialize the basis of natural as well as human capital. As a responsible citizen of nation or a businessman, can invest in health and education sector which is doing and working for overall development of business enterprises.

#### **Social sustainability**

Customer is a king of market. Whether, it is field of health, business enterprises, education or any profession. Honesty and best serving is key success words of development and survival which enhances the name and fame of respective organization as a result, it protects environment and supports equality and also maintain the ecological system.

#### **Economic sustainability**

Its aims to improve the social equality by following various protocols of economic aspects of nation. It is also possible to maintain and sustain the profitability ratios of various organization. There are many organizations who are working in this direction, we should follow them as a role model like America, Japan, Jarmany etc.

#### **Environmental sustainability**

It aims to improve human welfare via various platforms to protect environments and related issues of it. Our business and enterprises should take proper decisions to enhance the sustainability of environment. It's not only the responsibility of individual but each and every factor of society to serve for nation. As land, air, water, minerals etc. are limited source gifts by nature, so it's our moral responsibility to utilize it whenever required only.



### Conclusion

As sustainable management institutions adapt, it becomes imperative that they include an image of sustainable responsibility that is projected for the public to see. This is because business concern are socially based organizations. But this can be like a double edged sword, because sometimes they end up focusing too much on their image rather than actually focusing on implementing what they are trying to project to the public; this is known as green washing. It is very important that the execution of sustainable management practices

is not put aside while the firm tries to appeal to the public with their sustainable management practices. Commerce and management are heart of every field. Sustainable development is very nearest of it. Business and Industries are growing with the aids of science and technology. As a part of social responsibility, we should follow the guidelines of Governments of various nations also. As we are consuming the advantages of recent times, but it's our moral responsibility to take care of our forthcoming generation. Hence, now it's a burning issue to work on sustainability aspects.

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**ENVIRONMENTAL APPLICATIONS OF NANOMATERIALS: A REVIEW****Sarika khapre<sup>1</sup>, Priti Ghutepatil<sup>1</sup>, Sneha Bhat<sup>1</sup>, Pritam More<sup>1</sup> and Rujuta Joshi<sup>1,\*</sup>**

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**ABSTRACT**

Recent article mainly focuses on the application of nanomaterials for environmental remediation. Use of nanomaterials for the detection and removal of gases, contaminated chemicals, organic pollutants and biological substances found to be size dependant. Nanomaterials being highly reactive, exhibits appreciable performance in environmental remediation as compared to any other conventional techniques. This review provides precise information about the role of nanomaterials in controlling various environmental aspects.

**Keywords:** Nanomaterials, Inorganic Materials, Carbon based materials, Polymer based materials.

**Introduction**

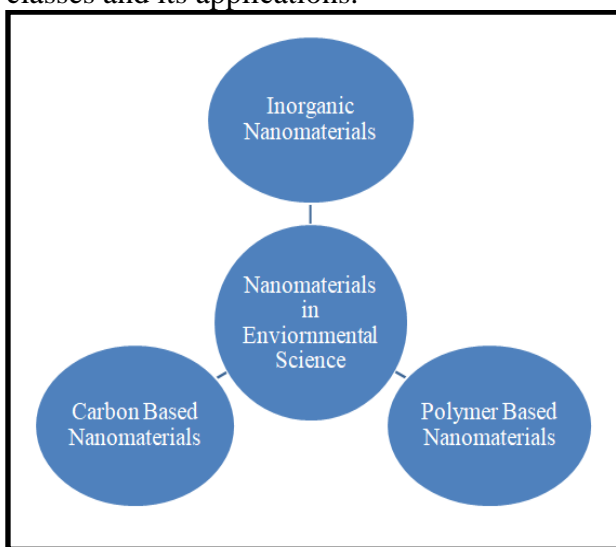
In today's world, one of the main problems that society faces is Environmental pollution. Scientists are continuously exploring new technologies for the remediation of contaminants of the air, water, and soil [1]. Particulate matter, heavy metals, pesticides, herbicides, fertilizers, oil spills, toxic gases, industrial effluents, sewage, and organic compounds are just a few examples of the many concerning contaminants [2,3]. In past few decades, Nanotechnology has gained a lot of attention because of unique physical properties of nanoscale materials. Enhanced reactivity is presented by nanomaterials and thereby it shows better effectiveness when they are compared to their bulkier counterparts because of their higher surface-to volume ratio.

**Literature Review:**

Various fields such as engineering, biology, chemistry, computing, material science, military applications, and communications has impact of nanotechnology in different applications like medicine, ethics and environment etc. Advances in nanotechnology provides more effective detection systems which are sensitive to air and water quality monitoring, which allows the simultaneous measurement of multiple parameters in real time response capability. The tunable physical parameter of the nanomaterial along with the rich surface modification chemistry offers significant advantages over conventional methods for addressing environmental contamination. By

extension, a number of methods have been developed as a combination of different materials (hybrids/composites), gathering specific desired properties from each of its components, are potentially more efficient, selective, and stable than methods based upon a single nanoplatform. To increase the stability of the material, for instance, adhering nanoparticles to a scaffold can be an alternative way when it is compared to the usage of nanoparticles alone. Functionalizing material with specific chemicals responsible for targeting contaminant molecules of interest can help increase the selectivity and efficiency of the material [4–8]. After the materials employed for the remediation of pollution, it is important that another pollutant themselves are not employed. Therefore, biodegradable materials are extremely interestingly useful for this field of application. Using the biodegradable materials may not only increase consumer confidence and acceptance of a particular technology, in the sense that there is no generation of a material waste to be disposed of after the treatment, but it also could offer a greener and safer alternative for the environmental remediation of pollutants. Furthermore, new technologies that can rely on the target-specific capture of contaminants are especially attractive, as they can overcome low efficiencies derived from off-targeting. Different studies have focused on using the principles of nanotechnology and combining it with chemical and physical modification of the surface of the materials in an effort to obtain engineered materials that can overcome many of the challenges involved with the remediation

of contaminants [9,10]. For environmental remedy, to the best of the knowledge, there is no as such established classification regarding various types of materials that can be employed. Therefore, this review focuses on three main types of nanomaterials described in the literature: inorganic, carbon-based, and polymer-based materials. In the following section, we are going to discuss each of these classes and its applications.



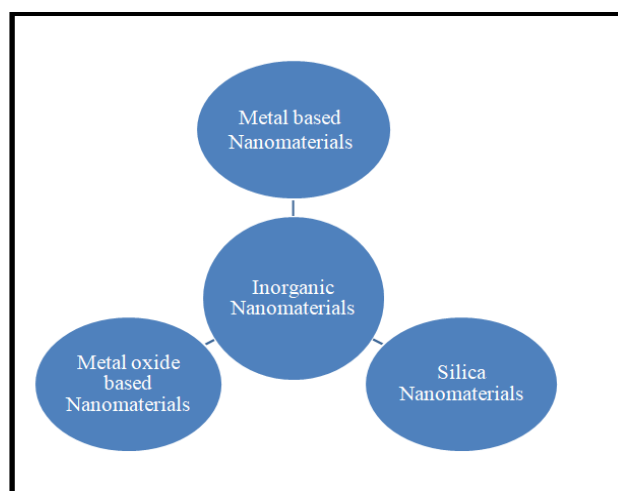
**Figure 1 .Applications of Nanomaterials in Environmental Science**

### Research work

#### Metal-and Metal Oxide-Based Nanomaterials

Metal and metal oxide based nanomaterials are known to be efficient adsorbents having several advantages like fast kinetics, flexibility towards in-situ and ex-situ applications in aqueous systems etc. [11] and hence are widely used for environmental remediation [12]. Silver nanoparticles (AgNPs) are known to be water disinfectants because of their significant antibacterial, antifungal, and antiviral activity [13]. In addition to it, triangular AgNPs found to exhibit better antibacterial effects than Ag nanorods and Ag nanospheres. This justifies the dependence of shape as well as size of the particles on antibacterial effects. The overall efficiency of metal oxide and polymer based composites can be enhanced by coupling them with AgNPs as discussed later. Another frequently investigated oxide material for environmental remediation is titanium oxide ( $\text{TiO}_2$ ). Due to low-cost, non toxicity, semiconducting, photocatalytic, electronic, gas sensing, and energy converting

properties  $\text{TiO}_2$  NPs are extensively studied for waste treatment, air purification, self-cleaning of surfaces, and as a photocatalyst in water treatment application [14]. Since this nanoparticles can be activated by light they are used to remove organic contaminants from various media. They are also capable of producing highly reactive oxidants like hydroxyl radicals which can serve as a disinfectant for several microorganisms like fungi, bacteria, viruses, and algae. The  $\text{TiO}_2$  nanoparticle can either be excited by UV-radiation leading to the release of  $\text{OH}^-$  /OH.



**Figure 2 . Inorganic Based Nanomaterials**

Amongst several other Nano-adsorbents, magnetic metallic Nano-adsorbents has gained more attraction as they can be easily retained and separated from treated water. One of the best examples is Iron and iron oxide NPs which are extensively studied for the removal of different heavy metals—such as  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Co}^{2+}$  and  $\text{Cd}^{2+}$  and also for the remediation of chlorinated organic solvents. However, there are certain challenges for using this class of NPs for the remediation of environmental contaminants. Aggregation is one of the major challenges as it can significantly affect the reactivity of the material, and consequently reduces the advantage of using nanoscale materials as a means of improving efficiency. Another challenge toxicity of the materials involved. In addition to it, the associated cost and fate of the remediation technology should be considered when opting for the use of NPs as a remediation material. A binary mixed magnetic nanoparticle system such as lecithin-loaded Ni/Fe nanoparticles has been developed

by Ding et al. [15] which can be used as pollutant. Lecithin can be used as a biocompatible surfactant for forming monodispersed and stable lecithin-Ni/Fe NPs and also to capture the targeted organic contaminant. The results revealed high efficiency and rapid removal of PCB77 by lecithin-nano Ni/Fe as compared to a control carrier (i.e., unmodified nanolecithin). Thus, succeeded in the developing a relatively nontoxic and inexpensive organic-inorganic based material for targeting polychlorinated biphenyl contaminants.

### Silica Nanomaterials

Versatile mesoporous silica materials have gained significant importance for its possible applications in adsorption and catalysis due to certain outstanding features such as high surface area, facile surface modification, large pore volumes, and tunable pore size. Several studies have reported its use for contaminant remediation in the gas phase. Furthermore, different surface modifications of mesoporous silica materials have also been reported elsewhere [16]. Table 2 summarizes some of the reported works found in the literature that mainly focuses on the use of silica nanomaterials for environmental remediation of different contaminants. Presence of hydroxyl groups on the surface of silica materials are of utmost important for surface modification, gas adsorption, wetting etc. Grafting of functional groups onto the pore walls is also a well-known strategy to design new adsorbents and catalysts [17].

Figure 3 illustrates important surface characteristics of mesoporous silica materials for adsorption applications. Use of amine-functionalized porous silica as an aldehyde abatement material to capture low-molecular weight aldehydes (e.g., formaldehyde) is reported by Jones et al. The results suggest that the primary and secondary amines are better suited for capturing aldehydes rather than the tertiary amines, consistent with covalent capture of the target contaminant by formation of imine and hemiaminal intermediates. They have also investigated the capture of a few higher molecular weights, less volatile aldehydes. However, the reaction time

necessary to achieve equivalent performance with these target contaminants was in excess of 10 hours which is a much longer period of time compared to formaldehyde adsorption [18].

### Carbon-Based Nanomaterials

The structural composition of elemental carbon and its mutable hybridization states account for the unique physical, chemical, and electronic properties of carbonaceous materials [119] compared to metal-based nanomaterials. Mutable hybridization states can yield different structural configurations such as fullerene C<sub>60</sub>, fullerene C<sub>540</sub>, single-walled nanotubes, multi-walled nanotubes, and graphene [19]. Graphene composites containing TiO<sub>2</sub> NPs show increased photocatalytic activity when compared to bare TiO<sub>2</sub> NPs due to an increase in conductivity [20]. With the development carbon-based nanomaterials it has become much easier to enable new technologies for identifying and addressing environmental challenges. Carbon-based nanomaterials are being widely used as sorbents, high-flux membranes, depth filters, antimicrobial agents, environmental sensors etc.

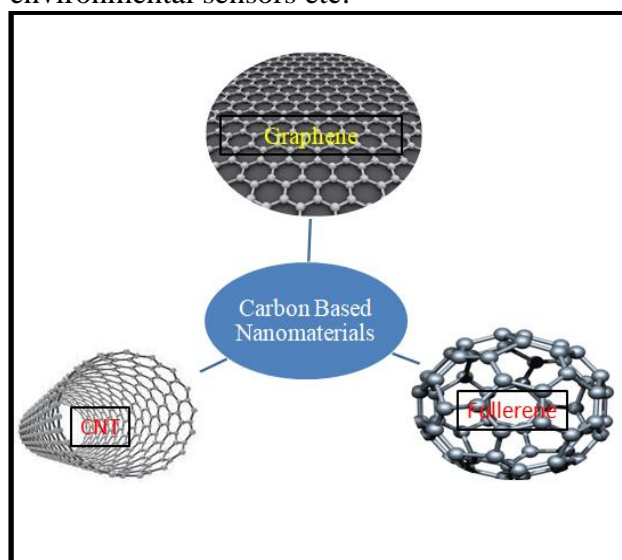


Figure 3. Carbon based Nanomaterials

Most notably, efforts have been undertaken to open the closed ends of pristine CNTs in order to enhance their adsorption properties. Generally, SWCNTs are arranged in a hexagonal configuration (i.e., one nanotube surrounded by six others), thus forming bundles of aligned tubes with a heterogeneous, porous structure. MWCNTs do not usually



exist as bundles, except when specific methods of preparation are used to create such configurations. Aggregated pores were shown to be more significantly responsible for the adsorption properties of these materials than the less accessible inner pores. [21]

### Polymer-Based Nanomaterials

Even though nanomaterials are highly reactive, the occurrence of aggregation, non-specificity, and low stability limits their use in the world of technology due to lack of functionality. Utilizing polymer as a host can be a possible alternative to enhance the stability of nanomaterials which will serve as a matrix [22,23]. Polymer-based materials Amphiphilic polyurethane nanoparticles, Amine-modified PDLLA-PEG, Polymer nanocomposites environmental remediation of contaminants [4,24,25].

### Conclusion

Various types of materials like Inorganic, carbonaceous, and polymeric nanomaterials can be successfully employed for a several environmental remediation applications. Selecting the appropriate nanomaterial to diminish a particular pollutant in a specific environmental context needs complete analysis of the type of contaminant to be removed, the accessibility to the remediation site, the amount of material needed to implement efficient remediation, and whether it is advantageous to recover the remediation nanomaterial (recycling). Even though lot of efforts have been made to investigate the use of nanotechnology for several possible environmental remediation applications some of the issues still needs to be addressed. Also while many studies do demonstrate efficacy in laboratory settings, more research is necessary in order to fully understand how nanotechnology can significantly affect the various treatment for the removal of contaminants in surroundings.

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## PORTRAYAL OF MUSLIM SOCIETY AS DEPICTED IN NADEEMASLAM'S MAPS FOR LOST LOVERS AND THE WASTED VIGIL

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### ABSTRACT:

*Nadeem Aslam, an upcoming England-based writer of Pakistani origin, is a recent and an important addition to this fairly long list of contemporary writers. His strident, trenchant and elaborate critique of Muslim society and his poignant delineation of battalions of misfortunes that plague the large majority of Muslim women are hard-hitting, provocative and worthy of critical examination. His novels recast those regions' resident and diasporic Muslim peoples – child soldiers, perfume-makers and migrant house-wives alike- as both susceptible to influences which present an alternative to an austere scripturalist Islam, and deeply, sensually human. Significantly, it argues that his novels stage moments where Muslim characters of different doctrinal and sectarian backgrounds are provided with a fleeting chance to identify commonalities of perspective through a mutual contemplation of this art. He touches upon a wide array topics, from honour killing and religious schism in the global Muslim community, to the Soviet invasion of Afghanistan during the cold war and 9/11. In order to explore Islam Aslam draws upon its religious history and multiple aesthetic traditions and anatomizes the different ways in which it is practiced globally- especially in Pakistan.*

**Keywords:** Honour killing, Sexual harassment, sexual abuse, forced marriage.

### Introduction:

Nadeem Aslam, Pakistani-born English writer is acclaimed for his portrayal of Muslim society as depicted in his novels. All his novels have been set in social, religious and cultural background of Pakistan, Afghanistan and Britain. He exclusively deals with the problems of women living in Pakistan and Afghanistan. Honour killing, sexual harassment, sexual abuse, forced marriage, gender- discrimination, financial deprivation, psychological and emotional trauma, etc are the foremost issues related to the world of women living in Pakistani community. It is observed that in Pakistani community educated women are considered as immodest, unholy symbols of society and threat to the religion because they protest against the tradition and refuse to follow Muslim laws. Pakistani society is basically male-dominated and conservative where religion plays a vital role to rule, shape and mould everyone's life. In these God-forsaken countries patriarchal ideology is visualized as powerfully incorporated into religious beliefs and practices. Men have in one way or the other way created it in different contexts and thus religion becomes a contrivance to uphold sexual hegemony and create prominently sexual beings. The fundamentalists in Pakistan and Afghanistan

reject the westernized views as these views lead to their transformation and change. Instead of progressing towards humanism, liberalism and enlightenment they practise age-old traditions and follow retrogression and exploit women in the name of culture, social taboos and religious misinterpretations. They do not want their religious foundation to be shaken by the westernized influences. In their views westernized influences are harmful, evils and against Islam because these views take them away from their religious roots. In Pakistani community modesty of woman is considered to be the most essential element of good breeding. The rigid Muslim laws not only devastate the social life of women but also affect them mentally, socially and physically thereby creating psychological problems of existence and identity. Women should be required to keep their heads down in public to cover their heads in front of males, and to avoid interaction with boys. Women become victims of gendered power, with discrimination and infliction of suffering through patriarchal, hegemonic and social power structure. They are forced to conceive and give birth to babies against their own will at alarmingly regular intervals. And they are not allowed by their husbands to use contraceptives since that will prevent their wives from giving birth to Allah's devotees. The fundamentalists do not approve

women's education and they reject their employment as sin against God. Men who immigrate from Pakistan and Afghanistan to Britain indulge in extra marital affairs and sex affairs but they do not tolerate any woman from their community to be indulged with such affairs. They kill or punish her severely. The fundamentalists are not in favour of transformation or change in society. They favour status quo. They impose their religious orders upon women to follow mutely. Women are victims of their hegemony and power gendered.

**Maps for Lost Lovers** (2004), set in an unnamed community in the Britain, is an account of a conservative Pakistani immigrant family living in London, who are forced to come to terms with the western culture which surrounds them when they discover one of their own living out of wedlock. The novel unfolds the events circling the murder of Shamas's younger brother Jugnu and his love Chanda. The fabric of the events is woven with the fine details of the life in Dasht-e-Tanhai including religious practices and a closer look at the enclosed chunk of the imaginary town of immigrants in the England. Chanda and Jugnu are killed cold-bloodedly by her brothers, Baara and Chhota, clearly a case of honour killing. The novel focuses on the honour killing, life of immigrants, their nostalgia and struggle of identity construction in the first and second generation of immigrants while keeping the focus on the family of Shamas and Kaukab. The novel also depicts the stories of the sufferings of women. In Pakistani society women's condition is worse than animal. Chanda is killed by her brothers when she is found having illicit love with Jugnu, Men who live in western country but they remain uninfluenced by the western education and practise their traditions.

**The Wasted Vigil** (2008), set in the fictitious city named Usha near Tora Bora Mountain in Afghanistan talks about the torture and suffering of those women who desire to bring about changes and transformation in society are whipped, tortured and killed. In Afghanistan the fundamentalists regard educated women as unholy symbols of Islam because these women reject Islamic laws,

protest against orthodox mores of religion and believe that emancipation of women is possible through education. So they educate their children, raise their voice against injustice and brutality. Dunia, a young school teacher is punished severely for opening and running school. Marcus and Katrina are beaten by the Taliban because they start teaching children. It shows that the religious authorities in the form of Maullana are against development and favour states quo. The novel is an expression of personal observation exposing the excruciating persecution perpetrated on women during the Afghan war era. Women are subjected to torture by the macho religio-political extremist forces. They become abject targets of the use of excessive power, being considered by the Taliban as unholy symbols of evil and sin.

### Conclusion

In Muslim community modesty of woman is considered to be the most essential element of good breeding. Women should be required to keep their heads down in public to cover their heads in front of males, and to avoid interaction with boys. Women become victims of gendered power, with discrimination and infliction of suffering through patriarchal, hegemonic and social power structure. The rigid Muslim laws not only devastate the social life of women but also affect them mentally, socially and physically thereby creating psychological problems of existence and identity. Educated women are considered by the fundamentalist as unholy symbols of evil because they do not follow traditions and reject Muslim laws. So the fundamentalist are not favour in development and progress. They favour status quo. They exploit and oppress women in the name religion. Women are supposed to be shy, caring, responsive, dreaming and beautiful whereas men are tough, coarse, insolent, wild and brave. In the novels the ignorance of the male characters about their religion is clearly reflected in the way they interpret and implement their interpretations and wherever there is any reflection of knowledge it is used against women. In fact the tribal- cultural codes play a stronger than religion. In both the countries Pakistan and Afghanistan patriarchal ideology is visualized

as powerfully incorporated into religious beliefs and practices. Men have in one way or the other way created it in different contexts and thus religion becomes a contrivance to

uphold sexual hegemony and create prominently sexual beings. Taliban used to smear any representation of a living thing and painted object for it is an un-Islamic practice.

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**THE BENEFITS OF PHYSICAL EDUCATION AND PHYSICAL ACTIVITY****Prof. Dilip M. More**Ph.D. Scholar, J.J.T.U. University, Rajasthan

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**ABSTRACT**

*Regular and quality physical education can help children and adolescents achieve the recommended amount of daily vigorous-or moderate-intensity physical activity and improve fitness and potentially body mass index (BMI). Quality monitoring systems are crucially needed to enable monitoring and evaluation of these important outcomes. This literature presents a brief summary of effective and promising approaches for increasing physical activity in schools.*

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**Keywords:** BMI, quality monitoring, fitness

**Introduction**

An effective or promising approach for increasing physical activity in youth is one that both has theoretical underpinnings and has been investigated through methodologically sound qualitative or quantitative research. The type of research and evidence relating to strategies for increasing physical activity in schools varies tremendously by program or policy components. As suggested by the L.E.A.D. (Locate Evidence, Evaluate It, Assemble It, and Inform Decisions) framework, developed to guide decision making on obesity prevention, evidence should be evaluated against criteria for assessing quality that are appropriate and established for this type of evidence (IOM, 2010). All research findings should be considered in light of their strengths and limitations, including internal and external validity, where appropriate and relevant.

**Systems Approaches: Multicomponent Programs And Interventions**

Multicomponent school-based approaches, which usually include enhanced physical education in conjunction with other forms of school-related physical activity, are effective in increasing physical activity among students. Although systematic reviews of the literature identify evidence for the promise of such approaches, the context for and generalizability of this evidence vary greatly.

**Impact on Physical Activity**

Physical education programs and policies can shape the quantity and quality of physical activity among students across schools (Slater

et al., 2012). Studies using direct observations of physical activity have found large variations in the amount of vigorous- or moderate-intensity physical activity performed by students during their physical education classes: a range of 9-48 percent.

**Impact on Other Outcomes**

**Fitness** Physical fitness (such as aerobic capacity or maximal oxygen consumption [VO<sub>2</sub>max]) is a marker of successful interventions addressing physical activity. In a physical education intervention study in middle schools, it is observed that the experimental groups improved significantly on the six fitness measures used and showed greater improvements than the control group on most fitness measures at 9 and 18 weeks.

**Body mass index (BMI)/weight status**

The relationship between physical activity and children's body weight has been studied in several reviews of school-based interventions designed to increase physical activity overall and during physical education in particular. Policies

**Physical education policies:** If adequately worded and incorporating mechanisms for monitoring compliance, have the potential to increase physical activity levels among school-age children across the nation.

**The impact of PE, physical activity and sport on cognitive function**

There is an extensive literature concerning the effect of single bouts of physical activity on cognitive function in young people and some studies examining the longitudinal (or chronic)



impact of undertaking extra physical activity over or example a few months on cognitive function. It is important to include such information in this review as each physical education lesson or sport activity represents a bout of physical activity which might impact on learning on that day and indeed over a period of time. Cognitive function is often examined using computer tests and may include tests of memory, attention, perceptual skills and occasionally in longitudinal, studies IQ tests.

A positive relationship exists between physical activity and cognition with primary and middle-school age children gaining the most benefit in terms of enhanced cognitive function. Perceptual skills, attention and concentration are all improved by a bout of physical activity, but perceptual skills seem to benefit the most from prior exercise. There are no differences between the acute and chronic effects of physical activity on cognition so it is unclear if there are any additional benefits of a longitudinal programme or whether children simply benefit from each bout of exercise undertaken. Prior exercise may be beneficial for cognitive function in both the morning and the afternoon as studies have shown an improvement in adolescents' performance on visual search and attention tests in the morning and on children's performance in mathematics

after an afternoon walk. Further research is needed to establish the optimal intensity and duration for cognitive stimulation in young people.

### Conclusion

As little as 10 minutes of additional organised physical activity in or outside the classroom implemented into the school day improves classroom behaviour, and consequently may enhance academic performance. The addition of break times when physical activity is undertaken improves classroom behaviour and consequently may enhance academic performance. There is a positive association between physical activity and several components of mental health, including self-esteem, emotive wellbeing, spirituality and future expectations all of which may impact on academic achievement. Physical activity has a positive impact on anxiety, depression, mood, and wellbeing, all of which may impact on academic achievement. Young individuals who participate in organised sport demonstrate lower rates of anti-social behaviour which may result in less disaffection from school. Large cross-sectional studies have shown a positive relationship between participation in sports programmes and school attendance and between physical fitness and school attendance.

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**PHYSICO-CHEMICAL ANALYSIS OF WATER VARIOUS LOCATIONS OF KAPSHI LAKE, KAPSHI DIST. AKOLA AND THEIR COMPARATIVELY STUDIES.****Dr. P.J. Deshmukh**

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**ABSTRACT**

Water is the most prime resource of man's food supply and most important house hold, agricultural, and industrial tool. Water is truly the life live of entire human community. The safety of drinking water is important for the heath. The safety of drinking water is affected by various contaminants which included chemical and microbiological. Such Contaminants cause serious health problems. Due to these contaminants quality of drinking water becomes poor. Sometimes such poor quality water causes many diseases in humans so that quality of water must be tested for both the chemical as well as microbial contaminants. During the study it was found that maximum no. physical and chemical parameters were within the desirable limit, as suggested by APHA and NEERI). The objective of the present research is to provide information on the physicochemical characteristics and ecological studies of Lake Water (Habitat) in order to discuss its suitability for human consumption. Physico chemical Biochemical Aspects of water have been investigated to assess the quality of water. The variations of the physicochemical properties of water sample directly influence the biotic communities and primary productivity of the water bodies at different points of Kapshi Lake, Kapshi dist. Akola.

**Keywords:-** Portable Water, Physicochemical Analysis, Chemical Microbial Contaminants, Kapshi Lake.

**Introduction:-**

Water is one of the most important in all natural resources known on earth. It is important to all living organism, most ecological systems, human heath, food production & economic development. The safety of drinking water is important for the heath. The safety of drinking water is affected by various contaminants which included chemical and microbiological. Such Contaminants cause serious health problems. Due to these contaminants quality of drinking water becomes poor. Sometimes such poor quality water causes many diseases in humans so that quality of water must be tested for both the chemical as well as microbial contaminants. Environmental parameters of water measured in 3 sampling locations (Corner, Middle and Centre of lake) presumably representative of the study area. These physico-chemical parameters of water include; Total dissolved Solids (TDS), pH, Alkalinity, turbidity, Transparency, Colour, Temperature, COD, BOD, Calcium, Chloride, Magnesium. In the open water sites water depth was also estimated. Total dissolved Solids (TDS) were measured using the TDS meter, the pH was measured using a pH/

Temperature controller. The turbidity and apparent colour of water were measured using a Calorimeter and expressed in Formalin Turbidity Units respectively.

**Study site**

Kapshi Lake is one of the oldest lake in Akola district, situated about 20 km from the district place and existing since the British regime. The lake is one of major drinking water source in the area. The people in the vicinity are also using the lake water for agriculture purposes, household acts, fishing, and other necessary things like washing of animals, clothing etc. Therefore, it is essential to know the water quality parameters to avoid the major hazardous conditions and health hazards. Keeping all this in view, the present investigation was planned to analyze various physiochemical parameters of Kapshi Lake with special reference to the algal diversity of the lake.

**Methods and Material**

The present study was carried out for 3 different location of Kapshi Lake, located Kapshi village dist. Akola. In the present study the sampling was done during morning hours and all water samples were collected in the polyethylene bottles. For lake water

samples collection the closed bottles was dipped in the lake at the depth of 0.7 to 0.9m, and then bottles open inside and was closed again to bring it out at the surface. From the time of collection and to the time of actual analysis, many physical and chemical reactions would change the quality of water sample therefore to minimize this change the sample were preserved soon after the collection.

The water samples were preserved by adding chemical preservatives and by lowering the temperature. The water temperature, Odour, Taste, TDS were analyzed immediately on the

spot after the collection, were as the analysis of remaining parameters were done in the laboratory. The study was carried for a period of 06 month (November 2012 to April 2013). The collected water samples were brought to the laboratory and relevant analysis was performed. pH was determined using pH meter and Similarly turbidity is measured by turbidity meter. Alkalinity, Chloride, Magnesium, Calcium, Total hardness, Dissolved oxygen, Dissolved carbon dioxide was determined by method according to Table.

**Table 2.1**

| Water quality test       | Description   | Instrument/ Method |
|--------------------------|---|--------------------|
| Temperature              | Temperature exerts a major influence on the biological activities and growth.                   | Thermometer        |
| Colour                   | The term colour is used to mean the true colour of water from which turbidity has been removed. | Visual Comparison  |
| Odour                    | Odour is recognized as a quality factor affecting acceptability of drinking water               | By Smelling        |
| Taste                    | Taste of water ranging from agreeable to disagreeable   | By Tasting         |
| pH                       | The major of acidity in water   | pH meter           |
| Turbidity                | Turbidity in water is the reduction of transparency   | Calorimeter        |
| Alkalinity               | Alkalinity of water is its quantitative capacity to react with strong acid to designated pH     | Titration Method   |
| TDS                      | The measure of total dissolved solids in the water  | TDS Meter          |
| Dissolved Oxygen         | The amount of oxygen available in the water   | Titration Method   |
| Dissolved carbon dioxide | The amount of carbon dioxide available in the water   | Titration Method   |
| Chloride                 | Measurement of Chloride amount in water   | Titration Method   |
| Calcium                  | Measurement of Calcium amount in water  | Titration Method   |
| Magnesium                | Measurement of Magnesium amount in water  | Titration Method   |
| Total Hardness           | Measurement of Calcium & Magnesium amount in water  | Titration Method   |

**Result**

| Sr. No. | Test                     | Site 1 (Corner) | Site 2 (Middle) | Site 3 (Centre) |
|---------|--------------------------|-----------------|-----------------|-----------------|
| 1.      | Temperature              | 29              | 28              | 26.7            |
| 2.      | Colour                   | <3              | <2              | <2              |
| 3.      | Odour                    | Disagreeable    | Agreeable       | Agreeable       |
| 4.      | Taste                    | Disagreeable    | Agreeable       | Agreeable       |
| 5.      | pH                       | 8.2             | 7.6             | 7.2             |
| 6.      | Turbidity                | 5               | 1.4             | 0.3             |
| 7.      | Alkalinity               | 10              | 09              | 08              |
| 8.      | TDS                      | 138             | 160             | 167             |
| 9.      | Dissolved Oxygen         | 6.1             | 6.3             | 6.3             |
| 10.     | Dissolved carbon dioxide | 40              | 38              | 37              |
| 11.     | Chloride                 | 58              | 36              | 30              |
| 12.     | Calcium                  | 6.2             | 7               | 8               |
| 13.     | Magnesium                | 2.2             | 3.5             | 3.5             |
| 14.     | Total Hardness           | 280             | 140             | 102             |

**Discussion**

Physical parameters like temperature, Odour, Taste and colour was agreeable in process of Centre and Middle site of Lake. The general ISI standard for drinking water's turbidity is <0.1 NTU. Turbidity >5 considered unhealthy. In different area water the turbidity ranging from 0.1 NTU to 0.5 NTU. In corner site location, observed higher Turbidity than the Centre and Middle Location. The pH range of drinking water should far between 6.5 to 7.5 and Centre location pH observed 7.2 to 7.6. So it complied with acceptance criteria of pH range & it was found to be healthy for human use. For portable water, dissolved carbon dioxide & dissolved oxygen were found to be 40 & 6.3 respectively. TDS of water sample showed range below 1500ppm & it complied with the given criteria of Indian standard. Minerals like Calcium, Magnesium, Chloride, are essential for body. Test of these minerals were performed on portable water sample. The Result complied with the given range of test of these minerals. Alkalinity & Total Hardness of

portable water were should less than or equal to 10 and 300 ppm respectively. Result were compiled with the given limits of both the tests. Water temperature may be depending on the season, geographic location and sampling time. As water temperature increases, it makes it more difficult for aquatic life to sufficient oxygen to meet its need. Thermal pollution can cause shifts in the community structure of aquatic organisms. Turbidity of lake ranges from 4 NTU to NTU. Some are naturally highly turbid but human activities have increased the levels of suspended solid in many habitats. The lake amount of total dissolved solids recorded ranges from 102 ppm to 280 ppm. High value of suspended solids can lower primary productivity of system by covering the algae and Macrophytes, at times leading to almost their complete removal. The low oxygen level was recorded during summer mainly due to removal of free oxygen through respiration by bacteria and other animals as well as the oxygen demand for decomposition of organic matter DO is the single most importance gas for the most



aquatic organism IF the amount of free oxygen go below than 2.0 mg/l for few day in lake containing aquatic organism it would lead the killing of most of the biota in the aquatic system. Higher value of free carbon dioxide generally coincided with minimum dissolved oxygen. Habited water is generally used by animals, birds and aquatic life. The disturbance in this biological system & ecological system may affect health of animals, Birds and Aquatic life. After physicochemical analysis we found that the sample of habitat water is free from pollution & ecologically balanced.

### Conclusion

The Result obtained during study was compared with ISI standards. The Lake water is safe enough to be consumed by humans or used with low risk of immediate or long term harm. Habitat water generally used by animals, Birds & aquatic life. The disturbance in this biological & ecological system may affect health of animals, birds & aquatic life. After physicochemical analysis we found that habitat water are free from pollution & ecologically balanced.

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**E-WASTES AND IT'S IMPACT ON ENVIRONMENT****Dr. Rupali P. Tekade**

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**ABSTRACT**

*E-wastes consist of discard of electronic appliances such as computers, mobiles and telephones. India is the Third largest electronic waste producer in the world approximately 2 million tons of e waste are generated annually while China and USA and these three countries together contributes 38% of total 53.6 millions tonnes.. These countries are forced to adopt the "reuse" procedure to save environment and money flow. However certain e-wastes are having their self-life, which cannot be reuse. Hence, it is essential to recycle or disposal of these with suitable precautions. Uncontrolled disposal and recycling activities generate and release high toxic metals such as Hg, Pb, Cd, Cr, Cr(IV), Co, Cu, Ni, and Zn. These also release high concentrations of different types of flame retardants such as Poly Brominated Diphenyl Ethers (PBDEs), Poly-Chlorinated Biphenyls (PCBs) and Organo Chlorine Pesticides (OCPs). In this current research paper, potential environmental health consequences of these toxic metals and organo compounds are described. The selection of this topic is to evaluate electronic waste (e-waste) pollution and the toxic substances present in the e-waste and their threats to environment.*

**Keywords:** E- waste, waste management, environment, hazardous Substances

**Introduction**

“Electronic waste or e-waste is one of the emerging problems in developed and developing countries worldwide. In general electronic gadgets are meant to make our lives happier and simpler, but they are considered dangerous, as certain components of some electronic products contain materials that are hazardous, depending on their condition and density. The hazardous content of these materials pose a threat to human health and environment. Discarded computers, televisions, VCRs, stereos, copiers, fax machines, electric lamps, cell phones, audio equipment and batteries if improperly disposed can leach lead and other substances into soil and groundwater. Many of these products can be reused, refurbished, or recycled in an environmentally sound manner so that they are less harmful to the ecosystem. Over the past two decades, the global market of electrical and electronic equipment (tEEE) continues to grow exponentially, while the life span of those products becomes shorter and shorter. Mostly e-wastes are dumped, burnt or exported to recyclers. During dismantling process like shredding, tearing and burning, the smoke and dust particles are eliminated. These smoke and dust particle consists of carcinogens and other hazardous chemicals which causes severe

inflammations and lesions including many respiratory and skin diseases (Sivakumaran and Sivaramanan, 2013). Circuits are burnt to hunt the valuable metals such as gold, platinum, cadmium but the wire coat of these consists of PCV and PCB which may produce erotic smoke and carbon particles from the toners are carcinogens, they may lead to lung and skin

cancer (Kevin et al., 2008) .E-waste from developed countries find an easy way into developing countries in the name of free trade is further complicating the problems associated with waste management (Joseph, 2007). The Basel Action Network (BAN) stated in a report that 50-80% of e-waste collected by the USA is exported to India, China, Pakistan, Taiwan, and a number of African countries (Monika and Kishore, 2020).Poverty and availability of cheap labor in these countries are the main reason to consume e-wastes from Europe and USA (Sivakumaran and Sivaramanan, 2013) Disposal of e-waste is an emerging global environmental and public health issue, as this waste has become the most rapidly growing segment of the formal municipal waste stream in the world (Dahl, 2002) . The rapid growth and faster change in modules of computers, cell phones and consumer electronics becomes major issue that enhances the amount of e-waste generation.

This paper highlights the hazards of e-wastes to the environment, the need for its appropriate management and options that can be implemented .

### Scenario of e-waste in India

Some of the major electronic devices that are responsible for the increase in e-waste in India are TV ,Laptops, mobiles, and desktops. The forecaste of the e-waste generated from these devices are shown in the following tabl

| Devices                      | 2014    | 2015    | 2016      | 2017      | 2018      | 2019    | 2020    |
|------------------------------|---------|---------|-----------|-----------|-----------|---------|---------|
| PCs                          | 59,558  | 66429   | 67,102    | 49,648.5  | 41699     | 35947   | 32511   |
| Laptops                      | 12640   | 15248   | 20,673    | 25,280    | 32360     | 40367   | 50,769  |
| Mobiles                      | 22919   | 23101   | 28827.5   | 33,475    | 36172.5   | 38870   | 41925   |
| TV                           | 130200  | 145,800 | 168,000   | 184,200   | 202,770   | 221,550 | 241,500 |
| <b>Total ewaste every yr</b> | 225,317 | 250,578 | 284,602.5 | 292,613.5 | 313,001.5 | 336,734 | 366,705 |

Table 1:Generation of E-waste every year(in metric tons) Souce:Ahmed et.al(2014)

| Sr.no | State       | Generated E waste | Percentage |
|-------|-------------|-------------------|------------|
| 1     | Maharashtra | 20270.59          | 18.49      |
| 2     | Tamil Nadu  | 1381.11           | 12.30      |
| 3     | AP          | 12780.33          | 11.66      |
| 4     | UP          | 10381.11          | 9.47       |
| 5     | West Bengal | 10.059.36         | 9.18       |
| 6     | Delhi       | 9729.15           | 8.87       |
| 7     | Karnataka   | 9118.74           | 8.32       |
| 8     | Gujarat     | 8994.33           | 8.20       |
| 9     | MP          | 7800.62           | 7.11       |
| 10    | Punjab      | 6958.46           | 6.35       |

Table 2:States generating E-waste Souce:Begum(2013)

The states that contributes maximum of e-waste in India are Maharashtra, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab. The amount of e-waste produced by these states is described in The states that contributes maximum of e-waste in India are Maharashtra, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab. The amount of e-waste produced by these states is described in The states that contributes maximum of e-waste in India are Maharashtra, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab. The amount of e-waste produced by these states is described in The states that contributes maximum of e-waste in India are Maharashtra, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab. The amount of e-waste produced by these states is described in The states that contributes maximum of e-waste in India are Maharashtra, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab.

Pradesh and Punjab. The amount of e-waste produced by these states is described in The states that contributes maximum of E-waste in India are Maharashtra ,Tamil Nadu, Andhra Pradesh ,Uttar Pradesh, West Bengal ,Delhi ,Karnataka ,Gujarat, Madhya Pradesh and Punjab. E-waste of developed countries, such as the US, disposes their wastes to India and other Asian countries. A recent investigation revealed that much of the electronics turned over for recycling in the United States ends up in Asia, where they are either disposed of or recycled with worker health and safety. Major reasons for exports are cheap labour and lack of environmental and occupational standards in Asia and in this way the toxic effluent of the developed nations' would flood towards the world's poorest nations. The magnitude of these problems is yet to be documented. However, groups like Toxic Links India are already working on collating data that could be a step towards

controlling this hazardous trade. It is imperative that developing countries and India in particular wake up to the monopoly of the developed countries and set up appropriate management measures to prevent the hazards and mishaps due to mismanagement of e-wastes. In India, solid waste management, with the emergence of e-waste, has become a mammoth task. Due to development in software sector, the Indian information technology industry has a major global presence today. More recently, policy changes have led to a tremendous influx of leading multinational companies into India to set up manufacturing facilities, R & D centers and software development facilities. This growth has significant economic and social impacts.

As there is no separate collection of e-waste in India, there is no clear data on the quantity generated and disposed of each year and the resulting extent of environmental risk. According to a report of Confederation of Indian Industries, the total waste generated by obsolete or broken down electronic and electrical equipment in India has been estimated to be 1,46,000 tons for the year 2005 (CII, 2006) [2].

However, according to the Greenpeace 2007

India generated 380,000 tones of e-waste. In India, about 1.38 million personal computers obsolete every year, increasing the rate of e-waste generation, which is approximately 10%, annually going to affect environmental health indicators (Monika and Kishore, 2020).

Despite a wide range of environmental legislation in India there are no specific laws or guidelines for electronic waste or computer waste (Devi et al., 2004) As per the

Hazardous Waste Rules (1989), e-waste is not treated as hazardous unless proved to have higher concentration of certain substances. Though PCBs and CRTs would always exceed these parameters, there are several grey areas that need to be addressed. As the collection and re-cycling of electronic wastes is being done by the informal sector in the country at present, the Government has taken the following action/steps to enhance awareness about environmentally sound management of electronic waste (CII, 2006) The consequences

of improper e-waste disposal in landfills or other non-dumping sites pose serious threats to current public health and can pollute ecosystems for generations to come. When electronics are improperly disposed and end up in landfills, toxic chemicals are released, impacting the earth's air, soil, water and ultimately, human health.

### AIR

Air pollution is a widespread problem in India—nine out of the ten most polluted cities on earth are in India.<sup>[13]</sup> An important contributor to India's air pollution problem is widespread, improper recycling and disposal of e-waste.

For example, dismantling and shredding of e-waste releases dust and particulates into the surrounding air. Low value e-waste products like plastics are often burned—this releases fine particles into the air that can travel hundreds-to-thousands

of miles.<sup>[14]</sup> Desoldering is a technique used to extract higher-value materials like gold and silver which can release chemicals and damaging fumes when done improperly.<sup>[14]</sup>

In addition to contributing to air pollution, these toxic e-waste particulates can contaminate water and soil. When it rains, particulates in the air are deposited back into the water and soil. Toxic e-waste air particulates easily spread throughout the environment by contaminating water and soil which can have damaging effects on the ecosystem.

### WATER

A child walks in a trash-laden river in the Indian Himalayas.

India's sacred Yamuna river and Ganges river are considered to be among the most polluted rivers in the world. It is estimated that nearly 80% of India's surface water is polluted.<sup>[15]</sup> Sewage, pesticide runoff and industrial waste, including e-waste, all contribute to India's water pollution problem.<sup>[15]</sup>

E-waste contaminates water in two major ways:

1. Landfills: Dumping e-waste into landfills that are not designed to contain e-



waste can lead to contamination of surface and groundwater because the toxic chemicals can leach from landfills into the water supply.

2. Improper recycling: Improper recycling produces toxic byproducts that may be disposed of using existing drainage such as city sewers and street drains. Once these products have been introduced into the local water supply, they can cause further pollution by entering surface water such as streams, ponds, and rivers..

In addition to being measurable, the effects of industrial waste pollution in India are easily observable. Approximately 500 liters of industrial waste, which includes e-waste, are dumped into the Ganges and Yamuna river daily which has led to the formation of toxic foam<sup>[17]</sup> which covers large regions of the rivers.<sup>[18]</sup>

### SOIL:

According to research by Jamia Millia Islamia University, the average concentration of heavy metals in topsoil near e-waste sites in India is significantly higher than in standard agriculture soil samples. Another study tested soil samples from 28 e-waste recycling sites in India and found that the soil contained high levels of toxic Polychlorinated biphenyls (PCBs), Polychlorinated

dibenzodioxins (PCDDs) and Polychlorinated dibenzofurans (PCDFs).<sup>[19]</sup> Further soil sample analysis conducted by the SRM Institute of Science and Technology found the average concentration PCBs in Indian soil to be two times higher than the average amount globally.

In India, PCB compounds are most prevalent in urban areas with the highest rate of soil-contamination found in Chennai (a city that imports e-waste), followed by Bengaluru, Delhi and Mumbai.<sup>[20]</sup>

### 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 materials are dumped or unhealthy conditions are developed during the informal recycling. Criteria are to be developed for recovery and disposal of e-wastes. Policy level interventions should include development of e-waste regulation, control of import and export of e-wastes and facilitation in development of infrastructure. An effective take-back program providing incentives for producers to design products that are less wasteful, contain fewer toxic components, and are easier to disassemble, reuse, and recycle may help in reducing the wastes. It should set targets for collection and reuse/recycling, impose reporting requirements and include enforcement mechanisms and deposit/refund schemes to encourage consumers for it. For e-waste management many technical solutions are available, but to be adopted in the management system, prerequisite conditions such as legislation, collection system, logistics, and manpower should be prepared. This may require operational research and evaluation studies.

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## STUDY OF BIRD DIVERSITY IN AN AROUND ISAPUR DAM OF YAVATMAL DISTRICT

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### ABSTRACT

*Study of bird diversity in the area of Isapur Dam near Shembalpimpri village. This area was surrounded by agricultural land with adjacent forestlands. In india Maharashtra state was carried out in early wet and dry seasons. Richness and diversity of birds species in and around the Isapur Dam was greatly vary in number. Its provides very good habitat for winter visitor guests. There is 9 species of birds of 9 families were recorded. It is the grassland area, herbs, shrubs, and trees located around the area that also provide food and shelter to these birds.*

**Keywords:** Birds, Isapur Dam, Shembalpimpri, grassland area, food and shelter

### Introduction

Birds are distributed worldwide with their diverse ecological functions in different types of ecosystem. Birds are very important component in any ecosystem. They are chordate belonging to class Aves. Aves is the latin name for birds- feathered, winged, bipedal, warm blood, egg laying vertebrate animal. Birds are some of the most prominent species of the earth's biodiversity and being sensitive to environmental changes[1]. The change in vegetation composition could impact the quantity and quality of habitat for birds in terms of food, water and cover, which can further affect diversity, abundance and distribution of birds[2,3]. Birds play vital role in keeping balance of nature. They also help in pollination of flowers and dispersal of seeds. Isapur Dam has great diversity. The area around Isapur Dam was surrounded by agricultural land. There are 9 species of birds are found and their was also recorded. As per report of Wikipedia there are 1,314 species of birds recorded in india[4].

### Materials and methods

The data of bird counting from intensive studies and surveys have been used to present study and estimate their densities. Diversity

and density are very useful indicators for quality[5]. Diversity and density of birds were recorded by weekly visit for 6 months to Isapur Dam and an average of 4 weeks was accounted for month. The relative abundance of birds was estimated and their monthly fluctuation was recorded and is classified on the basis of 'the book of indian birds'[6]. The method involves a time-constrained survey of a defined area, during which the observer records all birds seen or heard. Vegetation surveys, using a relevant method, are conducted in a search area. The birds were observed by sitting and standing from a hiding places.

### Results and discussion

After our continuous observation of 6 months, we have identifies 9 bird species which are listed below:

| S.No. | Species    | Family       | Order            |
|-------|------------|--------------|------------------|
| 1.    | Crow       | Carvidae     | Passeriformes    |
| 2.    | Woodpecker | Picidae      | Piciformes       |
| 3.    | Duck       | Anatidae     | Anseriformes     |
| 4.    | Sparrow    | Passeridae   | Passeriformes    |
| 5.    | Pigeon     | Columbidae   | Columbiformes    |
| 6.    | Eagle      | Accipitridae | Accipitriiformes |
| 7.    | Koel       | Cuculidae    | Cuculiformes     |
| 8.    | Cranes     | Gruidae      | Gruiformes       |
| 9.    | Parrot     | Psittacidae  | Psittaciformes   |

In this study 9 species of birds of 9 families were recorded. In now a days the no. of crow and sparrow are found in maximum no. but the woodpecker and eagle are present in less quantity. The no. of cranes are get extinct. To maintain the ecosystem balance we have need to conserve and save the birds.

### Conclusion

In our 6 months survey, 9 species belonging to 9 families. Our study of bird diversity in Isapur Dam revealed that current. Wildlife

conservation efforts do not coincide with areas of the highest bird abundance and species diversity which exist in urban areas.

This study therefore indicates the importance of protecting not only the natural habitats of native wildlife but also urban areas where birds in particular are more commonly existing. Although in and around Isapur Dam maintain the habitat for high diversity of resident and migratory birds in yavatmal district.

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## SUSTAINABLE DEVELOPMENT: EQUILIBRIUM OF ECONOMICS AND ENVIRONMENT

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### ABSTRACT

*The thrust for development is human nature. For hundreds and thousands of years, humans have co-existed with nature. Environment Conservation and Development are the two sides of the same road. Until the human civilization understood the importance of environment, development was never a threat to it. But unfortunately, human needs were replaced with greed, posing a serious threat to the environment at first glance and the existence of this planet itself. "Earth provides enough to satisfy every man's needs, but not every man's greed."*

*Mahatma Gandhi*

*Sustainable development means to "fulfil the present needs without compromising the needs of future generation. It is an organizing principle for meeting human development goals while also sustaining the ability of natural systems to provide the natural resources and ecosystem services on which the economy and society depend. It aims at a state of society where living conditions and resources are used to continue to meet human needs without undermining the integrity and stability of the natural system. This study aims at focusing on finding an amicable way between development and environment conservation. The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.*

**Keywords:** Sustainable Development, Sustainable Development Goals (SDG), Environment

### Introduction

Sustainable development means to "fulfil the present needs without compromising the needs of future generation. It is an organizing principle for meeting human development goals while also sustaining the ability of natural systems to provide the natural resources and ecosystem services on which the economy and society depend. It aims at a state of society where living conditions and resources are used to continue to meet human needs without undermining the integrity and stability of the natural system

### Definition

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains two key concepts within it:

1. The concept of 'needs', in particular, the essential needs of the world's poor, to which overriding priority should be given; and
2. The idea of limitations imposed by the state of technology and social organization on

the environment's ability to meet present and future needs.

— *World Commission on Environment and Development Our Common Future*

### Characteristic of Sustainable Development

The following cases indicate the fundamental traits of sustainable development.

1. Real per capita income and economic welfare should continue to increase over the long run.
2. Sustainable development means that resources should be utilized organically and without overusing them.
3. Sustainable development aims to use natural resources and the environment to raise the standard of living while preserving future generation's capacity to meet their own needs.
4. Promoting environmentally friendly and biodegradable products is a goal of sustainable development, as is establishing sustainable plans for resource replacement or replenishment.
5. Green architecture and other environmentally friendly building techniques are emphasized in sustainable development.

## Core Elements of Sustainable Development

1. **Environmental Conservation:** The main goal of sustainable development is to preserve the environment in order to prevent the depletion of the resources it provides.
2. **Social Development:** It attempts improve an individuals' and societies overall well-being. It involves ensuring that individuals have access to the resources they need, adequate healthcare, and a good standard of living.
3. **Economic Progress:** By convincing them of its long-term benefits and promoting both the environmental and social aspects of the cause, it persuade individuals to invest in sustainable endeavors.

### Objectives of the study

This study aims at focusing on finding an amicable way between development and environment conservation. The objectives of this paper are-

1. To reconcile economic growth.
2. To study environmental balance and social progress,
3. To find out ways and means of same opportunities to all people
4. To study methods of co-existence of human and nature.

### Research Methodology

The present study is based on secondary data collected from publications, books, websites and other internet sources which are clearly mentioned in the reference.

### Importance of the study

Mahatma Gandhi showed the dangers of unplanned and reckless industrialization. He advocated that the growth oriented theory must be replaced by theories of sustainable development that will guarantee harmonious co-existence of man and the ecosystem. The Sustainable development ideology states the interrelationship of human beings with the ecosphere. It is a way of life which involves the active participation of all the members of society.

Thus Development is related to environment conservation, without showering the wheels of

economic development. Learning lessons from past mistakes, the governments across the world are framing time bound strategies for preserving global natural resources

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

The 17 SDGs are framed with an objective to balance development with social, economic and environmental sustainability. This will require the creativity, knowledge, technology and financial resources from all thesections of society to achieve the SDGs in every context.

1. **No poverty -End poverty in all its forms.** According to various studies, nearly 10 percent of the global population live in poverty and struggle to meet basic needs like food, water and shelter.
2. **Zero hunger (No hunger) -SDG 2 aims to endhunger, achieve food security with improved nutrition, and promote sustainable agriculture.** SDG 2 has eight targets and 14 indicators to measure progress.The utmost importance is given to achieve zero hunger.
3. **Good health and well-being:** "Ensure healthy lives and promote well-being for all at all ages" is the main objective of this SDG. It has 13 targets and 28 indicators to measure progress toward targets. Significant strides have been made in increasing life expectancy and reducing some of the common causes of child and maternal mortality.
4. **Quality education -."Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all".** It has ten targets which are measured by 11 indicators. Major progress has been made in access to education, specifically at the primary school level, for both boys and girls.
5. **Gender equality- "Achieve gender equality and empower all women and girls".**This aims to grant women and girls equal rights, opportunities to live free without discrimination including workplace or any



- violence. This is to achieve gender equality and empower all women and girls.
6. Clean water and sanitation- "Ensure availability and sustainable management of water and sanitation for all". The eight targets are measured by 11 indicators. According to The Joint Monitoring Programme of World Health Organization and United Nations International Children's Emergency fund UNICEF reports, 4.5 billion people currently do not have safe sanitation. However, both supply- and demand-side interventions financed by aid can contribute to promoting access to water, as evident from previous experiences, but consistent long-term investments are needed.
  7. Affordable and clean energy: "Ensure access to affordable, reliable, sustainable and modern energy for all. The goal has five targets to be achieved by 2030. Progress towards the targets is measured by six indicators. Progress in expanding access to electricity has been made in several countries.
  8. Decent work and economic growth, "Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all." SDG 8 has (12) twelve targets in total to be achieved by 2030. Addressing youth employment means finding solutions with and for young people who are seeking a decent and productive job. Such solutions should address both supply, i.e. education, skills development and training, and demand.
  9. Industry, Innovation and Infrastructure- "Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation" SDG 9 has eight targets, and progress is measured by twelve indicators.
  10. Reduced inequality- "Reduce income inequality within and among countries". The Goal has ten targets to be achieved by 2030. The unequal distribution of wealth is the cause of social unrest. This SDG aims at reducing the gap between the rich and the poor.
  11. Sustainable cities and communities -"Make cities and human settlements inclusive, safe, resilient, and sustainable". Sustainable Development Goal 11 is divided into 10 targets and 14 indicators at the global level. The focus is to reduce the number of slum dwellers particularly in of the urban population.
  12. Responsible consumption and production- "Ensure sustainable consumption and production patterns". Sustainable Development Goal 12 has 11 targets. More and More Countries are striving to work towards the implementation of the "10-Year Framework of Programmes on Sustainable Consumption and Production Patterns".
  13. Climate action -"Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy". SDG 13 and SDG7 on clean energy are closely related and complementary. The leading sources of the greenhouse gas savings that countries need to focus on switching fuels to renewable energy and enhancing end-use energy efficiency.
  14. Life below water -"Conserve and sustainably use the oceans, seas and marine resources for sustainable development". Oceans and fisheries support the global population's economic, social and environmental needs. Oceans are the source of life of the planet and the global climate system regulator. They are the world's largest ecosystem, home to nearly a million known species. Oceans cover more than two-thirds of the earth's surface and contain 97% of the planet's water.<sup>1</sup> They are essential for making the planet livable. Rainwater, drinking water and climate are all regulated by ocean temperatures and currents. Over 3 billion people depend on marine life for their livelihood. However, there has been a 26 percent increase in acidification since the industrial revolution. Effective strategies to mitigate adverse effects of increased ocean acidification are needed to advance the sustainable use of oceans.

15. Life on land - "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss". Humans depend on earth and the oceans to live. This goal aims at securing sustainable livelihoods that will be enjoyed for generations to come. The human diet is composed 80% of plant life, which makes agriculture a prime economic resource. Forests cover 30 percent of the Earth's surface, provide vital habitats for millions of species, and important sources for clean air and water, as well as being crucial for combating climate change.
16. Peace, justice and strong institutions - "Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels". Reducing violent crime, sex trafficking, forced labor, and child abuse are clear global goals. The International Community values peace and justice; they call for stronger judicial systems that will enforce laws and work toward a more peaceful and just society. All women need to be able to turn to fair and effective institution to access Justice and important services. We cannot hope for sustainable development without peace and stability in any country.
17. Partnership for the goals - "Strengthen the means of implementation and revitalize the global partnership for sustainable development". Humanitarian crises brought on by conflict or natural disasters demand more financial resources and aid. Even so, many countries also require official development assistance to encourage growth and trade. Thus the aim of this SDG17 can be achieved with cooperation and coordination amongst various countries.

### Conclusions

International organizations such as NGOs, United Nations, aid organizations are making continuous efforts to ensure that the goal of sustainable development is achieved for every individual across the globe. They are funding various projects to achieve the various goals and objectives of sustainable development is achieved for every individual across the globe. They are funding various project to achieve the various goals and objectives of sustainable development. From the above discussion, we can conclude that sustainable development can help –

1. To develop new areas while using the fewest natural resources possible.
2. To build a sustainable environment that won't harm the environment in any way.
3. To offer a technique for reconstructing current developments so that they have eco-friendly initiatives and facilities

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## WATER POLLUTION

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### Introduction

Water is one of the renewable resources essential for sustaining all forms of life, food production, economic development, and for general well being. It is impossible to substitute for most of its uses, difficult to be expensive to transport and it is truly a unique gift to mankind from nature, water is also one of the most manageable natural resources as it is capable of diversion, transport, storage and recycling, all these properties impart to water is great utility for human beings. The surface water and ground water resources of the country play a major role in agriculture, hydropower generation, livestock production, industrial activities forestry, fisheries, navigation, recreational activities etc. The freshwater ecosystems of the world comprise and have a volume of  $2.84 \times 10^5 \text{ km}^3$ . Rivers constitute an insignificant amount (0.1%) of the land surface. Only 0.01% the waters of the earth occur in river channels. India receives annual precipitation of about  $4000 \text{ km}^3$ , including snowfall, out of this, monsoon rainfall is of the order of  $3000 \text{ km}^3$ . Rainfall in India is dependent on the south-west and north-east monsoons. On shallow cyclonic depressions and disturbances and on local storms. Most of it take place under the influence of South-West monsoon between June and September except in Tamil Nadu, Where it is under the influence of north-east monsoon during October and November, India is gifted with river system comprising more than 20 major rivers with several tributaries. Many of these rivers are perennial and some of them are seasonal. Although India occupies only 3.29 million km geographical area, constituting 2.4%, of the world's land area it supports over 15% of the world population. The population of India as on 1<sup>st</sup> March 2001 stood at 1/25<sup>th</sup> world's water resources.

### Principle forms of water pollution and their sources :

Water pollution can be defined as undesirable or unwanted change in physical chemical or biological characteristics of water making it unsuitable for designated use in its natural state.

#### Sources of water pollution :

- 1) Sewage and domestic wastes.
- 2) Industrial effluents.
- 3) Agro-chemical wastes.
- 4) Detergents
- 5) Toxic meals
- 6) Thermal pollution
- 7) Oil spillage
- 8) The disruption of sediments.
- 9) Acid rain pollution.
- 10) Radioactive waste
- 11) Climate change
- 12) Waste heat / thermal pollutants.

#### Other activities :-

Other activities like discharging 'Nirmalya' and immersion of Ganesh idols during Ganesh festival bathing. Cattle washing car and vehicles washing utensil washing mostly

in rural areas in river basins causing water pollution.

#### Effect of water pollution.

##### 1) Effect of water pollution in human health :-

Chemicals in water that affect human health ; some of the chemicals affecting human health are the presence of heavy metals such as Fluoride, Arsenic, lead, Cadmium, Mercury, Petrochemicals, Chlorinated solvent, pesticides and nitrates. Arsenic is highly dangerous for human health causing respiratory cancer arsenic illness from contaminated drinking water in some districts of West Bengal. Long exposure leads to bladder and lung cancer lead is contaminated in the drinking water source from pipes, fitting, solder, household plumbing systems. In the human beings. It affects the blood, central nervous system and the Kidneys, Child and pregnant women are mostly prone to lead exposure, pesticides fungicides etc.

##### 2) Effect of water pollution on Plants :

- 1) Effects of acid deposition
- 2) Nutrient deficiency in aquatic ecosystem
- 3) Effects of organic matter
- 4) Effects of detergent

deposition 5) Effects of agricultural chemicals 6) Effects of industrial wastes 7) Effects of silt deposition 8) Effects of oil spillage 9) Effects of thermal pollution 10) Effects of nutrient enrichment 11) Phytotoxicity effects on plants

### 3) Harmful effects of pollutions :-

It causes deleterious effects on living organisms and may bring about death of sub-lethal pathology of Kidney, liver brain and lungs. Also causes mortality of fish effluent containing acids and alkalies make the water corrosive.

### 4) Effect of thermal pollutants in water :

The rise in temperature in aquatic system has a profound effect on organisms as well as on water quality. These effects are as follows :

1) Reduction in dissolved oxygen (DO) 2) Increase in (BOD) 3) Excessively eutrophication

### 5) Effects of Radioactive pollutants in water :

1) Nausea, vomiting diarrhoea, general weakness which is known as radiation sickness.

2) Due to this (radioactive pollutants) body becomes less resistant towards a variety of disease.

3) It causes somatic and genetic disorders, gene mutations and blood abnormalities in higher animals including man.

## Control of Water pollution

### A) General aspects :

- i) Judicious use of agrochemical like pesticides and fertilizers which will reduce their surface run off and leaching. Avoid use of these on sloped lands.
- ii) Use of nitrogen fixing plants to supplement the use of fertilizers.
- iii) Adopting integrated pest management (IPM) to reduce reliance on pesticides.
- iv) Prevent runoff of manure. Divert such runoff to basin for settlement. The nutrient rich water can be used as fertilizer in the fields.
- v) Separate drainage of sewage and rain water should be provided to prevent overflow of sewage with rainwater.

vi) Planting trees would reduce pollution by sediments and will also prevent soil erosion.

vii) Bathing, washing cattle washing should be prohibited in the vicinity of sources.

viii) Ponds rivers, lakes etc. should be protected by suitable method for the prevention of waste entry.

ix) Ponds lakes etc should be regularly cleaned of aquatic weeds and plants.

x) Public awareness through electronic and print media regarding water pollution should be created. It will help in participation of public towards water pollution control campaigns.

xi) Strict enforcement of pollution control laws should be more punitive.

xii) Eco-friendly approach towards celebrating Ganesh Festival.

### B) Technical aspects for controlling water pollution, treatment of waste water is essential before being discharged.

i) Parameters which are considered for reduction in such water are- total solids. Biological oxygen demand, chemical oxygen demand, nitrate, phosphates oil and greased toxic metals.

ii) Waste waters should be properly treated by primary and secondary treatments to reduce the levels up to help permissible levels for discharge.

iii) Advanced treatment for removal of nitrates and phosphates will prevent eutrophication.

iv) Before the discharge of waste water. It should be disinfected to kill the disease causing.

v) Proper chlorination should be done to prevent the formation of chlorinated. Hydrocarbons or disinfection should be done by ozone or ultraviolet radiations

vi) For general drinking water treatment water treatment plants for industrial waste water treatment effluent treatment plants and for collective waste water treatment common effluent treatment plant should be adopted and should be maintained in good working conditions.



## Pollutions of stream and lakes

### Types of pollutants.

#### 1) Physical :

Physical pollutants to lakes and streams include materials such as particles of soil that are eroded from the landscape or washed from pavements by flowing water. Once in a lake or stream some particles settle out of the water to become bottom sediments. Chemical pollutants adsorbed (bound) to the particles are also incorporated into the sediments, where they may be permanently buried, or be carried by the water currents to other locations. Another type of physical pollutant is heat that may be discharged from an industrial source, or run-off from hot surfaces in warm weather. The over clearing of shade trees along the shoreline of a lake or stream may also permit sunlight to warm waters above the normal temperature range. Chemical fresh waters naturally contain chemicals dissolved from the solid and rock over which they flow. The major inorganic elements include calcium, magnesium, sodium, potassium, carbon chloride and sulfur as well as plant nutrients, such as nitrogen, silicon and phosphorus. Organic compounds derived from decaying biological materials may also be present. In addition, nearly all fresh waters contain some human-made compound, such as pesticides and other industrial and consumer products. Chemicals resulting from human activities that increase the concentration of plant nutrient may lead to excessive plant growth, while synthetic organic compounds may cause physiological changes in aquatic organisms. Or may become lethal at high concentrations. Pollutants can be taken up by plants and animals through contact with contaminated sediments, or directly from the water. Plants and organisms that become contaminated from these sources can pass the contamination up the food chain as predators consume them.

#### 2) Biological :

Although living organisms themselves are not generally thought of as pollutants, bacteria and plants that grow to nuisance proportions can impair the use of fresh waters. Such problems often arise when the

plants die and decay, which is when bacterial decomposition, consumes oxygen needed by aerobic aquatic organisms. An overabundance of algae or other plants provided more decaying material and hence a greater reduction in oxygen as the material decomposes. Moreover, nonnative plants and animals that are introduced as a result of human activities can change the basic ecology of a lake or stream often to great detriment.

### Point source of pollution

Point sources of water pollution are defined as those that originate from a known point such as a pipe from which a pollutant may enter a lake or stream. Nearly every city, town and waterside settlement discharges some type of pollution to surface waters. Human wastes that are collected in sewers and piped to municipal sewage treatment plants ultimately are discharged to surface waters and treated waste water older systems with combined sewer and storm water system discharge untreated sewage to rivers or lakes during heavy rainfall that overwhelms the drainage system. But in general treatment processes remove solid material. Many of the chemical pollutants, and then disinfect the treated sewage to kill disease-causing organisms before releasing the treated waste water to the receiving water body. Almost every industry uses water in its manufacturing process or in the production of raw materials and energy. Water can pick up pollutants when it is used to make a product or clean a manufacturing area. The pretreatment of wastes prior to discharge to sewers or directly to surface waters can recover metals and valuable chemicals that save companies money while reducing pollution.

### Marine pollution (Ocean pollution) :-

#### The main sources of marine pollution are :

- 1) Rivers, which bring pollutants from their drainage basins.
- 2) Catchment areas i.e. coastline where human settlements in the form of hotels, industry, agricultural practices have been established



3) Oil drilling and shipment most of the rivers ultimately join the ocean. The pollutants which these rivers carry from their draining basins are finally poured into sea. These include sewage sludge, industrial effluents, plastics, metals and waste heat (hot water) released by industries. In the sea the pollutant gets diluted and organic matter is further broken down as river water. Still many pollutants especially degraded causing marine pollution. These pollutants get biomagnified and affect fisheries and other marine life. Another important source of marine pollution is the leaking toxic substances, radioactive waste etc. which are stored in large containers and dumped in deep sea considering sea to be a better disposal site than land. Tankers and other shipping companies' industries (petroleum, refinery lubricating oil using industry metal industry, paint industry) automotive wastes, refineries, ship accidents and of shore production add to marine pollution. Tankers transporting oil contribute to oil pollution significantly. After delivering the oil through sea-route earlier empty used to be filled with water called ballast water to through sea-route earlier empty tankers used to be filled with water called ballast. Water to maintain balance. The ballast water containing residual oil from tankers was released into the sea on completion of return journey. Now a day the oil floating on the ballast water is removed in the newly designed load on-top tankers before ballast-water is let off. Oil in sea water can spread over a large of the sea remain desperados or get absorbed on sediments. It can cause adverse effects on marine life. Oil in the sea water affects sensitive flora and fauna. Phytoplankton, zooplankton, algal species, various species of invertebrates coral reefs, fish birds and mammals are affected by oil pollution. Fishes show mortality (death) because the fish gills get laden with oil after the slimy mucus of gills is affected oil disrupts the insulating capacity of feathers. Death occurs due to loss of buoyancy and subsequent drowning of birds. Leakage from oil tanker near Alaska in 1989 caused

damage to coral reefs and resulted in death of about 3,90,000 birds.

#### **Control of Marine pollution :**

- 1) Toxic pollutions from industries and sewage treatment plants should not be discharged in coastal waters.
- 2) Run-off from agricultural sector should be prevented to reach coastal areas.
- 3) Sewer overflows should be prevented by having separate sewer and rain water pipes.
- 4) Dumping of toxic, hazardous waste and sewage sludge should be banned.
- 5) Development activities on coastal areas should be minimized.
- 6) Oil and grease from service stations should be processed for reuse.
- 7) Oil ballast should not be dumped in to sea.
- 8) Ecologically sensitive coastal area should be protected by not allowing drilling.

#### **Ground water pollution :**

Over 98% of the fresh water in the earth lies below the surface. The remaining 2% is what we see in the lakes, rivers streams and reservoirs. Today human activities are constantly adding industrial, domestic and agricultural wastes to ground water reservoirs at an alarming rate. Ground water contamination is generally irreversible i.e. once it is contaminated; it is difficult to restore the original water quality of the aquifer.

#### **Factors affecting ground water pollution :-**

- 1) Rainfall pattern.
- 2) Depth of water table.
- 3) Distance from the source of contamination and soil properties such as texture, structure or filtration rate.

#### **Sources of contamination in ground water**

- 1) Domestic waste.
- 2) Industrial wastes.
- 3) Agricultural wastes.
- 4) Run off from urban areas.
- 5) Other sources. Waste waters. Treatment, lagoons, mine spills, seepage pits urban and rural garbage. Earthen septic tanks, refuse dumps, leaching and down ward movement of pollutants.

**Harmful effects of ground water pollution**

Harmful effects on man harmful effects on soil protecting ground water from pollution (Control measures)

- 1) The contaminant sources should be carefully surveyed.
- 2) Location of industrial and municipal disposal sites should be decided keeping in view the ground water levels and flow pattern in the area.
- 3) In case of toxic industrial effluents, steps should be taken for predispose treatment by the industry itself.
- 4) Location of wells for drinking water supplies of wells for drinking waste supplies should be decided with almost caution.
- 5) Surrounding contaminants sources and flow direction should be considered.
- 6) It is not advisable to tap uppermost aquifer case of drinking water wells.

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Industrial pollution : Types Effects and control of Industrial Pollutions by kumar <http://www.environmentalpollution.in>

**Principle forms of water pollution and their sources :**

Water pollution can be defined as undesirable or unwanted change in physical chemical or biological characteristics of water making it unsuitable for designated use in its natural state.

**Sources of water pollution :**

- 13) Sewage and domestic wastes.
- 14) Industrial effluents.
- 15) Agro-chemical wastes.
- 16) Detergents
- 17) Toxic meals
- 18) Thermal pollution
- 19) Oil spillage
- 20) The disruption of sediments.
- 21) Acid rain pollution.
- 22) Radioactive waste
- 23) Climate change
- 24) Waste heat / thermal pollutants.

**Other activities :-**

Other activities like discharging 'Nirmalya' and immersion of Ganesh idols during Ganesh festival bathing. Cattle washing car and vehicles washing utensil washing mostly in rural areas in river basins causing water pollution.

**Effect of water pollution.****6) Effect of water pollution in human health :-**

Chemicals in water that affect human health ; some of the chemicals affecting human health are the presence of heavy metals such as Fluoride, Arsenic, lead, Cadmium, Mercury, Petrochemicals, Chlorinated solvent, pesticides and nitrates. Arsenic is highly dangerous for human health causing respiratory cancer arsenic illness from contaminated drinking water in some districts of West Bengal. Long exposure leads to bladder and lung cancer lead is contaminated in the drinking water source from pipes, fitting, solder, household plumbing systems. In the human beings. It affects the blood, central nervous system and the Kidneys,

Child and pregnant women are mostly prone to lead exposure, pesticides fungicides etc.

**7) Effect of water pollution on Plants :**

- 1) Effects of acid deposition
- 2) Nutrient deficiency in aquatic ecosystem
- 3) Effects of organic matter
- 4) Effects of detergent deposition
- 5) Effects of agricultural chemicals
- 6) Effects of industrial wastes
- 7) Effects of silt deposition
- 8) Effects of oil spillage
- 9) Effects of thermal pollution
- 10) Effects of nutrient enrichment
- 11) Phytotoxicity effects on plants

**8) Harmful effects of pollutions :-**

It causes deleterious effects on living organisms and may bring about death of sub lethal pathology of Kidney, liver brain and lungs. Also causes mortality of fish effluent containing acids and alkalies make the water corrosive.

**9) Effect of thermal pollutants in water :**

The rise in temperature in aquatic system has a profound effect on organisms as well as on water quality. These effects are as follows :

- 1) Reduction in dissolved oxygen (DO)
- 2) Increase in (BOD)
- 3) Excessively eutrophication

**10) Effects of Radioactive pollutants in water :**

4) Nausea, vomiting diarrhoea, general weakness which is known as radiation sickness.

5) Due to this (radioactive pollutants) body becomes less resistant towards a variety of disease.

6) It causes somatic and genetic disorders, gene mutations and blood abnormalities in higher animals including man.

**Control of Water pollution :**

**C) General aspects :**

xiii) Judicious use of agrochemical like pesticides and fertilizers which will reduce their surface run off and leaching. Avoid use of these on sloped lands.

xiv) Use of nitrogen fixing plants to supplement the use of fertilizers.

xv) Adopting integrated pest management (IPM) to reduce reliance on pesticides.

xvi) Prevent runoff of manure. Divert such runoff to basin for settlement. The nutrient rich water can be used as fertilizer in the fields.

xvii) Separate drainage of sewage and rain water should be provided to prevent overflow of sewage with rainwater.

xviii) Planting trees would reduce pollution by sediments and will also prevent soil erosion.

xix) Bathing, washing cattle washing should be prohibited in the vicinity of sources.

xx) Ponds rivers, lakes etc. should be protected by suitable method for the prevention of waste entry.

xxi) Ponds lakes etc should be regularly cleaned of aquatic weeds and plants.

xxii) Public awareness through electronic and print media regarding water pollution should be created. It will help in participation of public towards water pollution control campaigns.

xxiii) Strict enforcement of pollution control laws should be more punitive.

xxiv) Eco-friendly approach towards celebrating Ganesh Festival.

**D) Technical aspects for controlling water pollution, treatment of waste water is essential before being discharged.**

vii) Parameters which are considered for reduction in such water are- total solids. Biological oxygen demand, chemical oxygen demand, nitrate, phosphates oil and greased toxic metals.

viii) Waste waters should be properly treated by primary and secondary treatments to reduce the levels up to help permissible levels for discharge.

ix) Advanced treatment for removal of nitrates and phosphates will prevent eutrophication.

x) Before the discharge of waste water. It should be disinfected to kill the disease causing.

xi) Proper chlorination should be done to prevent the formation of chlorinated. Hydrocarbons or disinfection should be done by ozone or ultraviolet radiations

xii) For general drinking water treatment water treatment plants for industrial waste

water treatment effluent treatment plants and for collective waste water treatment common effluent treatment plant should be adopted and should be maintained in good working conditions.

#### **Pollutions of stream and lakes :**

##### **Types of pollutants.**

##### **3) Physical :**

Physical pollutants to lakes and streams include materials such as particles of soil that are eroded from the landscape or washed from pavements by flowing water. Once in a lake or stream some particles settle out of the water to become bottom sediments. Chemical pollutants adsorbed (bound) to the particles are also incorporated into the sediments, where they may be permanently buried, or be carried by the water currents to other locations. Another type of physical pollutant is heat that may be discharged from an industrial source, or run-off from hot surfaces in warm weather. The over clearing of shade trees along the shoreline of a lake or stream may also permit sunlight to warm waters above the normal temperature range. Chemicals dissolved in fresh waters naturally contain chemicals dissolved from the solid and rock over which they flow. The major inorganic elements include calcium, magnesium, sodium, potassium, carbon chloride and sulfur as well as plant nutrients, such as nitrogen, silicon and phosphorus. Organic compounds derived from decaying biological materials may also be present. In addition, nearly all fresh waters contain some human-made compound, such as pesticides and other industrial and consumer products. Chemicals resulting from human activities that increase the concentration of plant nutrient may lead to excessive plant growth, while synthetic organic compounds may cause physiological changes in aquatic organisms. Or may become lethal at high concentrations. Pollutants can be taken up by plants and animals through contact with contaminated sediments, or directly from the water. Plants and organisms that become contaminated from these sources can pass the contamination up the food chain as predators consume them.

##### **4) Biological :**

Although living organisms themselves are not generally through of as pollutants, bacteria and plants that grow to nuisance proportions can impair the use of fresh waters. Such problems often arise when the plants die and decay, which is when bacterial decomposition, consumes oxygen needed by aerobic aquatic organisms. An overabundance of algae or other plants provided more decaying material and hence a greater reduction in oxygen as the material decomposes. More over, nonnative plants and animals that are introduced as a result of human activities can change the basic ecology of a lake or stream often to great detriment.

##### **Point source of pollution :-**

Point sources of water pollution are defined as those that originate from a known point such as a pipe from which a pollutant may enter a lake or stream. Nearly every city, town and waterside settlement discharges some type of pollution to surface waters. Human wastes that are collected in sewers and piped to municipal sewage treatment plants ultimately are discharged to surface waters and treated waste water older systems with combined sewer and storm water system discharge untreated sewage to rivers or lakes during heavy rainfall that overwhelms the drainage system. But in general treatment processes remove solid material. Many of the chemical pollutants, and then disinfect the treated sewage to kill disease-causing organisms before releasing the treated waste water to the receiving water body. Almost every industry uses water in its manufacturing process or in the production of raw materials and energy. Water can pick up pollutants when it is used to make a product or clean a manufacturing area. The pretreatment of wastes prior to discharge to sewers or directly to surface waters can recover metals and valuable chemicals that save companies money while reducing pollution.



**Marine pollution (Ocean pollution) :-**

**The main sources of marine pollution are :**

4) Rivers, which bring pollutants from their drainage basins.

5) Catchment areas i.e. coastline where human settlements in the form of hotels industry, agricultural practices have been established

6) Oil drilling and shipment most of the rivers ultimately join the ocean. The pollutants which these rivers carry from their draining basins are finally poured into sea. These include sewage sludge. Industrial effluents. Plastics metals and waste heat (hot water) released by industries. In the sea the pollutant get diluted and organic matter is further broken down as river water. Still may pollutants especially degraded causing marine pollution These pollutants get biomagnified and affect fisheries and other marine life. Another important source of marine pollution is the leaking toxic substances, radioactive waste etc. which are stored in large containers and dumped in deep sea considering sea to be a better disposal site than land.

Tankers and other shipping mans industries (petroleum, refinery lubricating oil using industry metal industry, paint industry) automotive wastes, refineries, ship accidents and of shore production add to marine pollution, Tankers transporting oil contribute to oil pollution significantly After delivering the oil through sea-route earlier empty used to be filled with water called ballast water to through sea-route earlier empty tankers used to be filled with water called ballast. Water to maintain balance. The ballast water containing residual oil from tankers was released into the sea on completion of return journey. Now a day the oil floating on the ballast water is removed in the newly designed load on-top tankers before ballast-water is let off. Oil in sea water can spread over a large of the sea remain desperados or get absorbed on sediments. It can cause adverse effects on marine life. Oil in the sea water affects sensitive flora and fauna. Phytoplankton, zooplankton, algal species, various species of invertebrates coral reefs , fish birds and mammals are affected by oil

pollution. Fishes show mortality (death) because the fish gills get laden with oil after the slimy mucus of gills is affected oil disrupts the insulating capacity of feathers. Death occurs due to loss of buoyancy and subsequent drowning of birds. Leakage from oil tanker near Alaska in 1989 caused damage to coral reefs and resulted in death of about 3,90,000 birds.

**Control of Marine pollution :**

1. Toxic pollutions from industries and sewage treatment plants should not be discharged in coastal waters.
2. Run-off from agricultural sector should be prevented to reach coastal areas.
3. Sewer overflows should be prevented by having separate sewer and rain water pipes.
4. Dumping of toxic, hazardous waste and sewage sludge should be banned.
5. Development activities on coastal areas should be minimized.
6. Oil and grease from service stations should be processed for reuse.
7. Oil ballast should not be dumped in to sea.
8. Ecologically sensitive coastal area should be protected by not allowing drilling.

**Ground water pollution :**

Over 98% of the fresh water in the earth lies below the surface. The remaining 2% is what we see in the lakes, rivers streams and reservoirs. Today human activities are constantly adding industrial, domestic and agricultural wastes to ground water reservoirs at an alarming rate. Ground water contamination is generally irreversible i.e. once it is contaminated; it is difficult to restore the original water quality of the aquifer.

**Factors affecting ground water pollution :-**

1. Rainfall pattern.
2. Depth of water table.
3. Distance from the source of contamination and soil properties such as texture, structure or filtration rate.

**Sources of contamination in ground water**

1. Domestic waste.
2. Industrial wastes.
3. Agricultural wastes.



4. Run off from urban areas.
5. Other sources. Waste waters. Treatment, lagoons, mine spills, seepage pits urban and rural garbage. Earthen septic tanks , refuse dumps, leaching and down ward movement of pollutants.

#### **Harmful effects of ground water pollution :**

Harmful effects on man harmful effects on soil protecting ground water from pollution (Control measures)

1. The contaminant sources should be carefully surveyed.
2. Location of industrial and municipal disposal sites should be decided keeping

- in view the ground water levels and flow pattern in the area.
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4. Location of wells for drinking water supplies of wells for drinking waste supplies should be decided with almost caution.
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## EFFECT OF GLYPHOSATE BASED HERBICIDE ON DEVELOPEMENT OF EARTHWORM (EISENIAFOETIDA)

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### ABSTRACT

*Glyphosate is an active substance that is broadly used in pesticides. Glyphosate based herbicides (i.e. formulations containing glyphosate and other chemicals) are applied in agriculture and horticulture primarily to combat weeds that compete with cultivated crops. They are applied before crops are sown and as a pre-harvest desiccating treatment, accelerating and evening the ripening process. ("European Food Safety Authority, 2016). Surprisingly, despite the enormous use of glyphosate-based herbicides around the world and the active research around glyphosate products, little is known of their potential effects on non-target soil organisms. The efficacy of glyphosate is based on the inhibition of 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS) in the shikimate acid pathway, which in turn interferes with the production of aromatic amino acids and secondary compounds required in the defense functions of plants and many microbe. The present study investigated the effect of herbicides on development of E. fetidafor 60 days. Different doses of glyphosate based herbicidewas used.*

**Keywords:** *Glyphosate, Herbicides, Agriculture, Earthworm*

### Introduction

The earthworms are long, thread-like, elongated, cylindrical, soft bodied, segmented animal commonly found in living in soil, feeding on wide variety of live and dead organic matter. An earthworm is a terrestrial invertebrate, common name for the largest number of Oligochaeta that belongs to the phylum Annelida. They are classified into three types, on the basis of their ecological environments: epigeic, endogeic, and anecic. Epigeic species lives above mineral soil layers near the soil surface. Endogeic species inhabit deeper layers (up to 0–20 cm) of soil profile, while anecic species (vertical burrowers) can open deep vertical galleries that may reach up to 1 m depth along the soil profile. Epigeic species function in the mineralization of plant surface residues as anecic species transport the decomposition products of this process to lower soil layers and also increase water infiltration and aeration (Edwards and Bohlen,1996; Karaca,*etal.*2010a). In many soils, earthworms play a major role in the conversion of large pieces of organic matter into rich humus, thus improving soil fertility. In addition to dead organic matter, the earthworm also ingests any other soil particles. When the worm excretes this in the form of casts, deposited on surface or deeper in the

soil. Earthworms accelerate nutrient cycling in the soil-plant system through fragmentation and mixing of plant debris – physical grinding and chemical digestion. Earthworm show many sensitive reactions towards environmental influences and they also act as decomposers, due to this they generally used as test organisms. Earthworms are ecologically very important as many substances are responsible for the risk of secondary poisoning through feeding on worms. It can be possible that worms themselves suffered from much adverse effect. The use of herbicides to control weeds has been recognized as a part of agricultural practices throughout the world. The herbicides, used to fight against the weeds in the agriculture are very toxic to soil biota (Kumar and Kumawat,2018 ). Unfortunately, the indiscriminate use of these herbicides to improve agricultural production and yield but may have impacts on non-target organisms, especially earthworms and they are being killed as non-targeted organisms and aquatic life forms and their environment. The excessive use of herbicides is responsible for the debasement of agro ecosystem sustainability .Weeds and pests are responsible for degradation in agricultural crops.Although, earthworm species vary in their tolerance, reports have shown a decline in earthworm populations in response to large amounts of

organic chemical deposition (Yasmin and D'Souza, 2010). To minimize weeds problems in crop production, the herbicides application should be on a regular practice. Various studies have showed that the qualitative and quantitative change in enzyme activity occurs due to the use of herbicides. Insecticides are the largest subsegment of agrochemicals with 60% market share, whereas herbicides with 16% market share are the fastest growing segment in India (FICCI Report, 2016). The interactions between the herbicides and soil biota have practical significance by the reason of possible inhibition in microbial action increasing to soil fertility. Glyphosate ( *N*-(phosphonomethyl) glycine) is a broad-spectrum, nonselective systemic herbicide and crop desiccant. It is an organophosphorus compound, specifically a phosphonate, which acts by inhibiting the plant enzyme 5-enolpyruvylshikimate-3-phosphate synthase. It is used to kill weeds, especially annual broad leaf weeds and grasses that compete with crops. Glyphosate is the most commonly used herbicide and was considered to be non-toxic. But its use in excess in agricultural lands has polluted soils and waters. Nowadays, glyphosate residues are found in soil, water and food. As a result glyphosate causes severe acute and chronic toxicological effects (Gill, Jatinder Pal Kaur, et al., 2018).

### Materials and Methods

*Earthworm, Eiseniafoetida* (Savigny, 1826) is recommended earthworm test species by Organization for Economic Co-operation and development (OECD, 1984a) and European Economic Community (EEC, 1985). *Eiseniafoetida* is collected from a commercial supplier and acclimatized and cultured in laboratory according to International Standard organization (ISO, 1993). The culture of earthworm species *E. fetida* was perpetuated to use the third generation of earthworms to avoid the pre-exposure or residual effects of agrochemicals at vermicomposting unit of Department of Zoology, Indira Gandhi Kala Mahavidyalaya, Ralegaon and animals were bred in Vermicomposting pit at temperature 15-30 °C. For the tests, only adult worms with clitellum with a fresh weight between 250 to

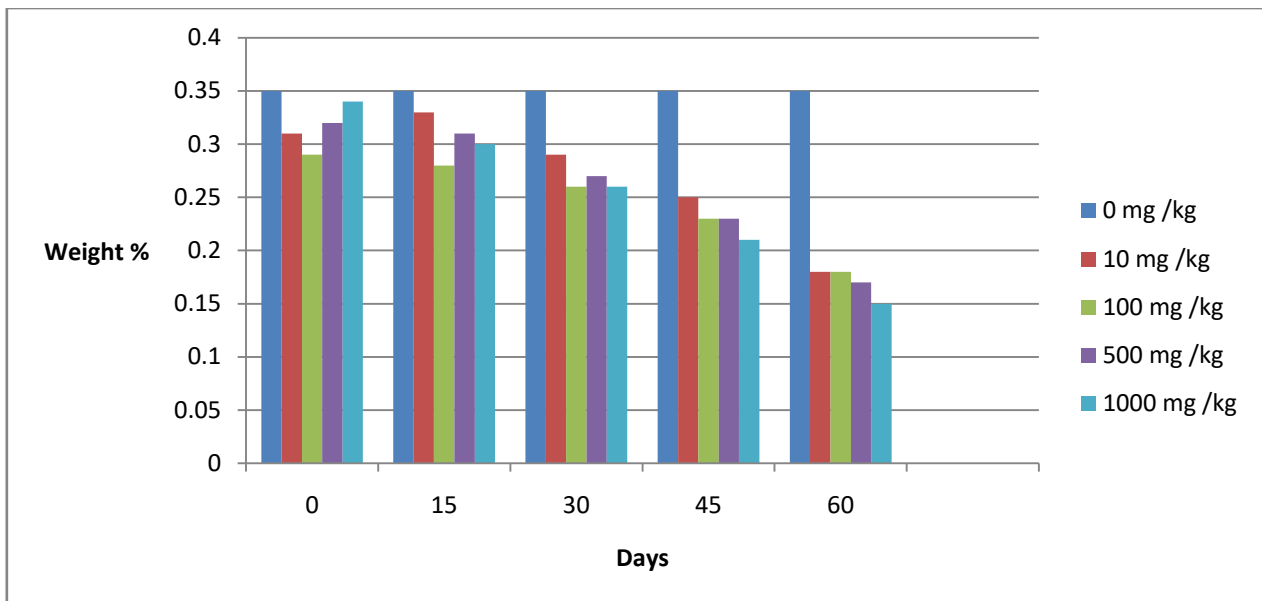
350mg were used. All earthworms were fed according to demand, usually once a week. The natural soil samples were collected from an abandoned area where no agricultural activity has done and which was an area with no known history of pesticides use. The physico-chemical characterization of soil was provided by department of chemistry Indira Gandhi Kala Mahavidyalaya Ralegaon. Glyphosate based herbicides with purity 71.% was used. All tests were performed using adult earthworms (age less than 2 months and clitella well developed) and with individual weight (ISO 11268-1 1993). For the experiments, 10 earthworms were transferred to each container with 400 g of soil prepared by adding different concentrations of glyphosate (dry weight basis). Four replicates were analyzed for each concentration and 4 control containers, prepared under identical conditions without the addition of the target pesticides. The concentrations used were 10; 100; 500; 1,000 mg/kg. The containers were covered with paper filter with holes to maintain aeration conditions during the 60 days of the test. Soil moisture was standardized at 60% of maximum water-holding capacity, and the samples were maintained at room temperature (27 ± 2C) in the presence of light. After 15, 30, 45, and 60 days of incubation, the containers were opened, surviving and dead earthworms were counted, and the survivors' average weight was verified. Earthworms were classified as dead when they did not respond to a gentle mechanical stimulus and morphological abnormalities were recorded.

### Results and Discussion

The glyphosate showed different effects on the earthworms. In the growth test, earthworms from the soil treated with glyphosate showed a gradual reduction in mean weight during the experiment. The percentage of weight loss at the end of the experiment was approximately 50% of baseline weight. All earthworms were classified as alive at all moments of sampling. Although glyphosate did not kill the test organisms in the range of test concentrations, the decrease in mean weight may indicate a severe effect of this herbicide. Morphological abnormalities like coiling, and curling were

observed in all specimens exposed to the highest concentrations of glyphosate after 30 days of exposure. Similar abnormalities were also observed in the organisms exposed for 55 days at lower concentrations. Excessive mucous secretion was observed in all exposed worms. For glyphosate, reproduction was always lower than 20% when compared to the control, so that glyphosate can be classified as toxic. Additional studies are required to fully understand this effect. In addition, reduction in weight was observed in the earthworms at the end of the experiment as compared to the

controls, suggesting a significant chronic effect. Soil ingestion and dermal absorption are the most important intake routes of soil pollutants by earthworms. Glyphosate demonstrated severe effects on the development of *Eiseniafoetida* in laboratory tests. Meanwhile, long-term exposure (60 days) to soil contaminated with glyphosate demonstrated a toxic effect on normal development of *Eiseniafoetida*, indicating that this substance may have significant toxic effects on soil biota.



**Fig.1 Effect of Glyphosate soil concentration and exposure time on *Eiseniafoetida* biomass**

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**BIOGAS TECHNOLOGY ENERGY CONVERSION SOURCE****<sup>1</sup>RB Yedatkar and <sup>2</sup>SM Dapkekar**<sup>1</sup>HoD, Dairy Science Shivaji Mahavidyalaya, Udgir Dist-Latur<sup>2</sup>HoD, Dairy Science Sambhaji Kendre Mahavidyalaya, Jalkot Dist-Latur  
ranjandtc123@gmail.com**ABSTRACT**

*Our surroundings and our domestic and our environment are collectively exclusive. It is very critical to preserve the cleanliness of the surroundings i.e. the existence of people relies upon at the herbal assets to be had withinside the surroundings. In order to preserve our surroundings pure, we have to all domesticate neem basil durva. In order to preserve the surroundings balanced, that is, to preserve the earth's fitness good, everybody from the ant to the eagle is attempting to attend to it in their very own way. But man, however, is annoying the stability of the surroundings because of his intelligence and new innovations in addition to together along with his paintings force. The social attractiveness of biogas is regularly hampered with the aid of using environmental and fitness concerns. In this study, the modern know-how approximately the effect of biogas generation is supplied and discussed. The survey reviews the emission charge estimates of the major greenhouse gases (GHG), specifically CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, consistent with numerous case research carried out over the world. Direct emissions of gaseous pollution are then discussed, with a focal point on nitrogen oxides (NO<sub>x</sub>); evidences of the significance of appropriate biomass and digestate storages are also reported. The modern know-how at the environmental effect brought on with the aid of using final use of digestate is severely discussed, thinking about each soil fertility and nitrogen launch into surroundings and groundwater; numerous case research are reported, displaying the significance of NH<sub>3</sub> emissions with regards to secondary aerosol formation. The biogas upgrading to biomethane is also protected withinside the study: with this regard, the methane slip withinside the off-fueloline can substantially lessen the environmental benefits.*

**Keywords:** Air quality; anaerobic digestion; biogas; digestate; renewable energy

**Introduction**

The environmental advantages of biogas generation are regularly highlighted, as a legitimate and sustainable opportunity to fossil fuels. Together with the discount of greenhouse fueloline (GHG) emissions, biogas can decorate power security, way to its excessive active ability. As a renewable power source, it permits exploiting agricultural and zootechnical byproducts and municipal wastes, with a decrease effect on air first-rate while as compared to combustion-primarily based totally techniques for those bio-masses. Furthermore, at the same time as ashes from combustion locate scarce agronomic applications, the derivative of anaerobic digestion, i.e. digestate, seems as a dependable fabric for agricultural uses. Another crucial gain of biogas generation is its smooth scalability, permitting exploiting the active ability of decentralized biomass sources. Finally, biogas may be upgraded to biomethane, certainly used as a automobile fuel, or injected into country wide herbal fuel-online grids.

A principal objective of biogas enterprise is the discount of fossil gas consumption, with the final aim of mitigating worldwide warming. However, anaerobic digestion is associated to the manufacturing of numerous greenhouse gases, specifically carbon dioxide, methane and nitrous oxide. As a consequence, devoted measures must be taken in order to lessen those emissions. According to Hijazi, the primary measures to enhance the worldwide warming discount capability of biogas flora are: to apply a flare fending off methane discharge, to cowl tanks, to beautify the performance of blended warmness and electricity (CHP) units, to enhance the electrical electricity utilisation strategy, to make the most as a whole lot thermal strength as possible, to keep away from leakages. A few different substances via which biogas may be generated are algae, crop residues (agro-wastes), rubbish kitchen wastes, paper wastes, sea wood, human waste, waste from sugarcane refinery, water hyacinth etc., other than the abovementioned animal wastes. Any cellulosic natural fabric of animal or plant origin, that is effortlessly biodegradable, is a capability uncooked fabric appropriate for biogas manufacturing. Biogas is produced with

the aid of using digestion, pyrolysis, or hydrogasification. "Digestion organic procedure that takes place withinside the absence of, oxygen and withinside the presence

of anaerobic organisms at ambient pressures and temperatures of 35-70°C. The box wherein this digestion takes location is understand because the digester.



Biogas



WATSAN



Solar Energy



Tree Plantation

### Biogas Properties

The energy content of biogas from AD is chemically bounded in methane. The composition and properties of biogas varies to some degree depending on feedstock types, digestion systems, temperature, retention time etc. Table 5.1 contains some average biogas

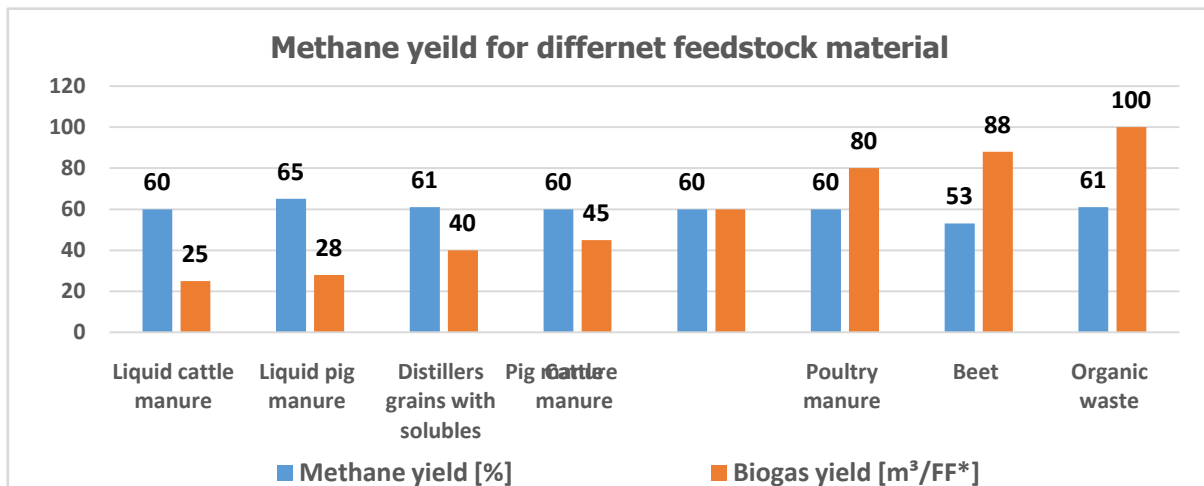
composition values, found in most of the literature. Considering biogas with the standard methane content of 50%, the heating value is of 21 MJ/Nm<sup>3</sup>, the density is of 1,22 kg/Nm<sup>3</sup> and the mass is similar to air (1.29 kg/Nm<sup>3</sup>).

### Composition of Biogas

| Compound          | Chemical symbol  | Content (Vol.-%)   |
|-------------------|------------------|--------------------|
| Methane           | CH <sub>4</sub>  | 50-75              |
| Carbon dioxide    | CO <sub>2</sub>  | 25-45              |
| Water vapour      | H <sub>2</sub> O | 2 (20°C) -7 (40°C) |
| Oxygen            | O <sub>2</sub>   | <2                 |
| Nitrogen          | N <sub>2</sub>   | <2                 |
| Ammonia           | NH <sub>3</sub>  | <1                 |
| Hydrogen          | H <sub>2</sub>   | <1                 |
| Hydrogen sulphide | H <sub>2</sub> S | <1                 |

### Methane yields of different feedstock material

| Feedstock                       | Methane yield [%] | Biogas yield [m <sup>3</sup> /FF*] |
|---------------------------------|-------------------|------------------------------------|
| Liquid cattle manure            | 60                | 25                                 |
| Liquid pig manure               | 65                | 28                                 |
| Distillers grains with solubles | 61                | 40                                 |
| Cattle manure                   | 60                | 45                                 |
| Pig manure                      | 60                | 60                                 |
| Poultry manure                  | 60                | 80                                 |
| Beet                            | 53                | 88                                 |
| Organic waste                   | 61                | 100                                |



### Microbiology of biogas production:

The manufacturing of biogas from natural cloth beneath anaerobic circumstance entails collection of microbial reactions. During the procedure complicated natural molecule gift within the biomass are damaged right all the way down to sugar, alcohols, insecticides and amino acids with the aid of using acid generating bacteria. The resultant merchandise are then used to produce methane with the aid of using every other class of bacteria. The biogas manufacturing procedure entails 3 degrees namely:

- i. **Hydrolysis**
- ii. **Acid formation and**
- iii. **Methane formation**

The procedure of deterioration of natural cloth in each step is finished with the aid of using variety of bacteria, that are specialised in discount of intermediate merchandise formed. The extraordinary procedure worried in manufacturing of biogas is given within the figure. The performance of the digestion relies upon how a ways the digestion occurs in those 3 degrees. Better the digestion, shorter the retention time and efficient fuel manufacturing.

#### Hydrolysis

The complicated natural molecules like fats, starches and proteins that are water insoluble contained in cellulosic biomass are damaged down into easy compounds with the assist of

enzymes secreted with the aid of using bacteria. This degree is likewise recognized as polymer breakdown degree (polymer to monomer). The primary quit product is glucose that's a easy product.

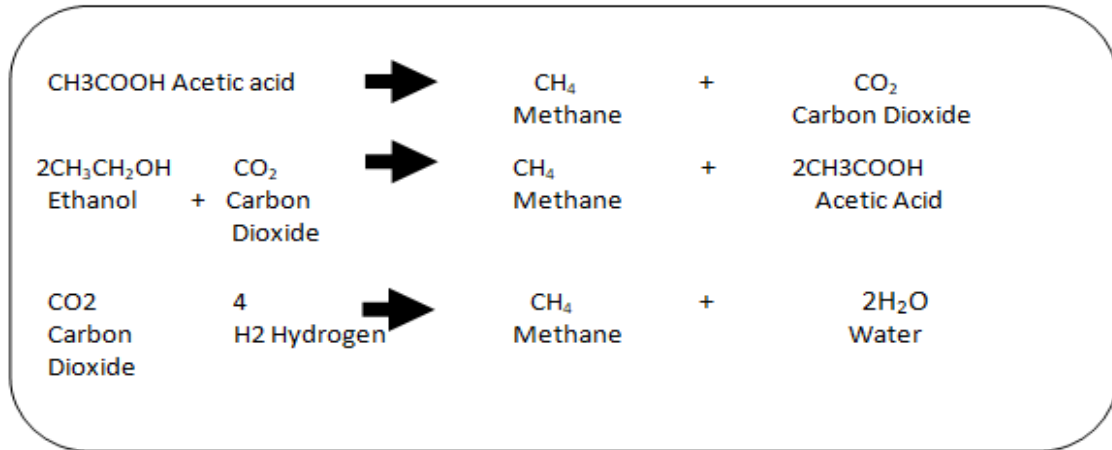
#### Acid formation

The resultant product (monomers) received in hydrolysis degree function enter for acid formation degree bacteria. Products produced in preceding degree are fermented beneath anaerobic situations to shape extraordinary acids. The primary merchandise produced on the quit of this degree are acetic acid, propionic acid, butyric acid and ethanol.

#### Methane formation

The acetic acid produced within the preceding degrees is transformed into methane and carbon dioxide with the aid of using a set of microorganism called "Methanogens". In other words, it's far procedure of manufacturing of methane with the aid of using methanogens. They are compulsory anaerobic and really touchy to environmental changes. Methanogens utilise the intermediate merchandise of the previous degrees and convert them into methane, carbon dioxide, and water. It is those additives that make up the majority of the biogas emitted from the system. Methanogenesis is touchy to each excessive and occasional pH's and happens among pH 6.5 and pH 8.

Major reactions occurring in this stage is given below



The process of biogas formation through different stages is depicted in figure.

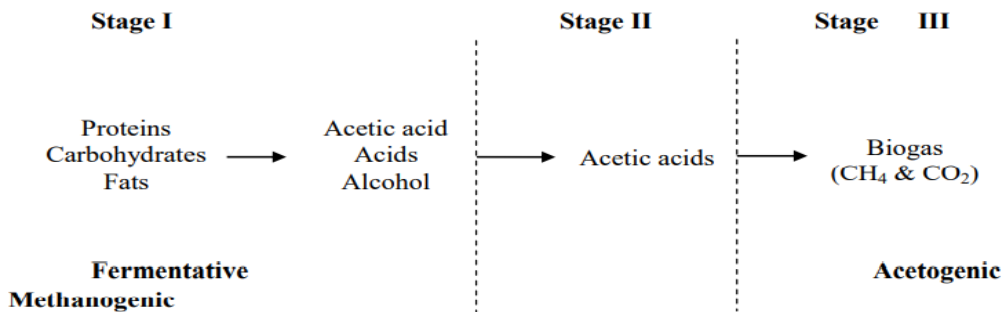
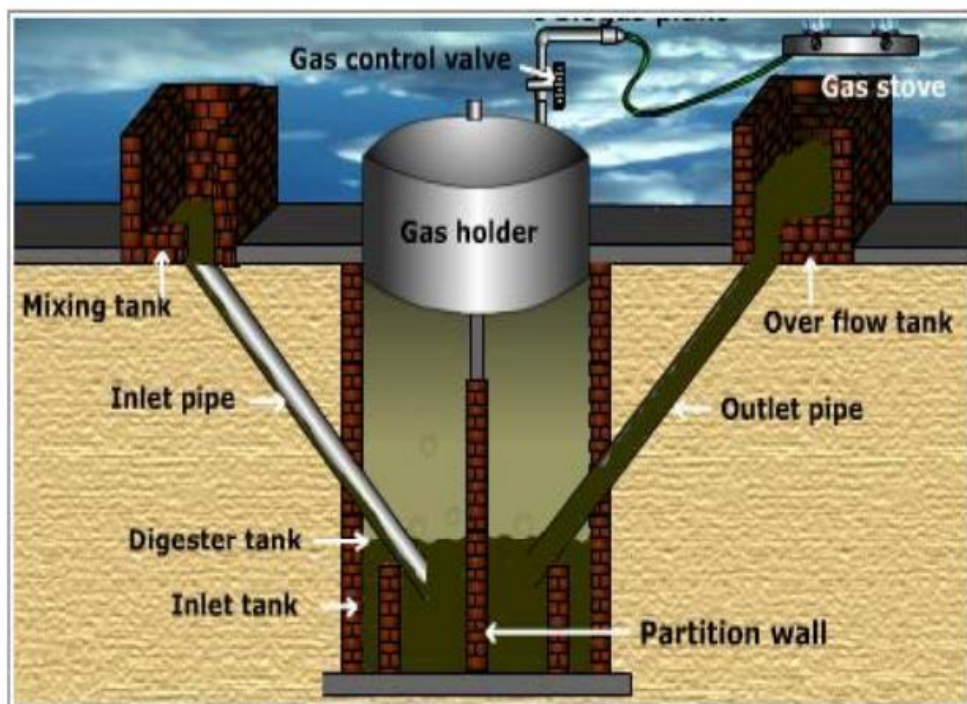


Figure: Stages of biogas formation

Fig. Floating drum biogas plant



### Conclusion

Biogas recuperation can enhance profitability whilst enhancing environmental quality. Maximizing farm assets in this type of way may also show crucial to stay aggressive and environmentally sustainable in today's farm animals industry. In addition, more huge use of biogas generation will create jobs associated

with the design, operation, and manufacture of electricity recuperation structures and lead. Biogas is produced keeps its cost as a fertilizer and may be back to the soil. Biogas has been famous at the name, "Gobar Gas" specifically due to the fact cow dung has been the cloth for its production, up till now.

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**ECOCRITICISM: A STUDY OF ENVIRONMENTAL ISSUES IN LITERATURE**

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**ABSTRACT**

*Nowadays world scenario is very horrible, and it spares humans with no option but to accept Cheryll Glotfelty's opinion that humans have been living in 'the age of environmental limits'. The lust for a mechanistic worldview and the greed for a luxurious life is harming the earth's primary support system, which is nature. If humans continuously destroy the world's beauty, they will push themselves towards destruction. Ecocriticism is the ray of hope that focuses its theory on the betterment of the environment. Literary scholars of ecocriticism explore the environmental crisis by giving dimension to their work and spreading how to bring under control the worst situation of the cosmos. Literary scholars have grown their speed and shown the no option situation but to search for solutions to environmental problems. The present paper seeks to explore the ecocritical perspectives as envisaged in some select world literature as well as Indian writing in English.*

**Keywords:** environment, nature, cosmos, literature, ecocriticism

Environmental problems have blended during the last few decades due to rising pollution, diminishing green cover, increasing overconsumption, frequent oil spills, nuclear hazards, and tail-pipe and smokestack emissions and increasing toxicity. All these have created a great threat to human society as well as mother earth. A lot of wrong use of nature has brought us to the edge of a ditch. Green activists, ecologists, ecocritics, environmentalists and academicians have at various points and places, been expressing concerns about increasing environmental degradation. All these men created things that cannot be seen to us by our naked eyes. **Timothy Morton's** alternative and counter-intuitive definition: "the environment is that which cannot be indicated directly," is very true.

It is very true because for few decades rainforests are cut down, fossil fuel is decreasing very fast, the cycle of the season's disorder environmental disaster is common now around the globe and our environment is at the brink but still, we are unaware about it. The time is now ripening and we have to take strong steps to bring awareness, stop environmental crises. There is hope because we can see awareness in art and literature. Art and literature are not harmed from socio-cultural the socio-cultural ecological scenario for it, they invariably become vehicles for articulating these concerns. Under this atmosphere there arose a new theory of reading nature writing about it during the few decades before called

Environmental Concern, Ecocriticism, Ecological Concern, Green Cultural, Eco-feminism and the like.

Ecocriticism is an umbrella term it involves everything which is related to the relationship between nature and culture. Ecocriticism involves ecology, science and cultural studies, ecocritical study is endowed very largely in versatility studies and it also compels rethinking of the relationships between human and nature, which is the current need of the society. Ecocriticism is a global concept which is studying nature, animal, human being and to all environmental aspects. The aim of this theory is to awake everyone to think about humans relationship with nature, about moral and beautiful problems faced by the environmental problems and about how language literature, creative writing exchange importance with intense ecological significance.

If ecological consciousness scientific, cultural or spiritual acceptance of the kinship of living belongings, including humans, with each other and with their environment, it is not anything new. The whole humankind and all the writers are accepting the ecocritical legacy. These critics who have invented, defined, studied and used the themes like 'pastoral', 'romanticism', 'transcendentalism', they all have explored the relationship between human beings and the natural world.

In present situation, ecocriticism is spreading with a great speed. Ecocriticism is a different appeal comparing traditional appeals in

literature. As a result, this appeal is relating to more than one branch to divide texts which includes environmental studies, natural sciences, cultural studies and social studies.

Ecocriticism is one of the youngest modification movements. Eco criticism is a new critical approach that analyzes literary agreement with ecologically vital issues and has repeatedly highlighted the need for rediscovering a huge human relationship with the environment around. Eco criticism is a theory which plays a different role in the study of human organization with nature. In the last few decades, this theory has made an impression of scholars and proved itself to be curiosity entertaining field of investigation in literature. It becomes very important to the humans, as the readers of literature, to know the theory and the different areas include in it. Human life is very close to both the environment and the literature. The theory 'Ecocriticism' focuses on the relationship between environment and human life. The word 'Ecocriticism' includes of two words 'ecology' and 'criticism'. The term 'eco criticism' is taken from Greek language words – 'Oikos' and 'Kritis'. 'Oikon' means 'household' a dwelling of human being, other species, nature and the spirit of nature, besides; and 'Kritis' means 'to judge'. Man is a social animal he lives in society and so his actions are based on his social and cultural perception. Man reflects in the direction of nature according to his cultural acceptance. For **William Howarth** in *Some Principles of Ecocriticism* (1996) explains -

“a person who judges the merits and faults of writing that depict the effects of culture upon nature, with a view toward celebrating nature, berating its despoilers, and reversing their harm through political action.” (1996, p.69)

Ecocriticism is the study of creative writing and environment from many-sided point of view in which all sciences come together for the sake to save globe and to take out the cosmos from the current environmental disaster. For this situation **Glotfelty's** opinion that earth is centered and according to her humans are only the part of nature and not the master of the earth. Life is impossible without environment

and literature. All the things, actions or anything else which happens on the earth is also have the touch of environment. Creative writings cover the natural world where human lifestyle is also part of it.

Disadvantages of modernization and industrialization have increased the advantages of 'naturalization' including 'wildernesses. Humans are responsible for this so it is their duty how to control over it. According to **Antony Giddens** if humans have taken the responsibility then they should follow caring attitude towards the nature and play the role of steward and not try to become the master of nature. This understanding leads to the study of 'Deep Ecology' which is formulated by **Arne Naess**. This study is accepted one of the most effected philosophies of environmental study. Nases indicates changing the anthropological view to ecological view. His main ideas have suggested thinking about environment differently. They are –

1. Human life forms are an integral part of the world.
2. There has to be an emotional relation with the nature, and not merely a rational-intellectual one.
3. Both human and non-human life forms have intrinsic values.
4. The value of non-human life is not dependent upon the usefulness of these life forms for humans.
5. The emphasis should be an appreciating the quality of human life.

Ecocriticism reflects the merits and demerits arose by human being reflected in many literary works by different writers. This is clear definition to understand the meaning of this theory.

One of the greatest jobs of literature is to reflect contemporary problems. Almost the whole literature reflects different angles of human life, handling with marvelousness and energy of environment. The ability of environmental concern and its consideration in literature has actually risen a new literary theory Ecocriticism. In each and every form of literature, the environmental aspect should not be skipped. The actual presence of human relies upon his faiths over religion and spirituality.

The relationship of religion and nature is known as ecotheology. According to Wikipedia –

“Ecotheology generally starts from the premises that a relationship exists between human religious and spiritual world view and the degradation of nature. It explores the interaction between ecological values, such as sustainability and human domination of nature” (Wikipedia,web).

Human mind ever goes after and certifies his presence relied on his religious dependency. Ecocriticism is a theory which having faiths ecological ethics like sustainability. Ecocriticism has taken this focus as the relationship between nature and culture and exclusively the language and literature. In critical point of view, ecocriticism is a coin on whose one side has literature and the other has land. The simple and clear aim of ecocritical work is to motivate humans to connect to the environment. The human clan has crossed all environmental limits and the results are their actions damaging the earth’s main life support system. This consciousness sparks the expectation to help to environmental concern.

Whenever the matter of development is discussed, it is always the economic, industrial developments have led to the misuse of nature and hence, ecocriticism comes out from these socio-cultural contexts. The thinkers and the critics have marked that suggested readings of cultural texts can arrive to awareness uplifting. By such actions, thinkers and critics, with the help of creative writing and literature, have expanded the consciousness in society about the establishment and the expansion of environment. Ecocriticism targets on surroundings of industrialization, progress, pollution and destruction while talk over the same context of literature.

It is extremely urged to focus main concentration towards ‘environment’ at the present time when human life has come to at the boundary of destruction and the livability of our survival on earth is come in danger. This approach focuses how literary texts can be worked to emphasize the sentiment towards nature and in extension to it, to supply sources for emphasizing and reexamining our coexisting environmental problems. It is always

known that literature is the study of human life and vice versa. Expanding consciousness about the environment and displaying delicacy towards the environment where human clan lives, has turned out the centre of all kinds of literature. The fact is, if one has to develop more, raise more, enhance more, upgrade more doesn’t mean to avoid the importance of nature. Human development can only be happened if it is carried by the development of the environment.

One of the causes why ecocriticism preserves to expand as strictness is the continued worldwide environmental dilemma. The responsibility of ecocriticism to lead how the literary work of writers, who are worried about the environment, can focus several parts in solving valid and forcing environmental concerns. From few decades more ecocritics are using ecocritical concept to works of writers who have exhibited their progress express human-nature relationship.

Ecocriticism brings attention the tranquility with nature and also never forgets to deal with the crisis arose to nature by the imbalance of environment take place in the modern world and for this entire human is responsible. In the race so called progress man has lost his satisfaction which lies in the nature. Consequently, ecocriticism is important part of literary scholarship because literature cannot be isolated from nature. Ecocritics motivate others to realize sincerely about the inventive and moral difficulties presented by the environmental crisis and how language and literature convey usefulness.

Before studying the relationship between literature and environment it is important to understand the relationship of nature with human and with others depend on the cultural background. In some cultures nature is worshipped as God, in some understood as external source of creativity or in some it a source of livelihood. Ecocriticism is a theory which views human beings basically as part of nature addressing to representations of human cultures in their different kinship with nature and environment more than centering only on texts which convey humans noticing or experiencing nature in the rural or the wild setting.

Literature's primary intention is to stimulate and aware the society to the crises connected to society, economics, gender, class, and so many things. The aim of environmental concern is to make this planet worth living so through literature the awareness is spread and the consequence will be everyone can sustain easily. The culture of human category is always mirrored by literary presentation. Hence literary study is cultural study also. Different writers writing in different way but the main essence of the work is environmental concern.

The Ecocriticism movement has swept humans over a few decades. The present cosmos is facing an eco-disaster and so the environment is at high risk. Only science and technology are not sufficient to fight the global environmental crisis, but we should also make a change in our attitude to nature. Literature does not go beyond reality in some issues, so it has its role to play. For a long time, the literary critics did not give due importance to nature, so environmental oriented literature makes an emotional appeal for understanding of nature in its worth attention. Ecocriticism has developed as 'a worldwide emergent movement,' during the last few decades. Some thinkers genuinely focus on this crisis of the current situation of the environment. The theme of environmental concern is not aroused just now, but it existed in literature of the past before any ecological movement. We can see the environmental concerns in writers like **H.D. Thoreau, R.W. Emerson, S.F. Cooper, and Margaret Fuller** and so on. Transcendentalists of United States were the great inventors of ecoconscious literature. For them, the wilderness was a place to search inner voice and focus on self. They were great supporters the melodious and close relationship with nature.

### World Eco-Literature

Ecocriticism has risen as a literary movement in environmental consciousness which started during the 1960's especially in America. **Rachel Carson's** book '*The Silent Spring*' is regarded as a milestone in this movement. The book grabbed the attention of the public raising questions about the use of the harmful and carelessly use of pesticides, causing damage to the environment and to the life of people and animals. The publication of *The Silent Spring*

(1962) created literary critics attention towards the environmental problems of modern era. The book has great place in the history of environmental literary criticism. This book became a booster to the thinkers from various fields of science, cultural studies and research. Everyone realizes the importance of environment. This theory also encouraged historians, anthropologists, philosophers, and also psychologists of the world to take environment seriously and to take environment seriously and to include this new lookout of theory in theory in their study. The consequence of this book within a short period a lot of pamphlets, articles and research papers presented including the environmental problems in literature.

Association for the study of Literature and Environment was created under the president ship of **Scott Slovic** in 1992 in the annual meeting of Western Literature Association. The journal *Interdisciplinary Studies in Interdisciplinary Studies in Literature and Physical Environment* was started in 1993 by this association. The association used more definite term 'literature and environment' to concentrate their effort on literature and no other areas of studies. Because ecocriticism is related to literature as well as other fields of knowledge like painting, architecture, music, and dancing. Environmental concern is studied under many different terms such as green studies, literary ecology, environmental literary criticism, ecopoetics and literary environmentalism.

**Cheryll Glotfelty** in 1996 co-edited with **Harold Fomm** *The Ecocriticism Reader: Landmark In Literary Ecology*. The book has given an extra effort in getting publicity the theory of ecocriticism all over the world. Glotfelty in the 'Introduction' compares the book with the two most famous areas of literary criticism: Feminist Criticism and Marxist Criticism. According to her, "Feminist Criticism is gender conscious and Marxist Criticism brings an awareness of modes of production and economic class to its reading of texts; ecocriticism takes on the earth-centered approach to literary studies" (1996, p. xviii).



Like feminism ecocriticism is likely both a political and a literary movement. It not only describes the things but tries to alter it by making the readers emotional, serious, and sensitive towards nature. The thinkers of ecocriticism's are hard working to visit places of environmental importance, are busy in promoting environmental awareness.

The great relationship between the environment and literature is originated in the pastoral tradition of medieval Europe and England. **Greg Garrard** says in his book, *Ecocriticism* (2004), pastoral is an integral part of the European tradition. Romanticism and Transcendentalism are two major movements and after pastoral which accepted on rich ecological heritage. Famous romantic poets such as **Williams Wordsworth** (1770-1850), **Samuel Taylore Coleridge** (1772-1834), **Percy Bysshe Shelley** (1790-1822), **Lord Byron** (1788-1824) and **John Keats** (1795-1821) generated ecoconscious works of great importance.

**Wordsworth** depicts the simplicity and beauty of nature. For Wordsworth, nature is 'the best teacher'. His long poem *The Excursion* (1814) presents the human-nature relationship very deeply. "Lucy Grey", "Prelude" and "Michael" are the poems which convey the message to think carefully in the philosophical way on the world of nature. In "Tintern Abbey" (1798), Wordsworth depicts the importance of nature - "In nature and language of sense. / The anchor of my purest thoughts, the nurse. / The guide, the guardian of my heart, the soul, / of all my moral beings" (109-12).

**Coleridge's** "The Rime of the Ancient Mariner" (1898) defends the mercy and coexistence of non-humans. **P.B. Shelley's** "Ode to the West Wind" is a pioneering example of the creating and destroying power of nature. **Keats** was the lover of nature his works clearly shows the existence of the change of human consciousness by the influences of nature.

**Ralph Waldo Emerson** was another point of interest American author. In his work *Nature* (1836) he depicts the announcement on the standards of the philosophy of Transcendentalism, which he depicts as, "a theory to represents nature by different standards than carpentry and science."

In this work, he deliberates the charmed solidarity of nature and requests his readers to praise an organization with the surroundings. This book depicts the fundamental truth of transcendentalism. In this book, he explains the theory of the close relationship between man and the natural environment. He supports simple living in nature and condemnation of material things and earthly possessions.

The general literary-critical study focuses on the external angels of like characters, their expectations, pain or objects; it also focuses on the internal angels of life like factors of sub-consciousness depicted by many writers. The ecocritical reading, however, focuses on the external ecosphere rather than the internal like the author and his psychology. It focuses on the ideas which break down the environment and also suggests the need of living together and the systems of co-existing. In short other literary theories study the relationship between writers, texts and the world. In those theories this world is synonymous with society – it is the social sphere. Ecocriticism spreads the concept of the theory – the world involves the whole ecosphere. An ecocritical reading investigates the reasons for environmental disasters and provides solutions. This study also shifts from the inside (disasters) and outside (solution) and is called Ecocriticism.

### Ecocriticism in India

Indian philosophy is rich in ecological thought since Veda which paid equal importance to all organisms. India is also a land of rich biodiversity. From the Himalayas of North to Kanyakumari of South, from the Bay of Bengal off east to the Arabian Sea on the west, the country has versatile physical surroundings leaving a deep impact on human beings. Literature is not apart from that. A good number of writers deal with ecocritical texts.

Ecocritical perspectives may be best perceived in the writings of Nobel Laureate Rabindranath Tagore who founded ViswaVarati at Shantiniketan far from madding crowd. His RaktaKarabi and MuktaDhara are the best example of ecocritical texts where he denounces human atrocities against nature. His ecocritical poems include "The Tame Bird was in a Cage" (The caged bird has even forgotten how to sing) and "I plucked you Flower" (The



human feel that plucking flowers is their own right. Nature is not a silent spectator. One day it will react. It would not be just a thorn-prick but can be a mighty tsunami. The human should be careful about this). Anita Desai's *Fire on the Mountains* is a good example of ecocritical text dealing with the problem of animal killing, population explosion, moral degradation of man -all causing a threat to the ecology symbolized by frequent fire in the forest. Kamala Markandaya's *Nectar in a Sieve* represents Nature as a destroyer and preserver of life. The novelist here has shown how the evils of industrialization spoil the sweet harmony of a peasant's life. Arundhati Roy's *The God of Small Things* is a portrayal of Exploitation of nature, by human beings in the name of progress and modernization which is a dominant theme of the novel. The authoress here has shown her keen awareness of today's pressing environmental issues. The novelist in this novel has raised her voice for the environment, which is now under a great threat of pollution. In this novel, she not only exposes the massive degradation of nature but also reflects on the reason behind its dehumanization.

Ruskin Bond's *No Room for a Leopard* presents the pathetic condition of the animals after deforestation. *The Tree Lover*, *The Cherry Tree*, *All Creatures Great and Small* and many others are all about the chain which binds man and nature, as in the chain of the ecosystem, showing interdependence.

Kiran Desai in her *Hullabaloo in the Guava Orchard* is critical of the hectic town life, Having dissatisfied of which the protagonist takes refuge in the Guava Orchard. In her *The Inheritance of Loss*, the novelist shows how Kanchenjunga pays for the brutality of human aggression. Ecocriticism here gets a political dimension in the novel when an un-estimated loss occurred due to Nepali insurgency causing a lot of damage to human life, animals and the serene beauty of nature. Amitav Ghosh's *The Hungry Tide* is a powerful ecocritical text as the novel underscores environmentally and socially oppressive system harbored by humans. The delta of the Sundarbans has been presented as the destroyer and preserver of life. The novel faithfully depicts the state sponsored

terrorism to evict the dispossessed Bengali Refugees settled at Marichjhapi. Ecocriticism as an academic discipline arose rather late in India. The Indian ecocritics making a considerable contribution to ecocriticism in India are as follows.

In her *Stolen Harvest*, a nice example of ecocritical text, Bandana Shiva (an Indian environmental activist turned ecocritic) denounces the bio-piracy of the west in the name of patents from the poor countries. Thus, she shows that colonization is not a matter of the past; it is still very much alive. According to her, industrial agriculture has not produced more food; it has destroyed the diverse sources of food. Thus, she gave a neocolonial dimension to ecocriticism. Among her notable contribution to the field of ecocriticism, mention may be made of *Tomorrow's Biodiversity*, *Soil Not Oil*, *Staying Alive*, *Ecofeminism*, *Violence of the Green Revolution*, *Water Wars*, *Biopiracy*, *Making Peace with the Earth* and the like.

### Conclusion

Therefore, Ecocriticism which was synonymous with the American nature writings as well as the British Romantic literature has now gained its momentum with worldwide ecoliterature. It has changed its colour from local to global perspectives in view of the present ecological crisis around the globe. The humans have only one earth to live in and we are at the brink of our forthcoming destruction unless we are careful of the blue planet. If we want to hear the song of the earth, we should change our anthropocentric vision without any delay. The world literature abounds in ecological perspectives. Environment being an inseparable part of human culture is paramount in all major canonical writings. An ecological insight may lead them into several new perspectives. Indian philosophy and writing is not an exception to this. From the ancient to the cyber age, Indian literature is thronged in environmental concern. Apart from the Traditional Indian writing in English, the classic works of regional literature coming in English translation have their representation of nature. They make us learn how we may lead a happy life in close harmony with nature. These environmental literary works beautifully deal with human nature

relationship and interconnection- the key note of eco-literature. The common message is keep nature in her pristine beauty; let not destroy what we cannot create. The more ecocritical

writings will come into focus, the more man will learn to behave with nature in a proper way keeping in tune with the present environmental crisis.

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**FRESHWATER ECOSYSTEM: REVIEW OF THREATS AND THEIR MITIGATION****V. N. Lohiya, S. M. Shende and <sup>1</sup>R N Khade**

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**ABSTRACT**

Water is an essential resource for our existence. According to the 2021 World Water Development Report released by UNESCO, the global use of freshwater has increased six-fold in the last 100 years and since 1980 it is growing by 1% every year. Urbanization, industrialization, and agricultural activities dramatically deteriorated the water quality and increase water consumption. Worldwide, an estimated 80% of industrial and municipal wastewater is released into the environment without any proper treatment. It causes adverse effects on human health and ecosystems. Moreover, in the least developed countries, this proportion is higher, where sewage treatment facilities are severely lacking. Thus, mitigation steps are needed to minimize freshwater degradation. These may include education and public awareness, integrated management, fine polluters, and research and monitoring of freshwater bodies.

**Keywords:** Freshwater, human health, integrated management, mitigation.

**Introduction**

Water is essential for the sustenance of all life forms on the planet. Most of its uses have no substitute. Water is necessary for food production, household uses, and economic development. Freshwater ecosystems include surface water bodies such as rivers, streams, lakes, and wetlands, groundwater, and ice caps. The freshwater resources of the country play an important role in agriculture, power generation, industries, forestry, fisheries, recreational activities, livestock production, sanitization, etc. Freshwater is spread around the globe unevenly. The 21 largest lakes on Earth contain two-thirds of the entire global freshwater sources and engaged various ecological and social environments (Sterner *et al.*, 2020). Freshwater habitats are vital for biodiversity because they provide important services to the environment. Studies revealed that freshwater environments are vulnerable due to the impacts of environmental change (Pinceel *et al.*, 2018; Reid *et al.*, 2019). Increasing human exploitation has significantly changed the aquatic environments, with changes affecting their physical, chemical, and biological characteristics. Over time, freshwater environments have undergone significant transformations that have influenced their characteristics (Carpenter *et al.*, 2011). Present-day human impacts on freshwater habitats include quick growth of substructures and changes in land use, wasteful use and over-

abstraction of water, and contaminants. Combined with the rising demand for water supplies, these risks intensify the problem of sustainable growth (Matthews, 2016). Thus, it is very crucial to conserve these freshwater ecosystems as it provides natural habitat to flourish biodiversity, water for human necessities, and a source of economy.

**Threats To Freshwater Ecosystem**

Threats to the freshwater ecosystems arise from exorbitant human activities including groundwater pumping, pollution by industry and domestic sewage, dam building, channelization of the rivers, diversion, climate change, and over-exploitation of natural resources. Most of the large rivers and lakes have usually large human population densities due to the availability of potable water and for the discharge of sewage. The threats to the freshwater ecosystems may include climate change, eutrophication, heavy metal contamination, groundwater contamination, invasive species, channelization, habitat loss, infectious disease, hydrological modification, urbanization and agricultural activities, freshwater salinization, and biotic harvesting.

**Climate Change:** The ecological effects of climate change on freshwaters include, a general increase in rates of primary production, organic matter decomposition, and nutrient cycling as a result of higher temperatures and longer growing seasons, reduction in habitat

for cool water species, and reduction in water quality and in suitable habitat in summer owing to lower base flows and intensification of the temperature dissolved oxygen squeeze in many rivers and reservoirs (Mulholland, *et al.*, 1997). Around 50% of the world's freshwater fish species are endangered by climate change (Darwall and Freyhof, 2016). Climate change, if combined with other human-related impacts could cause alteration in species distributions, population declines, and local extinctions. Different species have different threat levels, thus it is important to identify research and management priorities in deterring the effects of climate change on biodiversity (Jaric *et al.*, 2018).

**Eutrophication:** Eutrophication is characterized by excessive plant and algal growth due to the increased availability of one or more limiting growth factors needed for photosynthesis (Schindler, 2006). Various Human activities like excessive use of detergent containing the phosphorous, fertilizers and industrial effluents have increased the rate and degree of eutrophication of the aquatic ecosystems. Cultural eutrophication with dramatic consequences for drinking water sources, fisheries, and recreational water bodies (Carpenter *et al.*, 1998). The effects of cultural eutrophication are blooms of cyanobacteria, altered quality of drinking water, reduced recreational activities, and hypoxia.

**Heavy metal and Groundwater contamination:** Hazardous heavy metals and metalloid contamination in freshwater ecosystems originate due to increased industrialization and urbanization. Discharge of industrial effluents, domestic sewage, and mining activities may cause a serious toxic effect on human health as well as biodiversity. It may contain zinc (Zn), mercury (Hg), lead (Pb), cadmium (Cd), arsenic (As), nickel (Ni), chromium (Cr), thallium (Tl), and copper (Cu). Groundwater is contaminated due to various manmade activities and atmospheric contaminants. Improperly designed and constructed or poorly maintained septic systems of houses, laboratories, offices or other buildings can seep out bacteria, viruses, household chemicals, and other contaminants

pollute and taint the groundwater. Cracked storage tanks may leak gasoline, oil, and chemicals into the groundwater and may cause serious contaminations. The garbage from household, hospitals and other sources dumped into landfills may leak paints, acid from batteries, and other chemicals into groundwater.

**Invasive species:** Species invasions can also change habitat conditions. In freshwater systems, impacts of invasion include changes to biodiversity and community composition, physical habitat, ecosystem function and resilience, and degradation of ecosystem services (Francis & Chadwick, 2012). Invasive species reduce biodiversity by competing with native plants and animals and altering habitats. This can result in the extinction of species and economic loss.

**Infectious disease:** Infectious diseases are caused by parasites or pathogens which can impair or even kill the host. Infectious diseases can affect individual organism, populations, communities, and ecosystems. Freshwater is also a source of transmission for human and animal pathogens (Johnson and Paull, 2011). The freshwater environment also encourages the production of several parasite infectious stages, either directly or indirectly through ingestion, as well as the potential for interaction with potential hosts (Marcogliese, 2008; Johnson and Paull, 2011).

**Urbanization and agricultural activities:** Urbanization and agricultural activities have both direct and indirect effects on freshwater ecosystems. Direct impacts include an increase in the extraction of freshwater from the environment and habitat loss, and an indirect impact consists of reducing biodiversity and salinization of the freshwater.

**Freshwater salinization:** Freshwater salinization is the salty runoff that can harm aquatic organisms and contaminate drinkable water. Salinization can cause density stratification, anoxifying surface sediments, and changes in freshwater plant communities (Davis *et al.*, 2010). Biodiversity living in high salinity freshwater patches is predicted to decrease gradually (Mausbach and Dzialowski, 2020).



**Mitigation ways: Education and Public Awareness:** Environmental education provides people develop a deeper knowledge to understand and explore environmental issues and furnish the skills to play an effective role in problem-solving and making informed and responsible decisions. Environmental education enables society to understand its spiritual, aesthetic, and ethical values. According to UNESCO Environmental education is vital in imparting an inherent respect for nature among society and in enhancing public environmental awareness. It is important to increase awareness campaigns for the public to encourage their engagement in drafting and managing environmental issues.

**Integrated and holistic environmental management:** Integrated environmental management (IEM) is a comprehensive administration strategy that has evolved to tackle complex terrain and water management issues in many countries. The IEM aims to integrate management activities through stakeholder panels consisting of members of the government and nongovernment agencies (Margerum and Hooper, 2001). A desegregate and systematic approach to environmental regulation should be practiced to protect water resources and increase aquatic ecosystem production, while resolving problems composed of competing functions and priorities of various sectors within the country (Yusoff *et al.*, 2006). In the country, aquatic ecosystems are monitored by various agencies to protect and conserve natural resources.

**Research and Monitoring of freshwater bodies:** The immense value of freshwater ecosystems is enumerable. To inform and implement policies that support an integrated approach to water management, as well as to measure progress in halting the rapid decline in freshwater species, basin-level indicators describing the condition and threats to freshwater ecosystems and species are required (Revengea *et al.*, 2005). Thus, research and monitoring of freshwater ecosystems are of great importance for making proper action planning and management. The techniques used in bio-monitoring of an aquatic ecosystem include bioaccumulation, biochemical alterations, morphological and behavioral strategies, population and community level *modus operandi*, and *in vitro* toxicity tests of aquatic species (Mohd Izam *et al.*, 2021).

### Conclusion

Freshwater ecosystems ensure vital benefits and services for mankind, aquatic life forms, and biodiversity. These include habitat, potable water, agriculture, recreation, and energy. Thus it should be appropriately maintained, protected, monitored, and conserved to improve water quality. It can make a balance between the community and its environment. Reduction in the contamination of freshwater resources, surface, and groundwater, can minimize its salinization, harmful chemical contents, and growth of harmful pathogens, algal blooms, and bioaccumulation. It can reduce the hazardous effect of polluted water on human health and biodiversity, thereby providing a healthy ecosystem for their survival and growth.

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## THE ROLE OF ENVIRONMENT IN ECONOMIC DEVELOPMENT

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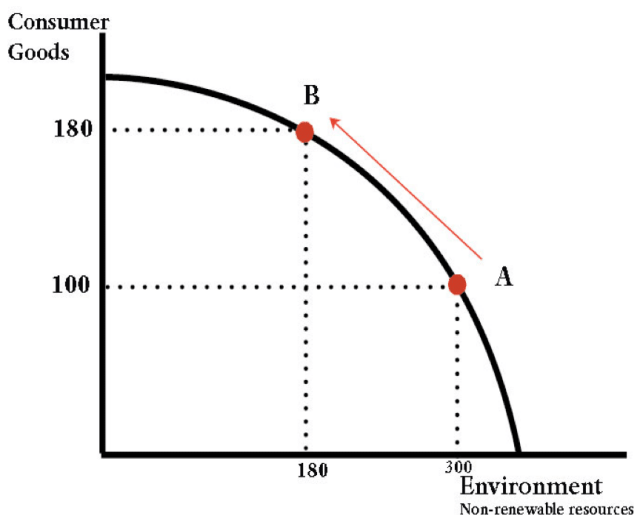
### ABSTRACT

*Achieving economic development is vital to a country. But what if it comes at the cost of environmental degradation? With globalization opening the doors of economic development for so many countries, there is a serious concern regarding how far we are being able to save the environment and not hamper its constituents. This paper discusses on some concerns related to environment and its impact economic growth.*

**Keywords:** economic development, globalization, constituents, environment

### Introduction

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



The above PPF curve shows a trade-off between non-renewable resources and consumption. As we increase consumption, the opportunity cost implies a lower stock of non-renewable resources. For example, the pace of

global economic growth in the past century has led to a decline in the availability of natural resources such as forests (cut down for agriculture/demand for wood) A decline in sources of oil/coal/gas

- Loss of fishing stocks – due to overfishing
- Loss of species diversity – damage to natural resources has led to species extinction.

### Four Crucial Functions Of Environment

**Supplying Resources:** The environment contains both renewable (air, water, land) and non-renewable (fossil fuels) resources. While the former are re-usable and do not get depleted soon, non-renewable resources come with the fear of depletion.

**Assimilating Waste:** Economic activities generate waste which the environment absorbs through natural processes.

**Sustenance of Life:** The environment comprises abiotic components that aid the living of biotic components. In the absence of elements such as air, water, land, etc. there would be no life on the planet.

**Aesthetic Value:** The environment adds aesthetic value to life. The mountains, oceans, seas, landmasses and other scenery of the environment enhance the quality of life.

### Environmental Degradation

Economic activities such as production and consumption have led to environmental degradation over the last few years. This is recognizable from the fact that there is a certain carrying capacity of the environment. When the rate of extraction of resources exceeds the rate of their regeneration, the environment fails to

perform its activities. The resulting phenomenon is called environmental degradation. Resources are limited and therefore, their over utilization is leading to their extinction. The waste generated is also exceeding the absorptive capacity of the environment. Rivers and other waterways are getting increasingly polluted due to the excessive dumping of wastes into them. This has led to poor water quality for consumption. The rate of use of non-renewable resources has not only depleted their limited reserves but also led to pollution tendencies. The increasing emphasis is therefore on renewable sources or on devising other sources of generating energy. Different kinds of pollution have harmed the environment as well as man's well-being. Air and water pollution particularly contribute to air and water-borne diseases and ill-health. Ozone layer depletion and global warming are other severe problems resulting from such degradation.

### The Natural Environment And Economy

The natural environment plays an important role in supporting economic activity. It contributes:

- directly, by providing resources and raw materials such as water, timber and minerals that are required as inputs for the production of goods and services; and
- indirectly, through services provided by ecosystems including carbon sequestration, water purification, managing flood risks, and nutrient cycling.

Natural resources are, therefore, vital for securing economic growth and development, not just today but for future generations. 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 production and consumption decisions whilst also driving economic growth. With many key natural resources and ecosystems services scarce or under pressure, achieving sustained economic growth will require absolute decoupling of the production of goods and services from their environmental impacts<sup>1</sup>. This means

consuming environmental resources in a sustainable manner – whether by improving the efficiency of resource consumption or by adopting new production techniques and product designs. It also means avoiding breaches in critical thresholds beyond which natural assets cannot be replaced and can no longer support the desired level of economic activity. Existing commitments to avoid dangerous climate change exemplify the need for absolute decoupling, requiring a reduction in greenhouse gas emissions, even in the face of an expanding global economy.

### Measures To Save The Environment

Concerted efforts are required to deal with the global environmental crisis. The concept of sustainable development, thereby, comes into play. Some of the measures that can be undertaken to control the crisis that already underway includes:

**Pollution Control:** Air, water, noise, soil are some of the major forms of pollution plaguing the environment today. Pollution control boards can be set up or regulatory standards must be enforced to keep pollution within lowest levels.

**Forest Conservation:** Increased industrialization has come at the cost of deforestation. The implication of forests being cut down is that the ecology is significantly affected. Afforestation measures need to be taken and forest conservation regulations must be seriously implemented.

**Social Awareness:** Until people are made aware of the graveness of the situation, the problem of environmental degradation cannot be dealt with. Creating awareness through campaigns and movements can help avert the problem of the ongoing environmental crisis.

**Waste Management:** Solid waste management must be carefully managed in urban areas. Rural waste has the potential of being used as natural manure by converting it into compost.

**Water Management:** Rainwater harvesting and conservation of water can help with the long-term potent problem of scarcity of water.

**Implementation of Policy Programmes:** Enactment of environment-centric acts and policies is not enough. Their

effective implementation and careful observation are what will actually make a difference to environmental conservation efforts.

### **Environment Related Provisions In The Indian Constitution**

Environment protection is mentioned in the Indian Constitution as part of Directive Principles of State Policy as well as Fundamental Duties.

#### **Directive Principles of State Policy (Part IV) Article 48A**

Protection and improvement of environment and safeguarding of forests and wildlife The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country.

#### **Fundamental duties (Part IV A) Article 51A**

To protect and improve the natural environment including forests, lakes, rivers, and wildlife, and to have compassion for living creatures.

### **Major Environment Policies And Legislations In India**

**The Ministry of Environment & Forests** is the nodal agency in the administrative structure of the Central Government, for the planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. The Ministry is also the Nodal agency in the country for the United Nations Environment Programme (UNEP). The principal activities undertaken by Ministry of Environment & Forests, consist of conservation & survey of flora, fauna, forests and Wildlife, prevention & control of pollution, afforestation & regeneration of degraded areas and protection of environment, in the frame work of legislations. The main tools utilized for this include surveys, impact assessment, control of pollution, regeneration programmes, support to organizations, research to solve solutions and training to augment the requisite manpower, collection and dissemination of environmental information and creation of environmental awareness among all sectors of the country's population.

**The Central Pollution Control Board (CPCB)**, statutory organisation, was constituted in September, 1974 under the Water (Prevention and Control of Pollution) Act, 1974. Further, CPCB was entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981. It serves as a field formation and also provides technical services to the Ministry of Environment and Forests of the provisions of the Environment (Protection) Act, 1986. Principal Functions of the CPCB, as spelt out in the Water (Prevention and Control of Pollution) Act, 1974, and the Air (Prevention and Control of Pollution) Act, 1981, (i) to promote cleanliness of streams and wells in different areas of the States by prevention, control and abatement of water pollution, and (ii) to improve the quality of air and to prevent, control or abate air pollution in the country.

### **Policies To Protect Environment In India**

- \*Environment Protection Act, 1986
- \*National Conservation Strategy and Policy Statement on Environment and Development, 1992
- \*Policy Statement for the Abatement of Pollution, 1992
- \*National Environment Policy, 2006
- \*Vision Statement on Environment and Health

### **The Way Forward With Sustainable Economic Development**

The planet must shift to renewable sources of energy as compared to the regular thermal or hydropower plants that lead to climatic degradation. Solar energy is an effective alternative that we can harness using photovoltaic cells. It is less costly and environmentally friendly.

A shift to wind energy is also an option. Setting up windmills in areas with high-speed wind can help convert the natural resource into electricity for commercial or household usage. Another effective solution can come through the use of natural manure or bio-compost as a substitute for chemical fertilizers. This helps avert soil erosion and soil pollution. Subsidized LPG as a fuel in rural areas and CNG as a fuel for vehicles in urban areas could lead the way forward along with the shift towards the EV vehicles inline.

The rest of the change can come majorly through increased awareness and consciousness. Only when the gravity of the situation and a moral responsibility towards forthcoming generations is realized can we pass on a healthy environment to them.

### Conclusion

India faces significant environmental challenges, from averting dangerous climate change to protecting vital ecosystem services. Creating a consistent, coherent and effective environmental policy framework is essential in order to maintain a natural environment that supports wellbeing and enables long-term

economic growth and development. In the long-term, the benefits of moving to an environmentally sustainable growth path are likely to outweigh the costs of making the shift. However, in the short-term there may be some trade-offs between protecting the environment and economic growth, although evidence to-date suggests these are likely to be relatively small. Moreover, smart policy design can help reduce some of these shorter-term trade-offs, through interventions that provide businesses and consumers with greater certainty to invest and that keep policy costs and administrative burdens to a minimum.

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**NATURAL WATER SPRINGS AND ITS MANAGEMENT: AN OVERVIEW****Anil Khole & Sunil Modak**

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**ABSTRACT**

Natural water springs occurring in hilly areas mainly serve as the important source of drinking water and for their neighboring areas population. Springs are found in the areas where fractures, gravitational and belonging metamorphic groups of rocks. The natural water springs have a specific role in health and wellness on this Earth. But population growth results, scarcity of freshwater around the world. Water resources development has taken place throughout the world. Tremendous amount of pressure in protecting and conserving the natural resources available. Now protecting the natural freshwater resources is an important task for human beings. The present review paper focuses on the role and importance of natural resources and their management and conservation.

**Keywords:** Resources, Conservation, Spring, Water, Ecosystem

**Introduction**

On Earth natural resources refer to the resources that exist independently of any human actions. These natural resources fall under two categories a) renewable and b) non-renewable resources. Both of these include air, water, soil, mineral, as well as metals etc. environmentalists have proven that natural resources are essential to the survival of humans and all the other living organisms. But due to high demand for natural resources around the world has led to rapid depletion. Research has shown that sustainable natural resources conservation is a process of rational use and skillful management and preservation of the natural environment with all its resources (Thomas, 2006). The most relevant natural resources to the people are water, land, food, plants, animals, and soils. Natural resources may involve managerial activities such as controlling, preserving, and /or evaluating a natural resource or natural resources' function (Anil Kumar *et al.*, 2021). Water is one of the most important natural resources without which animals cannot survive. The natural resources of water are rain water, springs water (underground water) and surface water. A natural spring is a point of exit at which groundwater from an aquifer flows out on top of Earth's crust and which becomes surface water. The natural springs occurring in hilly areas generally serve as the main source of drinking water for the

population nearby it (Yumpen&Mahendra, 2020). In India the village population of the Indian Himalayan region largely depends on spring water since time immemorial. Studies have shown that at present the quality and quantity of spring water are depleting at an alarming rate due to various factors. Awareness and conservation management of natural resources is important.

**Discussions**

On Earth water is critical to life, but it is also a limited resource and several interrelated factors are decreasing its availability (WHO). The natural springs are the main source of water for millions of people and their livestock. Peoples which are living in the hilly areas depend on springs for their livestock and for the drinking, domestic and agricultural needs. The factors determining the qualities of natural waters are chemical composition of the underlying rocks, formations of soil and length of period that the water body has been trapped underground (DWAR, 1997). The shortage of freshwater throughout the world can be directly attributed to human misuse of natural resources and the form of pollution.

**Natural Springs**

The natural spring is a discharge point of subterranean water at the surface of ground. Springs are defined as places where groundwater flows naturally from a rock sediment or soil onto the land surface or into a

body of surface water. Spring water is inexpensive and high-quality which flows out to the surface due to natural gravity and hydrostatic pressure, when the spring waters interact with the surface; it undergoes rapid contamination (Vilane *et al.*, 2016). The diversity of springs is indicative of the wide array of geologic and hydrologic conditions which lead to their occurrence. Springs are dynamic and flow in response to changes in climatological, topographical, geological, and geomorphological conditions. Scientifically, the most fascinating aspect related to spring flow is the mechanism that creates the spring: type of source rock, the character of adjacent beds, dynamic face, gravity, permeability, geomorphologic process, and geologic structure all-important of spring discharge. Spring water is the common source of the public water supply in most rural communities of developing countries (Van Wijk-Sibesma).

#### **Characteristics of springs**

The rainfall, made slightly acidic by the CO<sub>2</sub> that it picks up from the atmosphere, enters aquifer and slowly dissolves fractures, channels and caves in the limestone and dolomite, forming complex underground flow systems. Water moving through small pore spaces travels slowly, while water that travels through channels and caves can move rapidly. The natural spring is a natural groundwater outflow that responds well to any changes that occur in natural ecosystems with water volume increasing in the raining season and drastically reducing in the dry season (Nelson *et al.*, 2017).

#### **Uses of natural spring water**

The natural spring water eventually emerges from below the surface, in the form of a spring (Ibeneme *et al.*, 2007). Springs are very important elements of the natural environment and respond well to any changes that occur in natural ecosystems, and therefore can be classified as important hydrogeological indicators. In mountainous areas, springs are an important element of groundwater studies (Wolanin & Zelazny 2009). The most popular use of mineral water in ancient times was for medical treatment. However, there were also

records of employing hot springs for cooking and agriculture. Several springs have been known in Saudi Arabia for hundreds of years on which many old settlements were dependent for both domestic uses and irrigation purposes (Mohd. Abdullah, 2017).

#### **Mechanism of natural spring water**

The natural water springs origin, occurrence and concept related to the hydrologic cycle, groundwater and the occurrence of springs is contained in the book of History or Hydrology (Biswas 1970). Biswas research based on discussions on concepts of water on earth by Plato, Tartarus, Aristotle and in early biblical documents. Ancient scientist Plato believed that there were numerous interconnected perforations and passages, broad and narrow in the interior of the earth. The water retires with a rush into the inner parts of the earth, it flows through the earth into those regions, and fills them up like water raised by a pump. The spring water leaves those regions and rushes back hither, it again flows into the nearby hollows, and when these are filled, it flows through subterranean channels and finds its way to several places, forming seas, lakes, rivers and springs.

#### **Hydrological cycle of natural spring water**

Groundwater, an active component of the hydrologic cycle. Springs are the places where groundwater flows naturally from a rock sediment or soil onto the land surface. Springs are an important link in the hydrogen cycle. The precipitation is the starting point of the vast unending circulation of the water on the Earth, known as the hydrogen cycle. Water is evaporated from the oceans, the land, vegetation, and from smaller bodies of water such as streams, lakes and ponds. The water moves as vapor through the atmosphere where it accumulates as clouds and eventually returns as precipitation both on the land and sea. The rainwater enters the aquifer, pressure is placed on the water already present. This pressure moves through the cracks and tunnels within the aquifer, and this water flows out naturally to the surface at places called springs.

#### **Management and Conservation of natural springs**

On Earth natural resources that are most relevant to the people are water, land, food, plants, animals, and soils. The natural resources work may involve administrative, conserving, preserving such resources an important role (Lamb *et al.*, 2005). The key element in the management and conservation of natural spring is recognition of their position at the interface of their distinct ecosystem. Human impacts show significant effects on spring habitat integrity. Effective management of natural springs must recognize the environmental and societal values associated with them (Jose & Mike, 2008).

A key element in the management and conservation of springs is recognition of their position at the interface of three distinct ecosystems } groundwater, surface water and terrestrial. Human impacts on all three contributing ecosystems can have significant effects on spring habitat integrity. Effective management of springs must recognize the full range of environmental and societal values associated with them, understanding threats to the sustainability of these values and formulating strategies that provide a balance between potentially conflicting uses. As with any management strategy, the clear definition of management goals for springs is a precursor to effective conservation, protection and restoration. A key element in the management and conservation of springs is recognition of their position at the interface of three distinct ecosystems } groundwater, surface water and terrestrial. Human impacts on all three contributing ecosystems can have significant effects on spring habitat integrity.

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terrestrial. Human impacts on all three contributing ecosystems can have significant effects on spring habitat integrity.

4. Effective management of springs must recognize the full range of environmental and societal values associated with them, understanding threats to the sustainability of these values and formulating strategies that provide a balance between potentially conflicting uses. As with any management strategy, the clear definition of management goals for springs is a precursor to effective conservation, protection and restoration.

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### Conclusion

Awareness of geophysical aspects related to natural springs is greater. Springs are used as visual attractions within their natural

environment. Around the world many aspects related to the use of spring and groundwater. Springs need to be considered as an integral part of our ecosystem as it helps in the maintenance of spring sheds in natural settings and human manipulated situations. The environmental context of springs should be

carefully considered and determine the management actions to protect, enhance or store ecological integrity. The conservation and rejuvenation of the spring among the local communities can help in conserving the springs.

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**A BRIEF STUDY OF RIGHT TO INFORMATION ACT 2005**

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**ABSTRACT**

*The right to information is a basic human right of every individual. Famous French Philosopher Michel Foucault once said, that power is derived from knowledge and knowledge is fundamental knowledge factor. Knowledge makes man intelligent and competent enough to face modern times the world, so it is the duty of the government to inform the citizens about the education policies, whatever is happening inside Govt. The transition from good governance is possible only when there is an opportunity for it Increase people's participation in government and free access to information. According to the Indians understanding this act has passed (Right to Information Act 2005) in the Parliament to make the government responsible, accountable and must be transparent. The purpose of this article is to shed light on the basic guidelines of the RTI Act, its relation to justice Issues related to Notification Act and Good Governance and RTI Act. In the final part, the paper offers Some key recommendations for successful implementation of Right to Information Act. An attempt has been made to make it A clear comparison of RII laws in India.*

**Keywords:** RTI act, Policy implementation of RTI, Concept of RTI act 2005.

**Introduction**

Right to Information Act – 2005 is a most popular, reformative and ambitious law in Indian political and administrative history. Right to Information Act enacted by United Progressive Alliance-1 (UPA) Government headed by Prime Minister Dr. M. Manmohan Singh in the year of 2005(14th Loka Sabha). Right to Information Act empowers the citizens of India against Administrative corruption and erratic/ wrong administration. This act discloses the Governmental and Administrative functions, programs and process related information to every common man. In popular democracy the Government should be responsible and accountable to individuals. Therefore, the Government discloses and provides the information of documents, files and samples required by the individuals on request. Supreme Court judgment in 'Raj Narayan v/s Uttar Pradesh Government' says, Information Right is also part of Constitutional and fundamental rights under the article 19 (1) (a) of part three of Indian Constitution. Right to Information Act create a new era in Indian Democratic Republics political journey. In India following a nationwide campaign led grass roots and civil society organization, the Government of India passed a landmark Right to Information Act 2005. Since then social activists, civil society organizations and ordinary citizens have effectively used the Act to tackle corruption and

bring greater transparency and accountability in the government. Right to Information Act replaced the Freedom of Information Act-2002 and repelled the "official secrets act- 1923" and many other laws of British raj and rules establishments by union Legislature. The Right to Information Act provides a provision to appoint a Public Information Officer (PIO) and Assistant Public Information Officer (APIO) in every public authority, private aided and unaided private educational institutions. PIO and APIO is answerable to the public request related to information within time limit of 30 days. In case the PIO and APIO fail to provide the information to applicant, respective PIO is held responsible to pay penalty of Rs. 250 per day to up to rupees Twenty-Five Thousand.

**Historical framework of RTI Act 2005**

Right to Information (RTI) is an index to measure the growth and development of a country. In India, till 2005, the citizens had no access to any information which was dealt by a Publicly. Matters effecting public interest was not easy for a common man to get accessibility. Thus, without getting relevant information it was difficult for a citizen to participate in any social, political or economical debate concerning the issues or interest of the country. However, with the growing consciousness of participatory democracy, the inbuilt desire to know and participate in the matters concerning the country or own self, reached a new height



that paved the way in which it could be ascertained and ensured was through bringing the objective of transparency and accountability in the administration. In the International arena, the need to disseminate information was hugely felt and the first ever RTI law was enacted by Sweden in 1766, largely motivated by the parliament's interest in access to information held by the King. The Swedish example was later followed by the US, which enacted its first law in 1966 and then by Norway in 1970. Similarly, several western democracies enacted their own Objective of the Right to Information Act, the Government of India has enacted 'the Right to Information Act 2005' to provide for setting out the practical regime of right to information for citizens to secure access to information under the control of Public Authorities. The basic objective of the Right to Information Act is to empower the citizens, promote transparency and accountability in the working of the Public Authorities, contain corruption, and make our democracy work for the people in real sense.

In Asia so far almost 20 nations have adopted FOI laws like Kazakhstan, Afghanistan, Bhutan, Maldives etc. The journey to grant this sacred right was never an easy one. In the life of Indian Republic, the first political commitment to citizen's right to information came up on the eve of the Loksabha election in 1977 as corollary to public resentment against suppression of information, press censorship and abuse of authority during the internal emergency of 1975-77. The Morarji Desai led Janata party government of 1977 in its election manifesto promised an open government, and declared that it would not misuse the intelligence services and governmental authority for personal and partisan ends. Pursuant to this commitment, Morarji Desai constituted in 1977 a working group to ascertain if the Official Secrets Act, 1923, could be modified so as to facilitate greater flow of information to public. But the working group brought out a 'no change' recommendation shutting the doors to transparency and openness. In 1986, the Supreme Court in the famous case of L.K. Koolwalv/s State Of Rajasthan and gave a clear cut direction that the Freedom of Speech

and Expression provided under article 19 of the Constitution clearly impels Right to Information as without information the freedom of speech and expression cannot be fully used by the citizens. In 1989, the National Front Government's renewed its commitment to right to information. It was an outcome of people's frustration over the earlier government's reluctance to part with the information relating to Bofors and other deals. Reiterating this commitment, the then Prime Minister V.P. Singh, in his first broadcast to the nation in 1989 said, "We will have to increase access to information. If the government functions in full public view, wrongdoings will be minimized. To this end, Official Secrets Act will be amended and we will make the functioning more transparent. Right to information will be enshrined in our Constitution." Sadly despite such strong commitment, there was actually no headway towards transparency and openness in governmental functioning due to early fall of the National Front Government. In 1994, Mazdoor Kisan Shakti Sangathan (MKSS) [an organization for worker's rights] started a grassroots campaign for Right to Information – demanding information concerning development works in rural Rajasthan. The movement grew and the campaign resulted in government of Rajasthan enacting a law on Right to Information in 2000.

In 1996, National Campaign for People's Right to Information (NCPRI), one among several civil society groups, was founded with the objective of getting legislation on RTI passed. In 1997, Tamil Nadu became the first state in India to pass a law on Right to Information. In pursuance with the commitment of National Democratic Alliance, the new coalition to implement its National Agenda on Governance, introduced the Freedom of Information Bill, 2000 in the Parliament. After having been pending for about 2 years the bill was finally passed by the parliament. Parliament on 4th December, 2002 and it received the assent of President of India on 6<sup>th</sup> January, 2003. Meanwhile, instead of waiting for a central legislation, half a dozen states have enacted a laws on RTI Act. These include Goa (1977), Tamil Nadu (1977), Rajasthan (2000), Maharashtra (2000), Karnataka (2000), and

Delhi (2001). In 2004, the UPA government appointed a National Advisory Council to monitor implantation of government schemes and advise government on policy and law. NAC recommended changes to the existing Freedom of Information Act, 2002. RTI Bill 2004 was tabled in Parliament as applicable only to the Union Government. The civil society protested against the bill as most of the information required by the common man was from state governments. After heavy lobbying by NCPRI and other organizations the RTI Act, 2005 was passed with 150 amendments.

### **Salient Features of Right to Information Act, 2005**

- Public authorities have a duty to provide any information which is claimed by a citizen.
- Public authorities are under the obligation that they need to circulate the information to the person who demands the information. However, this Act comes with certain obligations relating to the security of the nation, personal information & other person's information.
- There is a time limit on the authority to give information within 30 days.
- If the authority denies providing any kind of information, then the person has the power to go to the appellate authority. Later they can also go for the second appeal which falls under the "central information commission/state information commission".
- Local court commands cannot be entertained in these scenarios.

### **Procedures Right to Information Act 2005.**

Information is any material in any form. It includes records, documents, memos, e-mails, opinions, advices, press releases, circulars, orders, logbooks, contracts, reports, papers, samples, models, data material held in any electronic form. It also includes information relating to any private body which can be accessed by the public authority under any law for the time being in force.

### **Right to Information**

The right to information includes an access to the information which is held by or under the control of any public authority and includes the right to inspect the work, document, records,

taking notes, extracts or certified copies of documents / records and certified samples of the materials and obtaining information which is also stored in electronic form. There are three sections of the Right to Information Act provides as under:

#### **Public Authority**

A "public authority" is any authority or body or institution of self government established or constituted by or under the Constitution; or by any other law made by the Parliament or a State Legislature; or by notification issued or order made by the Central Government or a State Government. The bodies owned, controlled or substantially financed by the Central Government or a State Government and non-Government organizations substantially financed by the Central Government or a State Government also fall within the definition of public authority. State Bank of India is a Public Authority.

#### **Central Assistant Public Information Officer (CAPIO)**

The Bank has designated all Branch Managers except Scale – IV & V branches as Central Assistant Public Information Officer (CAPIO) in the Bank. In case of Scale – IV and above branches, the Branch Managers are designated as CPIOs and are directly responsible for furnishing information under RTI Act. The next senior most officer in Scale – IV & V branches is designated as CAPIO of their respective branches. The bank has designated Law officer as CAPIO at Head office. The CAPIOs send the application or appeal to the Central Public Information Officer or the concerned Appellate Authority for disposal. A Central Assistant Public Information Officer is not responsible for supply of the information.

#### **Central Public Information Officer (CPIO)**

Central Public Information Officers are responsible for giving information to a person who seeks information under the RTI Act. The Bank has designated all Regional Managers of respective regions for branches under their control as Central Public Information Officer (CPIO) in the Bank and Chief Manager (I & A) is designated as CPIO at Head office. Appellate Authority (A A) If an applicant

is not supplied information within the prescribed time of thirty days or 48 hours, as the case may be, or is not satisfied with the information furnished to him, he may prefer an appeal to the First Appellate Authority. The Bank has designated GM(OP) as Appellate Authority in Bank.

### Methodology

The researcher has used secondary data sources which in published form, to studied in order to test whether the RTI Act is promoting transparency in the Indian administrative system, information from both representatives of civil society and RTI activists was insightful. Other hand Media, civil society organisations, and social activists have played a critical role in generating awareness about the RTI Act at a mass scale. Also researcher has focused on primarily through news articles based on RTI investigation. Therefore, primary sources of data collection were newspapers articles and internet search.

### Review of literature

**Gomi. M** he stressed on implementation of RTI is a significant tool to ensure transparency in most of the operations of the Government. It must be proper implementation will ensure good governance and eliminate corruption and thereby move up the ranking of the country in the index of honesty in the governmental and institutional operations

**Ghosh 2008** focused on the implementation of RTI and compel us to contemplate on ways to improve the same work. Despite claims of massive training programs for PIOs in the states, there is no evidence to suggest that they have made more people avail the Act or take up any follow up action. Also highlighted on the schedule and organization of training programmes hardly give a picture of seriousness and strategic approach.

**Mittal 2008** Taking a leaf out of Bihar's book, the department of information technology (DIT) has come up with the idea of setting up an RTI call center which will allow applicants to seek information over the phone from any of the central government departments and organizations across the country.

**Rachna Sharma 2006** studied the impact of RTI It is based on the action taken by her for

release and payment of salary arrear from a Public Institution under RTI 2005. She has focused on salaried employee for the period from 01.04.2002 to 18.12. 2002 was not released and paid by the employer in spite of several verbal and written reminders made during three and a half years period. When an appeal was submitted to Appellate Authority on 3 July 2006 some more responses were received.

**Chetan Agrawal** has studied on effectiveness of RTI act to combating corruption in India. He highlighted on the public servants which have relatively become responsive and accountable to service RTI act to the peoples.

### Conclusion

Undoubtedly, the Right to Information Act is historic, and has the potential of changing, forever, the balance of power in India – disempowering governments and other powerful institutions and distributing this power to the people. It also has the potential to deepen democracy and transform it from a representative to a participatory one, where governments, and their functionaries at all levels, are directly answerable to the people for their actions and inaction. However, if this potential has to be actualized, a much more concerted push has to be given to strengthen the RTI regime in the next few years. In struggles as fundamental as those for power and control, there is no time to waste. If the people do not come together and recapture the power that is rightfully theirs, vested interests will exploit this weakness and grow stronger and more invincible with each passing day.

Recently, in the country, growing number of people are using the RTI applications as a weapon to fight corruption and demand their rights. The study supports that aligning public service architecture with appropriate transparency mechanisms does promote transparency.

### Suggestions and recommendations

- The govt. office should be set up in each State as a repository of expertise, to monitor all records. One per cent of the funds for all flagship government programmes should be earmarked for five years for updating records and building infrastructure. At least half the

members of the Information Commission (IC) should be drawn from a non-civil service background.

- There must be prime role of the government and the NGOs in implementing RTI needs to be appreciated and supported by the people at large.
- An awareness should be created amongst rural areas (peoples) at mass level by using media like hoarding, social media and kiosks.
- Government should come out with a special postage stamp of Rs. 10 towards payment of RTI fee nationwide. The amount collected through the stamp and this information cost can be used to create awareness programme,

particularly to educate them, as to how to seek the necessary information under RTI act.

- The procedure of seeking information against RTI should be simplified.
- It is suggested that strict directions be issued by the Central Government, that all the State Governments /Public Authorities should fulfill their obligations laid down under Section 4 of the RTI Act, 2005. Failing which, may lead to penal provisions being invoked against such Public Authority. Secretary of the Department may be held responsible in this regard and be clearly held culpable in case of non-compliance of Section 4(1) (b).

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## IMPACT OF INCREASING POPULATION ON EDUCATION , HEALTH AND ENVIRONMENT

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### ABSTRACT

*In this Research paper I have to study about impact of increasing population and it's effect on human health, education as well as environment situation. Over population has affected the health , environmental of the people adversely. There is not enough nutritive food for everybody. Millions of people are below poverty line. They have lost their vigour and efficiency to work. In a big family with low income, the condition of woman is pitiable. From morning till night she has no rest; as a result of which she loses both her physical and mental vigour. Children too suffer on account of increasing population. In big families, where the income is not very high, they cannot get good food, good medical facilities and good care from the parents.*

**Keywords:** *Affected, Nutritive, Vigour, Efficiency, Facilities etc.*

### 1. Introduction

#### **Increasing population impact on education,huma human health and environment situation.**

Population, in general, refers to the total number of people inhabiting in a specified environment, geographical area, be it a village, taluka, district, country or the world as a whole; or belonging to any particular race, religion, sex, class, caste, group, community, and so on. Education is the process that imparts, improves or changes the knowledge, information, understanding, attitudes, skills, abilities, practices and so on of the people for their effective performance in life as an individual and as a member of the family, society, nation and the world. Having considered the two terms, 'population' and 'education' as above, deciding on what sort of education can be imparted to which section of population, on what population matters and to what extent poses a serious challenge to population educators and educationists.

### 2. Objectives of the Study

#### **1. To study the impact of increasing population on Environmental**

2.To study the impact of increasing population on Education.

3.To study the impact of increasing population Health

4.To study the advantages of increasing population.

5.To study the steps to control increasing population.

### **3. Impact of increasing population on Education**

#### **i. More Teachers**

The higher the population of school age people in a society, the more teachers are needed to teach these students. This can place a strain on an already overtaxed system. Many teachers are moving to different professions for the monetary increase, while those who stay are overburdened with the ever increasing number of students. The educational issues this causes can increase when teachers are dealing with students who have to stay after school and come in early due to parental work obligations.

#### **ii. School Overcrowding**

All buildings are built with a specific number of occupants in mind. In schools that experience an increase of population, this number can be exceeded. This can cause serious school overcrowding which can cause negative feelings among the students. This means the district needs to build more and bigger schools. This costs money that most school districts do not have, resulting in having to take out loans and the community having to assist in the building of a new school.

#### **iii. Change in Attitudes**

Most schools attempt to foster positive attitudes about education and learning, but this can be hard to do if students are experiencing



school overcrowding. This attitude can shift if the high population of the school becomes distracted by other more negative attitudes and ideas. These negative attitudes can include drug usage, gang mentalities and a lack of education idealism. This is especially true for those schools that were previously prone to such distractions. A lack of control can appear in schools with too many students and not enough teachers.

#### **iv. Funding Issues**

Schools need funds from the community to exist. Those communities that have experienced a population growth without an economic growth may find resistance in the funding of the school. This can lead to a lack of funding and insufficient funds to provide enrichment activities to the students. This can result in the school becoming boring for students and a lack of sports or other activities. Schools may also find a lack of supplies to cover the students in need. Schools in communities that experience a population growth as well as an economic growth do not need to worry about this as much.

#### **v. Continued Education**

Negative attitudes about schooling can carry on through a student's life, resulting in a lower chance for that student to attend college or other extended education. This lowers the earning potential of the student, resulting in a possible poverty situation. Correcting the issues of population growth in the educational system is necessary to prevent dropouts and to encourage continued learning.

### **4. Impact of increasing Population on Health**

#### **i. Crowded areas and infections go hand-in-hand**

Human health is at risk as the denser the population; the easier airborne diseases can spread. The increase in population has led to issues like urban crowding and environmental changes that have resulted in the emergence of many infectious diseases. Increase in antimicrobial resistance proves to be an unexpected problem for diseases such as:

- Tuberculosis
- Malaria
- Cholera
- Dengue fever

#### **ii. Filtering only drinking water may not be enough**

Overpopulation results in polluted water supplies. People die each year because of contaminated water-related disease. The viruses spread faster in a denser population which enables deadly mutations to continue, making the water unsafe for utilization.

#### **iii. More the people, lesser the fresh air(environment)**

With the increasing number of people travelling by their vehicle, there is a growing concern about the health impacts caused due to the traffic on the road. The toxic content in the environment impacts the kids more than the adults. Today, the decrease in the quality of air has resulted in the majority of people suffering from respiratory problems such as:

- Asthma,
- Lung cancer
- Chest pain
- Congestion
- Throat inflammation Cardiovascular disease.
- Respiratory diseases

### **5. Advantages of population growth**

#### **1. Higher economic growth.**

Population growth will lead to economic growth with more people able to produce more goods. It will lead to higher tax revenues which can be spent on public goods, such as health care and environmental projects.

#### **2. Economies of scale.**

Farming and industry have been able to benefit from economies of scale, which means as the population grows; food output and manufacturing output have been able to grow even faster than population growth.

#### **3. The efficiency of higher population density.**

In terms of per capita carbon footprint, areas with a high population density are significantly more efficient than rural areas and places with a low population. When people live in densely populated areas, they are more likely to use public transport, live in apartment buildings which are easier to heat. In big cities, transport and the delivery of goods is much more

efficient, whereas for low population densities, the average cost and environmental footprint are much higher.

### 5. The improved demographic structure of society.

Many western economies are now experiencing a falling population, with the result that their population demographic is being skewed to old, retired people. This is imposing costs on society as we struggle to pay for health care and pensions. Moderate population growth helps to rebalance the population with a higher share of young, working people.

### 6. Critical mass.

Higher populations can enable a critical mass of people to enable a richer, more vibrant society. With low populations, there is less scope for diversity. But, when the population grows, it can enable the support of a broader cultural range of activities.

### 6. Steps to Control Increasing Population and impact on health, and environment in India

The Government of India, politicians, policy-makers should initiate a bold population policy so that the economic growth of the country can keep pace with the demands of a growing population. Major steps which have been already implemented but still need to be emphasised more control population. Increasing the welfare and status of women and girls, spread of education, increasing awareness for the use of contraceptives and family planning methods, sex education, encouraging

male sterilization and spacing births, free distribution of contraceptives and condoms among the poor, encouraging female empowerment, more health care centres for the poor, to name a few, can play a major role in controlling the population. India's strengths in the global world in various fields cannot be ignored, whether in science & technology, medicine and health care, business and industry, military, communication, entertainment, literature and many more. Experts are hopeful that by increasing public awareness and enlisting strict population control norms by the Government will definitely lead the way for the country's economic prosperity and control of the population.

### 7. Conclusion

**In this Research paper I have to study about impact increase population on human health, education as well as environment.**

Continuously improving population projections can help support increased investment in education and human resources as India continues to develop," says KC adding: "We hope that people approach us for collaboration to run more future narratives, do more in-depth analysis, or use this research as input for policy work. We made all our calculations open so people can make their own 'what-if' scenario, which will help us improve our projection and make a stronger case for the importance of education in India.

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## A REVIEW ON MYCOLOGICAL MANAGEMENT OF STEM ROT DISEASE OF GROUNDNUT

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### ABSTRACT

Groundnut is one of the most important oil seed crop in the world. *Sclerotium rolfsii* Sacc. is the causal agent of stem rot disease of groundnut, which is one of the major production constraints of groundnut (*Arachis hypogea* L.). The fungus infects lower stems of groundnut, which are in contact with the soil as well as pegs, pods and roots. The traditional agricultural practice to control the phytopathogen *S. rolfsii* by using variety of fungicides like Bavistin, Captan etc. But severe disadvantage of the traditional practice is that it is not effective to check the *Sclerotium* during the cropping period (90- 100 days) and is not eco-friendly. Recently new technology is emerging i.e. biological control of plant disease which will be eco-friendly to human beings and environment. Various microorganisms like bacteria, fungi that can be used as biological control agents. The use of fungi as biocontrol agents is a safe and eco-friendly strategy towards sustainable agriculture. Fungi belonging to genera *Aspergillus*, *Fusarium*, *Gliocladium*, *Petriella* and *Trichoderma* are known to be important biocontrol agents.

Key words: Groundnut, Stem rot, *Sclerotium rolfsii* Sacc, Biocontrol agents, *Trichoderma*, and *Gliocladium*.

### Introduction

Groundnut is considered as one of the most important crops in the world. Groundnut is the 4<sup>th</sup> most important source of edible oil, and is ranked as 3<sup>rd</sup> most important source of vegetable protein in the world (Smith, 2002). It is cultivated in more than 100 countries of the world. That's why it is referred as a "Universal Crop".

Groundnut is grown on a large scale in almost all tropical and subtropical countries of the world. It is estimated that around 65% of the crop produced in the world is crushed to extract groundnut oil and the rest is used in making other edible products. The most important

groundnut growing countries are India, China, Nigeria, Sudan and USA (Handbook on Grading of Food Grains and Oilseeds). Groundnut (*Arachis hypogea*, L.) belongs to the family Fabaceae.

Groundnut is a valuable source of protein, Niacin, Fiber, vitamin E and antioxidants. The groundnut seed is a good source of edible oil and proteins in the form of oil cake, which can also be used as animal fodder and fertilizer. It also has some industrial uses like in paint, varnish, lubricating

oil, soap, furniture, polish etc.

Groundnut crop is prone to attack by different pathogens and to a much larger extent than many other crops. More than 100 pathogens have been reported to affect groundnut, but only a few are economically important in India such as leaf-spot (Tikka), early leaf-spot (*Cercospora arachidicola*), late leaf-spot (*C. personatum*), rust (*P. arachidis*), and aflatoxin contamination (*Aspergillus flavus* and *A. parasiticus*). The other diseases such as collar rot (*A. niger*), Stem-rot (*S. rolfsii*), root-rot (*M. phaseolina*), bud necrosis (tomato spotted wilt virus), clump and peanut (groundnut) mottle disease are localized (Subrahmanyam *et al.*, 1980). In all these diseases of groundnut, one of the most emerging and rapidly spreading disease is the stem rot disease of groundnut caused by *S. rolfsii*. To control the plant diseases various traditional practices are being followed.

### Stem Rot Pathogen of Groundnut:

The pathogen *Sclerotium rolfsii* Sacc., is a soil borne pathogen. It commonly occurs in the tropics, sub-tropics and other warm temperate regions of the world causing root rot, stem rot, wilt and foot rot on more than 500 plant



species including almost all the agricultural and horticultural crops (Aycock, 1966; Domschet *et al.*, 1980; Farr *et al.*, 1989).

*Sclerotium rolfsii* was first reported by Rolfs (1892) later the pathogen was named as *Sclerotium rolfsii* by Saccardo (1911). Higgins (1927) worked in detail on physiology and parasitism of *S. rolfsii*. This was the first detailed and comprehensive study in USA. Sclerotia initially white in color, later it becomes light brown to dark brown at maturity and they are sub spherical, the surface finely wrinkled, sometimes flattened as shown in

Figure 1.0 (Subramanian, 1964 and Mehan, 1995). This pathogen *Sclerotium rolfsii* forms brown sclerotia which are very well organized compact structures, built of three layers, the rind, composed of empty melanized cells; the cortex cells, filled with vesicles and the medulla (Chet, 1975). Sclerotia may be spherical or irregular in shape and at maturity resemble the mustard seed (Taubenhaus, 1919; Barnett and Hunter, 1972). Sclerotial size was reported to be varied from 0.1 mm to 3.0 mm (Om Prakash and Singh, 1976; Ansari and Agnihotri, 2000 and Anahosur, 2001).



Figure 1. Stem Rot Disease of Groundnut caused by *Sclerotium rolfsii*

To control the plant diseases various traditional practices are being followed.

#### **Traditional Plant Disease Management Practices:**

Methods of plant disease management vary considerably from one disease to another, depending on the kind of pathogen, the host, the interaction of the two, and many other variables. In controlling diseases, plants are generally treated as populations rather than as individuals, although certain hosts (especially trees, ornamentals, and, sometimes, other virus-infected plants) may be treated individually. Control measures are generally aimed at saving the populations rather than a few individual plants (Agrios, 2005).

Traditionally the plant disease management can be classified as regulatory, cultural, biological, physical, and chemical, depending on the nature of the agents employed. Regulatory control procedures aim at excluding a pathogen

from a host or from a certain geographic area. Most cultural control methods aim at helping plants to avoid contact with a pathogen, creating environmental conditions unfavourable to the pathogen or avoiding favourable ones, and eradicating or reducing the amount of a pathogen in a plant, a field, or an area. Finally, physical, and chemical methods aim at protecting the plants from the pathogen inoculum that has arrived, or is likely to arrive, or curing an infection that is already in progress (Agrios, 2005).

In general, excluding or reducing the initial inoculum is most effective for the management of monocyclic pathogens. Controls such as crop rotation, removal of alternate hosts, and soil fumigation reduce the initial inoculum. With polycyclic pathogens, the initial inoculum can be multiplied many times during the

growing season. Therefore, a reduction in the initial inoculum must usually be accompanied by another type of control measure (such as chemical protection or horizontal resistance) that also reduces the infection rate. Many controls, e.g., excluding a pathogen from an area, are useful for both monocyclic and polycyclic pathogens (Agrios, 2005).

The physical agents used most in controlling plant diseases are temperature (high or low), dry air, unfavourable light wavelengths, and various types of radiation.

Chemical agents are generally used to protect plant surfaces from infection or to eradicate a pathogen that has already infected a plant. A few chemical treatments, however, are aimed at eradicating or greatly reducing the inoculum before it encounters the plant. They include soil treatments (such as fumigation), disinfestation of warehouses, sanitation of handling equipment, and control of insect vectors of pathogens (Agrios, 2005, Mahmood *et al.*, 2016).

The traditional agricultural practice employed to control the plant disease have severe disadvantage that it is not effective to check the pathogen and is not eco-friendly. However, excessive use of chemical fungicides in agriculture has led to deteriorating human health, environmental pollution, and development of resistance in pathogen to fungicide (Dalvi and Rakh 2017, Bolognesi and Merlo, 2019).

One of the most promising alternatives to synthetic fungicides is biological control of pathogens, which includes the use of biofungicides based on antagonistic microorganisms. In contrast to commonly used chemical fungicides, biofungicides have several advantages, i) high specificity against target pathogens, ii) rapid degradation in the environment and iii) low mass-production cost. Antagonistic microorganisms operate through various modes of activity such as competition with pathogens for space and nutrients, production of antibiotics, cell-wall degrading enzymes and reduction of pathogen population by hyperparasitism (Dimkić *et al.*, 2013, Stanojević *et al.*, 2016, Rakh *et al.*, 2019).

#### **Economic Importance and Distribution of Stem Rot Pathogen:**

The Sclerotium rolfsii attacks more than 500 species, the most common hosts are legumes, crucifers, and cucurbits (Punja, 1985). The disease is distributed throughout the world and prevalent particularly in warm dry climates. It was first reported by Mc Clintock (1917) in Virginia. Garren (1959) has estimated the losses in southern USA as 10 to 20 million dollars annually. Weber (1931) and Garret (1956) reported that the fungus survived in the soil for years together by producing sclerotial bodies and causing the disease on various hosts. The loss of yield caused by the pathogen is 25%, but sometimes it reaches 80- 90% (Grichar and Bosweel, 1987). Similarly, yield losses over 25% have been reported by Mayee and Datar (1988). Stem rot causes pod yield losses of 10-25%, but under severe diseased conditions yield losses may range to up 80% (Rodriguez Kabana *et al.*, 1975). Patil and Rane (1982) reported yield loss up to 10 to 50% due to this disease. Adiver (2003) reported the yield loss of 15-70% in groundnut is due to leaf spot, rust and stem rot singly or in combination.

#### **Fungi as biological control agents:**

The control of fungal diseases of plants by the use of naturally occurring antagonistic microorganisms has been the focus of intense research throughout the world. This approach is popularly known as biological control of plant pathogens. Biological control is a bio-based, ecofriendly strategy that offers a practical and economical alternative for the management of plant pathogens with a potential to emerge as an alternative to chemical control (Mark *et al.*, 2006).

Pathogens affecting plant health are a major and chronic threat to food production and ecosystem stability worldwide (Compant *et al.*, 2005). It has been estimated that about 10-16% of global food production is reduced due to field and post-harvest plant diseases (Lo Presti *et al.*, 2015; Strange and Scott 2005). Since agriculture is the largest economic sector in the world so to ensure high yield pesticides including bactericides, fungicides, herbicides and insecticides are used. It has been estimated that more than two billion tons of pesticides are used every year all over the world to eliminate



undesirable crop pests. But pesticides leave undesirable effects in the environment including the contamination of soil, groundwater and water bodies which then affect human and animal health due to their carcinogenic potential, recalcitrance, and toxicity (Baron *et al.*, 2019).

The use of fungi as biocontrol agents is greatly beneficial due to their metabolic diversity and efficiency that enhances the chances of finding the apt isolates for biocontrol and their relative environmental safety, as they are primarily decomposers (Thomas and Read 2007). Fungi belonging to genera *Aspergillus*, *Fusarium*, *Gliocladium*, *Petriella* and *Trichoderma* are known to be important biocontrol agents (De Silva *et al.*, 2019). The biocontrol activity of *Verticillium leptobactrum* against wilt disease induced by *Fusarium oxysporum*, *F. lycopersici* has been demonstrated by Hajji-Hedfiet *al.*, (2018).

Further many fungal biocontrol agents are also available as commercial products such as *Verticillium lecanii*, *Trichoderma polysporum*, *Trichoderma gamsii*, *Trichoderma asperellum*, *Purpureocillium lilacinum*, *Phlebiopsis gigantea*, *Paecilomyces lilacinus*, *Metarhiziumanisopliae*, *Gliocladium catenulatum*, *Coniothyrium minitans*, *Candida oleophila*, *Beauveria bassiana*, *Aureobasidium pullulans* and *Ampelomyces quisqualis* (Larranet *al.*, 2016; Tranieret *al.*, 2014). The use of fungi as biocontrol agents is a safe and eco-friendly strategy towards sustainable agriculture. Furthermore, hidden possibilities or uses of fungi could be explored to enhance agricultural productivity, nano-agriculture, and metabolite production (Singh *et al.*, 2019).

### **Mycological Management of Stem Rot Pathogen:**

Several authors have reported the use of fungi

as a biological control agent for the management of plant diseases. Some of them are mentioned here:

Doley *et al.*, (2017) investigated that the inoculation of arbuscular mycorrhizal fungi (AMF) and Fungal species found to be worth applying as they stimulated growth and decreased harmful effects of *S. rolfsii*. The low-input AMF along with Fungal species may be needed for the advancement of modern agricultural systems.

Wonglom *et al.*, (2019) evaluated five Fungal spp. against *Sclerotium spp.* SZ01 and LS01 which caused Fruit rot of snake fruit and stem rot of lettuce respectively. *Fungal sp.* T76-12/2 showed significant inhibitory effect on mycelial growth of *Sclerotium sp.* LS01 and SZ01 with 81.48% and 78.33% inhibition. While Fungal sp. T76-12/2 caused discoloration of *Sclerotium sp.* mycelia at the contact point. Volatile antifungal bioassay revealed Fungal sp. T76-12/2 was superior in inhibiting the growth of *Sclerotium sp.* by up to 44.44% for LS01 and by 59.52% for SZ01.

### **Conclusion**

The survey of available literature suggests that every year, severe economic losses are caused due to soil – borne fungal pathogens. The excessive use of chemical fungicide was found to create food contamination, environmental risks, posing hazards to human health. To overcome such problems management of plant diseases by using fungi as a biological control agent has been suggested.

### **Acknowledgement**

The authors are grateful for the encouragement and support provided by Head of the Botany Department, Science College, Nanded, Principal Science College, Nanded and Principal, Shri Guru Buddhiswami Mahavidyalaya, Purna (Jn.).

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**QUATERNARY SEDIMENTS AND CLAY MINERALS STUDY OF MANJRA RIVER NEAR PATODA, BEED DISTRICT****Mahesh D Phalke<sup>1</sup>, P Zamarkar<sup>2</sup>, Apurva D Fuladi<sup>2</sup>**<sup>1</sup>Department of Geology & Geo-Informatics, Shri Shivaji College of Art's, Commerce & Science Akola<sup>2</sup>Department of Geology, Shivaji Science College, Nagpur\*Corresponding author: e-mail: [pushpa.zamarkar@sscnapur.ac.in](mailto:pushpa.zamarkar@sscnapur.ac.in)**ABSTRACT**

The present work is intended to study the field and laboratory investigation of Quaternary sediments of Manjra River near Patoda, Beed district. For this extensive field work has been carried out in and around Patoda, Beed District. An attempt has been made to study the geographical, structural and lithological features of the sediments. The studies have found that the Deccan trap of Upper Cretaceous to Lower Eocene is found at the base of soil and Quaternary sediments. Samples have been collected from the field work for the laboratory investigations while carrying out the field work. The laboratory investigation includes the study of sieve analysis, pH and Granulometric studies. The studies manifest that the flow regime is turbulent and it is mixture of varying size of sediments based on the nature of sediments. Beside turbulent flow regime at some places, the flow is suddenly changed to stagnant, represented by the fine sediments. The overall investigations manifests that sediments of the study area are river transported.

**Keywords:** Patoda, Lithology, Upper Cretaceous, Sieve analysis, Turbulent.

**Introduction:**

The present dissertation has been intended to study the field and laboratory investigation of Quaternary sediments of Manjra River. The various studies on geographical, lithological and structural mapping of a limited area and Quaternary sediments have been carried out from the upper and lower Godavari sediments by handful of workers. This prompted the author to take up the similar studies in Manjra River. Hence, the area near Patoda was selected for the present studies. The field observations were made and samples from various sections were collected. Sediment supplies from continental sources to adjoining river are gently influenced by climatic and tectonic variables at various spatio – temporal scales (Milliman and Meade, 1983; Vaithyanathan, et. al. 2002; Wasson, 2003, Chakrapani, 2005). Relating the sediments characterizes to their provenance/ source is, therefore, essential to understand the mechanism of transport and sediment flux. Mineral magnetism method is used for such studies to characterize the sediment source, sediment dispersal and sediment mixing patterns amongst variety of depositional environments. The following pages incorporate the work carried out for the various parameters of sediments to understand their source and

depositional regime. First the geological field work subsequent laboratory work is explained respectively.

**Study Area:**

Present study area is located near Patoda in Beed and Ahmednagar districts of Maharashtra. The area fall on the Survey of India Toposheet No. 47 N (Beed) and 56 B (Osmanabad). This can be reached by National High No. 561 by Road. The field locations can be reached by motorable road in all seasons. The river flows from west to east and the villages are on the either sides of the Manjra River. The samples were collected from Patoda (18° 48' 167" N) (25° 29' 343" E). The Manjra river is a tributary of the River Godavari. It passes through the states of Maharashtra, Karnataka and Telangana. It originates in the Balaghat range of hills near Pathardi in Ahmednagar District at an altitude of 823 meters (2,700 ft) and empties into the Godavari River. It has a total catchment area of 30,844 square kilometers (3,084,400 ha).

**Literature Review:**

Initially, all the available information about the area was collected. The published and unpublished geological literatures, on the main as well as surrounding area were consulted.

This has enabled to get acquainted with the regional geological setting. The Mineral magnetic Characterization of the Godavari River and Western Bay of Bengal Sediments was carried out by Kulkarni et al. (2015). The similar work and the sedimentological work specially on Quaternary sediments has not been carried out on Manjara River. However, work on various geological – particularly sedimentological aspects was critically carried out by Rao(1982), Sonam and Kale(1993), and Deshpande (1998 and references therein).

**Geology:**

The Deccan basalt geology has been explained by several geoscientists for various parts of Maharashtra (Table. 1). The surrounding parts of the Manjra River are covered with black cotton soil, at places it is with grey and brownish coloured. The Deccan basaltic flows are spread over the longer distances on either side of the river. The Quaternary soil is mainly exposed in river flood plain and along the river in the river bed. In general The Deccan basalt of Upper Cretaceous – Lower Eocene is overlain by recent alluvium.

|          |          |  |
|----------|----------|--|
|          |          | chemical basalt<br>Jammu patti member  |
| KALSUBAI | Neral    | Tunel type basalt<br>Neral chemical type<br>Termbre basalt<br>Neral chemical type<br>Ambivili pierite basalt |
|          | Igatpuri | Kashele GPB<br>Nilamati  |
|          | Jawhar   | Thalghat GPB<br>Juni Jawhar<br>Val river<br>Golbhan phyrlic<br>Devbandh<br>Khardi phyrlic                    |

Table 1. Stratigraphy of Deccan Basalt – After Beane et al. 1986, Bodas et al. 1988, Cox and Hawkesworth, 1985, Subbarao and Hooper, 1988 and Khadri et al. 1988.

**Methodology:**

The collected samples were brought to laboratory for analysis of various parameters viz. sieving, pH, clay mineral analysis, cumulative curves, textural parameters. For understanding the depositional environment of sediments, the source rocks of the sediments, to know fossils content if any. From the river, various beds sections were taken, and care was also taken to avoid contamination of samples from different beds or levels. The collected samples were properly packed and brought to the laboratory then these were subjected to various analyses in the laboratory. The collected samples were brought to the laboratory for analysis of various parameters viz. sieving, pH, clay mineral analysis, cumulative curves, textural parameters. For understanding the depositional environment of sediments, the source rocks of the sediments, to know fossils content if any.

| Sub group | Formation     | Member / flow  |
|-----------|---------------|--|
| WAI       | Desur         |  |
|           | Panhala       |  |
|           | Mahabaleshwar |  |
|           | Ambenali      |  |
|           | Pladpur       |  |
| LONAVALA  | Bushe         |  |
|           | Khandala      |  |
|           | Bhimashankar  | Monkey hill GPB<br>Giravalli GPB   |
|           | Thakurvada    | Thakurvadi chemical type<br>Water type member<br>Thakurvadi chemical type High<br>TiO <sub>2</sub> Thakurvadi basalt<br>Thakurvadi |

|                      |                                |                                      |  |
|----------------------|--------------------------------|--------------------------------------|--|
| Clay mineral present | Clay suspension Methylene blue | Clay suspension Methylene blue + KCl | Nature of the residue At the bottom of test tube |
| Kaolinite            | Violet                         | Violet                               | Dense & compact                                  |
| Illite               | Violet – blue, Blue-sky blue   | Blue, Blue Skyblue                   | Dense & compact                                  |
| Montmorillonite      | Violet                         | Blue, skyblue, Green                 | Jelly- like                                      |
| Bedeilite            | Green                          | Green                                | Jelly- like                                      |

Table 2: Coloration and identification chat.

**Result And Discussion:**

**Location: 1 (Patoda):**

Lat. – Long. : 18<sup>o</sup>48’167” N, 25<sup>o</sup>29’343” E  
 These location is little hilly. In the middle of the river bolders and pebbles are found. There are 3 main sections found. In S1 section influx sudden flow of water may occur and matrix of various size grains settle there. In the second

spell i.e. S2 graded pattern are seen it indicate that the flow was continuous and current is fluctuated multidirectional channel or flow. In the S3 clay is seen that means it may be clam water deposition. The sequence can be seen alternate in the given figure below. It may pass from alternate climate so the sequence is seen alternate,as shown in fig.1.It can be seen that alternate clay, matrix and graded sections are formed.

**Sieving Data:**

Table 3: Sieve analysis according to different matrix of sieve.

| Sieve scale | 7       | 16      | 30     | 60 | 120   | 240   | 270     | total   |
|-------------|---------|---------|--------|----|-------|-------|---------|---------|
| L3 / 1 / a  | 11.141  | 11.149  | 22.073 | -  | 1.197 | 4.336 | 267.846 | 317.742 |
| L3 / 1 / b  | 122.422 | 161.515 | 72.179 | -  | 0.623 | 1.923 | 16.660  | 375.322 |
| L3 / 1 / c  | 196.397 | 102.224 | 46.685 | -  | 1.599 | 2.043 | 37.809  | 386.757 |

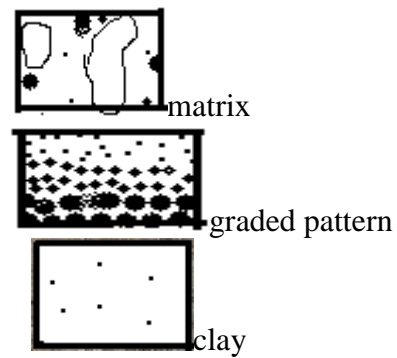
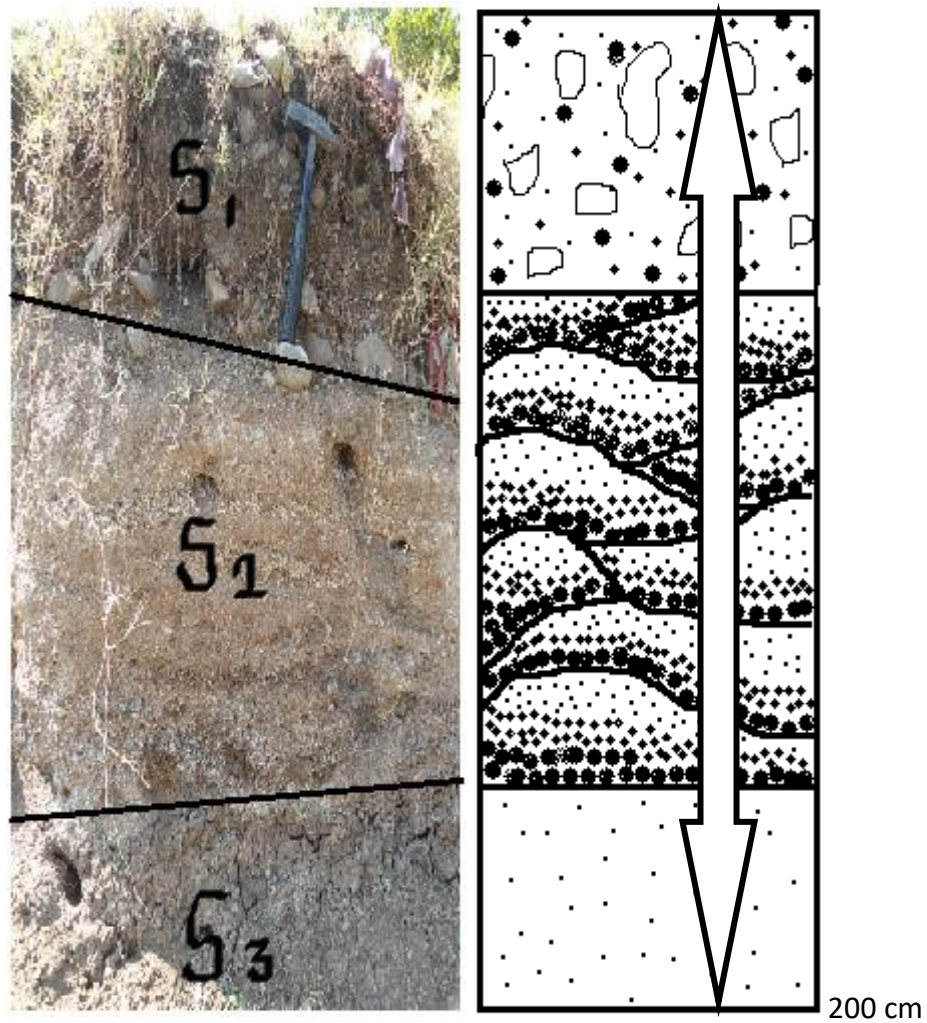


Fig. 1, vertical section of Location I

L3 / 1 / a

| Sieve Scale | Frequency % | Cumulative % | Φ Scale |
|-------------|-------------|--------------|---------|
| 7           | 3.51        | 3.51         | -2      |
| 16          | 3.51        | 7.02         | -1      |
| 30          | 6.95        | 13.97        | 1       |
| 60          | -           | -            | 2       |
| 120         | 0.38        | 14.35        | 3       |
| 240         | 1.36        | 15.71        | 4       |
| Pan         | 84.30       | 100          | 5       |



Table 4. a  
L3 / 1 / b

| Sieve Scale | Frequency % | Cumulative % | Φ Scale |
|-------------|-------------|--------------|---------|
| 7           | 32.62       | 32.62        | -2      |
| 16          | 43.03       | 75.65        | -1      |
| 30          | 19.23       | 94.88        | 1       |
| 60          | -           | -            | 2       |
| 120         | 0.17        | 95.05        | 3       |
| 240         | 0.51        | 95.56        | 4       |
| Pan         | 4.44        | 100          | 5       |

Table 4. b  
L3 / 1 / c

| Sieve Scale | Frequency % | Cumulative % | Φ Scale |
|-------------|-------------|--------------|---------|
| 7           | 50.78       | 50.78        | -2      |
| 16          | 26.07       | 77.21        | -1      |
| 30          | 12.07       | 89.23        | 1       |
| 60          | -           | -            | 2       |
| 120         | 0.41        | 89.69        | 3       |
| 240         | 0.53        | 90.22        | 4       |
| Pan         | 9.78        | 100          | 5       |

Table 4. c

**Granulometric table:**

| Sample No. | Mz φ | Type of sand | σi φ | Vc                   | Ski  | Vc                 | Kg  | Vc                    |
|------------|------|--------------|------|----------------------|------|--------------------|-----|-----------------------|
| L3/1/a     | 4.36 | Gravel       | 0.99 | V. moderately sorted | 0.52 | Strongly F. skewed | 5.9 | Extremely leptokurtic |
| L3/1/b     | 2.5  | Gravel       | 0.80 | Moderately sorted    | 0.64 | Strongly F. skewed | 3.6 | Extremely leptokurtic |
| L3/1/c     | 5.7  | Gravel       | 1.22 | Poorly sorted        | 3.04 | Strongly F. skewed | 5.9 | Extremely leptokurtic |

Table 5: Granulometric reading and analysis.

**pH :**

|            |      |
|------------|------|
| L3 / 1 / a | 8.21 |
| L3 / 1 / b | 7.84 |
| L3 / 1 / c | 8.4  |

| Sample     | Clay suspension Methylene blue | Clay suspension + Methylene blue + KCL | Nature of the residue of the bottom of the test tube | Clay mineral present |
|------------|--------------------------------|--|--|----------------------|
| L3 / 1 / a | Violet                         | Violet                                 | Jelly like   | Montmorollinite      |
| L3 / 1 / b | Blue                           | Blue                                   | Dense and Compact                                    | Illite               |
| L3 / 1 / c | Blue                           | Blue                                   | Dense and Compact                                    | Illite               |

Table 6. pH scale of different section.

**Clay mineral analysis :**

Table 7: Clay mineral analysis with the help of color and bottom residue.

**Conclusion:**

From the above data it is observed that all the beds formed in the river are of river sediments it is clear from the Moiola, Weiser and Friedman graph. In the studied samples percentage of Illite mineral is more, except L3 /

1 / a, is having Montmorillonite. Sediments are very poorly sorted and they shows high percentage of strongly fine skewed type of sediments, it means generally sediments are extremely leptokurtic. The sediments also can be said that they were less transported.

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## SYNTHESIS OF SOME NEW SCHIFF BASES AND THEIR ANTIMICROBIAL POTENTIAL

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### ABSTRACT:

some novel Schiff bases (3a-3d) were synthesized on facile condensation of 1-(1-hydroxynaphthalen-2yl)ethanone with substituted aromatic amines in presence of catalytic amount of acetic acid. The structure of newly synthesized Schiff bases were confirmed on the basis of spectral analysis and screened for antimicrobial potential against some microorganisms. All the synthesized compounds show good to moderate activity.

**Keywords:** 1-(1-hydroxynaphthalen-2yl)ethanone, Aromatic amine, spectral analysis, Antimicrobial potential.

### Introduction:

The Schiff bases constitute one of the most active classes of the compounds possessing diversified biological applications. The Schiff bases have been reported to possess higher degree of antitubercular [1], anticancer [2], antibacterial [3], anti-inflammatory [4], antifungal [5]. Schiff bases belong to a widely used group of organic intermediates used for synthesis of pharmaceutical or rubber [6] additives and amino protective group in organic synthesis [7-10]. The utility of Schiff bases lay in their usefulness as synthons in the synthesis of bioactive molecules such as 4-thiazolidinines, 2-azetidinones, benzoxazines, formazans, they occupy an important role in medicinal chemistry and have been reported to possess antiviral [11-13], antimicrobial [14,15] and anti-inflammatory [16], anticancer [17], anti-HIV [18] activities. By considering wide

range of biological activities of Schiff bases in the present research article we have synthesized some new Schiff bases by conventional technique and all newly synthesized Schiffbases were evaluated for antimicrobial activities.

### Materials and methods

All the Chemicals used in the synthesis are used were of laboratory grade. Melting points were determined in an open capillary tube and uncorrected. IR spectra were recorded in KBr on a Perkin-Elmer spectrometer. <sup>1</sup>H NMR spectra were recorded on a Gemini 300 MHZ instrument in CDCl<sub>3</sub> as solvent and TMS as an internal standard. The mass spectra were recorded on EI-SHIMADZU-GC-MS spectrometer. Elemental analysis was carried out on Carlo-Erba mass analyzer. The purity of products was checked by thin layer chromatography (TLC) on silica-gel.

### Reaction:

**Scheme:** Synthesis of Some new Schiff bases



**Table 1.** Physical Data of Schiff Bases. (3a-3d)

| Entry | R               | R1              | Colour      | M.P. °C | Yeild (%) |
|-------|-----------------|-----------------|-------------|---------|-----------|
| 3a    | H               | H               | Yellow      | 128-130 | 70        |
| 3b    | H               | CH <sub>3</sub> | Yellow      | 135-137 | 72        |
| 3c    | CH <sub>3</sub> | H               | Yellow      | 140-142 | 68        |
| 3d    | H               | Cl              | Pale Yellow | 180-182 | 78        |

### General procedure for synthesis of Schiff bases

Equimolar quantities of 1-(1-hydroxynaphthalen-2yl)ethanone and substituted aromatic amines were dissolved in ethanol (15 ml) and acetic acid (0.5 ml) was added and refluxed for 2 hr. After completion of reaction (monitored on TLC), the reaction mixture was cooled and poured in water, solid separated out. Solid was filtered, washed with water and crystallized from ethanol to give corresponding Schiff bases 3a-3d. M.P. yield and analytical data of Schiff bases are given in Table-1

### Result and discussion

Schiff bases (3a-3d) were synthesized by condensation of 1-(1-hydroxynaphthalen-2yl)ethanone with aromatic amines. 1-(1-hydroxynaphthalen-2yl)ethanone and aromatic amines were dissolved in ethanol, few drops of acetic acid added and refluxed for 2-3 hr (monitored on TLC). Reaction mixture on cooling to room temperature or on pouring in cold water solid separated. Solid was filtered, washed with cold water and crystallized from ethanol (scheme-1). The structures of the Schiff bases were assigned on the basis of elemental analysis and spectral data. IR spectra of Schiff bases showed characteristic band in the region 1629 cm<sup>-1</sup> due to C=N. Stretching vibration and band around 1452 cm<sup>-1</sup> due to aromatic stretching. <sup>1</sup>H NMR spectra of Schiff bases showed multiplet in the region 6.82-8.48 due to aromatic protons. A singlet of methyl group was observed at  $\delta$  2.49 and phenolic hydroxy group as a singlet at  $\delta$  14.02. Mass spectra of the Schiff bases were in agreement with its suggested structure

### 2,2-(1E)-1,1-(1,2phenylene)bis(azan-1-yl-1-ylidene)bis(ethan-1-yl-1-ylidene)dinaphthalen-1-ol (3a)

Yield-70%, Color-Yellow, M.P.128-130°C. FT-IR (KBr, cm<sup>-1</sup>): 3434( $\nu$ OH), 1629( $\nu$ C=N), 1452( $\nu$ C=C-), 1018( $\nu$ C-N-C). <sup>1</sup>H NMR (400MHz, CDCl<sub>3</sub>):  $\delta$  14.02 (s, 2H, Ar-OH), 8.48-6.82 (m, 16H, Ar-H), 2.49 (s, 6H, CH<sub>3</sub>). Anal. Calc. for C<sub>30</sub>H<sub>24</sub>N<sub>2</sub>O<sub>2</sub>(444): C 81.06, H 5.44, N 6.30; Found: C 81.04, H 5.42, N 6.28.

### 2,2-(1E)-1,1-(3methyl-1,2phenylene)bis(azan-1-yl-1-ylidene)bis(ethan-1-yl-1-ylidene)dinaphthalen-1-ol (3b)

Yield-72%, Color-Yellow, M.P.135-137°C. FT IR (KBr, cm<sup>-1</sup>): 3434( $\nu$ OH), 1629( $\nu$ C=N), 1452( $\nu$ C=C-), 1018 ( $\nu$ C-N-C). <sup>1</sup>H NMR (400MHz, CDCl<sub>3</sub>):  $\delta$  14.02 (s, 2H, Ar-OH), 8.48-6.82 (m, 15H, Ar-H), 2.49 (s, 6H, CH<sub>3</sub>), 2.10 (s, 3H, Ar-CH<sub>3</sub>). Anal. Calc. for C<sub>31</sub>H<sub>26</sub>N<sub>2</sub>O<sub>2</sub>(458): C 81.20, H 5.72, N 6.11; Found: C 81.18, H 5.70, N 6.09.

### 2,2-(1E)-1,1-(4-methyl-1,2phenylene)bis(azan-1-yl-1-ylidene)bis(ethan-1-yl-1-ylidene)dinaphthalen-1-ol (3c)

Yield-68%, Color-Yellow, M.P.140-142°C. FT-IR (KBr, cm<sup>-1</sup>): 3434( $\nu$ OH), 1629( $\nu$ C=N), 1452( $\nu$ C=C-), 1018 ( $\nu$ C-N-C). <sup>1</sup>H NMR (400MHz, CDCl<sub>3</sub>):  $\delta$  14.02 (s, 2H, Ar-OH), 8.48-6.82 (m, 15H, Ar-H), 2.49 (s, 6H, CH<sub>3</sub>), 1.98 (s, 3H, Ar-CH<sub>3</sub>). Anal. Calc. for C<sub>31</sub>H<sub>26</sub>N<sub>2</sub>O<sub>2</sub>(458): C 81.20, H 5.72, N 6.11; Found: C 81.18, H 5.70, N 6.09.

**2,2-(1E)-1,1-(4-chloro-1,2-phenylene)bis(azan-1-yl-1-ylidene)bis(ethan-1-yl-1-ylidene)dinaphthalen-1-ol (3d)**

Yield-78%, Color-Pale Yellow, M.P.180–182°C.

FT-IR(KBr,cm<sup>-1</sup>): 3434(vOH),1629(vC=N),1452(vC=C-), 1018 (vC-N-C).<sup>1</sup>H NMR (400MHz,CDCl<sub>3</sub>):δ 14.02 (s,2H,Ar-OH),8.48–6.82 (m,15H, Ar-H), 2.49(s,6H-CH<sub>3</sub>), Anal. Calc. for C<sub>30</sub>H<sub>23</sub>ClN<sub>2</sub>O<sub>2</sub>(478): C 75.23, H 4.84, Cl 7.40, N 5.85 ;Found:C 75.21, H 4.82, Cl 7.38, N 5.83.

### Antimicrobial activity

All the newly synthesized compounds were screened in vitro antibacterial activity evaluated against 24hr culture of different bacterial strains such as *Staphylococcus aureus*, *Streptococcus pyogenes* (Gram +ve) and, *Escherichia coli*, *Pseudomonasaeruginosa* (Gram -ve) at a concentration 50 µg ml<sup>-1</sup>. The cultures were diluted with 5% of autoclaved saline and the final volume was adjusted to a concentration of approximately 10<sup>5</sup>-10<sup>6</sup> CFU ml<sup>-1</sup>. The synthesized compounds were diluted with acetone for the antibacterial biological

assay for agar disc diffusion method. The liquid form of test compound was soaked on to a disc (5mm) and then allowed to air dry, such that the disc became completely saturated with the test compound. The saturated chemical discs were introduced onto the upper layer of medium evenly loaded with the bacteria and incubated at 37°C for 24 to 48 hrs for better inhibition of bacteria. The zones of inhibition were measured after 24 to 48 hrs. All the experiments were performed in triplicate and the results are expressed as zone of inhibition in mm. The zone of inhibition of the synthesized compounds (3a-3d) was compared with zone of inhibition of standard antibiotics Ofloxacin (50 µg mL<sup>-1</sup>)[19]. From the screening studies (Table 2), it is evident that the synthesized Schiff base derivatives 3a, 3b,3c, and 3d showed good antibacterial activity against all the tested organisms. It was further observed that the Chloro-substituted compound 3d was better over the all other compounds. This showed best activity near to that of standard drug. This observation leads to conclusion that halogen substituted Schiff bases showed higher activity against bacterial strain tested.

**Table 2.** Antibacterial activity of Compounds

| Sr. No. | Compounds | Diameter of zone of inhibition (mm) |            |                     |              |
|---------|-----------|-------------------------------------|------------|---------------------|--------------|
|         |           | Gram (+ve) bacteria                 |            | Gram (-ve) bacteria |              |
|         |           | S.aureus                            | S.pyogenes | E.coli              | P.Aeruginosa |
| 1       | 3a        | 20                                  | 22         | 21                  | 23           |
| 2       | 3b        | 24                                  | 23         | 23                  | 24           |
| 3       | 3c        | 22                                  | 23         | 25                  | 23           |
| 4       | 3d        | 28                                  | 27         | 29                  | 28           |
| 5       | Standard  | 30                                  | 29         | 28                  | 28           |
| 6       | DMSO      | -                                   | -          | -                   | -            |

### Conclusion

In the present work, we synthesized some novel Schiff bases derivatives from different Substituted aromatic amines and 1-(1-hydroxynaphthalen-2-yl)ethanone. The newly synthesized compounds were obtained in good yield and confirmed by spectral analysis. The antibacterial data revealed that electron donating and halogen containing Schiff bases

showed higher activity against bacterial strain tested. It also revealed that all compounds showed good to moderate activity compared to standard drug.

### Conflict of interest

There is no conflict of interest in the present study.

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## GREEN COMPUTING: A CONTROVERSY IN IT

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### ABSTRACT

*Green computing, also known as green technology, is the use of computers and other computing devices and equipment in energy-efficient and eco-friendly ways.*

*One of the early green computing initiatives in the United States was the Energy Star labeling program. This voluntary program was developed by the Environmental Protection Agency in 1992 and implemented by manufacturers to promote energy efficiency in computing hardware and other types of appliances. The Energy Star label is common, especially for laptop computers and displays. European and Asian countries have implemented similar programs. During recent years, attention in Green Computing has moved research into energy-saving techniques for home computers to enterprise systems' Client and Server machines. It is needed to find a way to handle computers and its devices for save the environment and society from such E-hazards. This study provides a brief account of Green Computing. The emphasis of this study is on current trends in Green Computing; challenges in the field of Green Computing and the future trends of Green Computing. Since, it is a qualitative research; the researcher used Individual interviews and Observations to collect relevant information to fulfill this research. IT industry is putting efforts in all its sectors to achieve Green computing. Equipment recycling, reduction of paper usage, virtualization, cloud computing, power management, Green manufacturing are the key initiatives towards Green computing.*

**Keywords:** - Green Computing, Energy, Computer and IT.

### Introduction

A green computer or green IT system is one where the entire process from design, manufacture, use, and disposal involves as little environmental impact as possible. In the design aspect, a green computer is created to perform without a negative environmental impact. Such design includes everything from materials and components to how the computer uses its power supply. Nowadays, most computers are built with a sleep or hibernate mode that allows them to power down when not in use and, therefore, save on energy impact. A green computer will also take into account how it impacts the environment during its life. One way to make a green computer reduce its usage impact is to extend its longevity. The longer the computer lasts, the less impact it will have on the environment because disposal, normally the most significant green influence of the computer's cycle, will be delayed for a longer period of time. To increase a computer's longevity, we suggest looking toward upgrades and modularity. For example, building a new computer from scratch produces a greater environmental effect than building a new RAM module for replacement in computing equipment.

### What is included in a green computing strategy?

IT managers typically focus energy efficiency efforts on data centers, equipment rooms, storage areas and other elements that use energy or are affected by energy use. Saving money is one driving factor. Government regulations dealing with energy conservation also drive green efforts. Concern about climate change, along with internal and external pressure to be environmentally responsible, is a third factor behind the green movement. Companies' green computing strategies can include the following steps:

**Remote work.** The COVID-19 pandemic has spurred many changes in the workplace environment, including ones that have led to reduced energy consumption. It has decreased the number of people commuting to and from work. It has also cut the number of employees present in an organization's facilities, reducing demand for power, water and other resources.

1. **Smart technology.** Organizations can use internet of things sensors and artificial intelligence (AI) monitoring tools to collect and analyze information about the data center and create a power usage model. AI-powered tools can also autonomously manage heating, cooling and power in the data center.

2. **Upgrade and rearrange the data center.** Older equipment often uses more energy and puts out more heat than newer devices. Hot and cold aisle setups can be used to group assets based on energy consumption and temperature, optimizing heating, ventilation and air conditioning (HVAC) efficiency.

3. **Power down.** CPUs and peripherals can be powered down and turned off during extended periods of inactivity. Power up energy-intensive peripherals, such as laser printers, only when needed.

4. **Strategic scheduling.** Do computer-related tasks in dedicated blocks of time, leaving hardware off at other times.

5. **Display selection.** Liquid crystal display monitors use less energy and give off less heat than cathode-ray tube monitors.

6. **Computer selection.** Laptops use significantly less energy than desktop computers.

7. **Power management.** These features can be set to automatically power down hard drives and displays after several minutes of inactivity.

8. **Temperature check.** Newer IT devices can safely run at higher temperatures than older ones, so the data center may not need to be as cool as in the past.

9. **E-waste.** Dispose of e-waste according to federal, state and local regulations.

10. **Alternative energy.** Investigate alternative energy sources, such as geothermal cooling and wind and hydroelectric power.

### Problem

According to a report from the United Nations University, it takes about 1.8 tons of chemicals, fossil fuels and water to produce a typical desktop computer -- and world-wide over one billion PCs have been sold. When it comes to green IT, at least three issues get in the way of doing the right thing.

#### 1. Misaligned incentives

The IT department calls the shots when it comes to managing computer networks, but it doesn't pay the electricity bills. When we work with companies to reduce their IT energy costs, the IT manager often meets the person who pays the utility bill for the very first time.

### 2. Competing priorities

An IT manager's job, first and foremost, is to keep computer networks up and running. Security threats, viruses, malware, hardware failures and software upgrades ensure that this job remains deeply challenging, and that all other initiatives take a distant back seat.

### 3. Lack of expertise

Energy efficiency is almost never a part of an IT professional's training. The time it takes to research energy-saving strategies, tools and techniques is often significant enough to serve as a barrier to action.

Hence the problem with "Green IT": The people we most need to act have the least to gain from doing so.

So what can you do? As a sustainability, Environmental Health & Safety or facility manager, you're probably accustomed to championing such initiatives, but in the case of green IT, you'll likely need more than charm and grit on your side.

### Objectives of the study :

In recent years focus of enterprises and technology firms has been shifted towards Green Computing rapidly. The goal of green computing is to attain economic viability and improve the way computing devices are used. Green computing practices include the development of environmentally sustainable production practices, energy efficient computers and improved disposal and recycling procedures.

### Current Trends on Green Computing :

Current trends of Green Computing are towards efficient utilization of resources. Energy is considered as the main resource and the carbon footprints are considered the major threads to environment. Therefore, the emphasis is to reduce the energy utilization & carbon footprints and increase the performance of Computing. There are several areas where researchers are putting lots of efforts to achieve desired results:

#### A. Energy Consumption

Organizations are realizing that the source and amount of their energy consumption



significantly contributes to Greenhouse Gas (GhG) emissions. In response to this finding, organizations are currently using the following equation:

*Reduced energy consumption = Reduced greenhouse gas emissions = Reduced operational costs for the data center*

It means adopting fewer and more energy efficient systems while refactoring application environments to make optimal use of physical resources is the best architectural model. According to Environmental Protection Agency in around 30% to 40% of personal computers are kept 'ON' after office hours and during the weekend and even around 90% of those computers are idle.

#### B. *E-Waste Recycling*

Based on the Gartner estimations over 133,000 PCs are discarded by U.S. homes and businesses every day and less than 10 percent of all electronics are currently recycled. Majority of countries around the world require electronic companies to finance and manage recycling programs for their products especially under-developed Countries. Green Computing must take the product life cycle into consideration; from production to operation to recycling. E-Waste is a manageable piece of the waste stream and recycling e-Waste is easy to adopt. Recycling computing equipment such as lead and mercury enables to replace equipment that otherwise would have been manufactured. The reuse of such equipments allows saving energy and reducing impact on environment, which can be due to electronic wastes .

#### C. *Data Center Consolidation & Optimization*

Currently much of the emphasis of Green Computing area is on Data Centers, as the Data Centers are known for their energy hunger and wasteful energy consumptions. United State Department of Energy (DoE) reported in its study in 2006 that United States data centers consumed 1.5% of all electricity and their demand is increasing by 12% per year and cost \$7.4 billion per year by 2011. According to DoE's current report in July 2011 Data Centers are consuming 3% of all US electricity and this consumption will double by 2015. With the purpose of reducing energy consumption in Data Centers it is worthwhile to

concentrate on following :

- **Information Systems** – efficient and right set information systems for business needs are a key in building Green Data Centers. As per green computing best practices efficient servers, storage devices, networking equipments and power supply selection play a key role in design of information systems.
- **Cooling Systems** – it is suggested by the researchers that at the initial stage of design process for data center cooling systems, it is significant to consider both current and future requirements and design the cooling system in such a way so it is expandable as needs for cooling dictates.
- **Standardized environment for equipment** is must for Data Center Air Management and Cooling System.
- **Consider initial and future loads**, when designing & selecting data center electrical system equipment.

#### D. *Virtualization*

One of the main trends of Green Computing is virtualization of computer resources. Abstraction of computer resources, such as the running two or more logical computer systems on one set of physical hardware is called virtualization. Virtualization is a trend of Green computing it offers virtualization software as well as management software for virtualized environments . One of the best ways to go towards green and save enough space, enough resources, and the environment is by streamlining efficiency with virtualization. This form of Green Computing will lead to Server consolidation and enhance computer security. Virtualization runs fewer systems at higher levels of utilization. Virtualization allows full utilization of computer resources and benefits in:

- Reduction of total amount of hardware;
- Power off Idle Virtual Server to save resources and energy; and
- Reduction in total space, air and rent requirements ultimately reduces the cost

#### E. *IT Products and eco-labeling*

Another approach to promote Green Computing and save environment is to introduce policies all around the World, so that,

companies design products to receive the eco-label. There are several organizations in the world which support eco-label. IT products. These organizations provide certificates to IT products based on factors including design for recycling, recycling system, noise energy consumption etc.

### Challenges

According to researchers in the past the focus was on computing efficiency and cost associated to IT equipments and infrastructure services were considered low cost and available. III. CHALLENGES IN GREEN COMPUTING According to researchers in the past the focus was on computing efficiency and cost associated to IT equipments and infrastructure services were considered low cost and available. Now infrastructure is becoming the bottleneck in IT environments and the reason for this shift is due to growing computing needs, energy cost and global warming. This shift is a great challenge for IT industry. Following are some of the Challenges that Green computing is facing today.

1. Return of Investment The major problem was educating the stakeholders regarding the environmental impact of computers. For a project that involves Greening, the returns are generally seen after a long period of time. Hence an important challenge in this project was to show immediate returns after the successful implementation of Green IT in the computer center.

2. New Optimization Techniques in Performance-Energy-Temperature aware Computing The exponential growth in computing activity and the rising concern for energy conservation have made energy efficiency in computers a technological issue of prime importance. The tradeoff between Performance-Energy-Temperature has to be made so that the maximum benefits can be achieved. Designing techniques that are optimal with respect to performance, energy, and temperature are of utmost requirement as far as green computing research challenges are concerned.

3. Disposal of Electronic Wastes Reliability about the use of green materials in computer is perhaps the biggest challenge

that the electronics industry is facing. Electronics giants are about to roll out eco-friendly range of computers that aim at reducing the e-waste in the environment. They are likely to be free of hazardous materials such as brominated flame-retardants, PVCs and heavy metals such as lead, cadmium and mercury, which are commonly used in computer manufacturing.

4. Perspective with respect to Indian Scenario In India, the implement-ability of principle of "Green Computing" is facing a dilemma due to many socio-economic matters and those are linked to be soured out to pull India in the mainstream movement of "Green Computing". Lack of basic research initiative and congenial infrastructure has resulted in absence of good patents and commercial production of indigenously built equipments.

5. Power Consuming Leaderships in the field are trying to find a generation of IC chips that have high efficiency and give higher performances without consuming too much power but this is not a simple process, it takes a huge effort, amount of a lot of time, and needs high levels of skilled engineers to reach and achieve this goal.

6. Increase in energy requirements Some people need or prefer to use high processors to achieve their tasks. However, these requirements need a great amount of power with the green computers with the same specifications considered extremely expensive virtualization, cloud computing, power management, Green manufacturing are the key initiatives towards Green computing.

### Future Trends

As discussed earlier the reason for shift is because of growth in computing needs, energy cost and global warming and this shift is great challenge for IT industry. The future of Green Computing is going to be based on efficiency, rather than reduction in consumption. The primarily focus of Green IT is in the organization's self interest in energy cost reduction, at Data Centers and at desktops, and the result of which is the corresponding reduction in carbon generation. The secondary focus of Green IT needs to focus beyond energy use in the Data Center and the focus should be on innovation and improving

alignment with overall corporate social responsibility efforts. This secondary focus will demand the development of Green Computing strategies. The idea of sustainability addresses the subject of business value creation while ensuring that long-term environmental resources are not impacted. There are few efforts, which all enterprises are supposed to take care of :

#### A. *Certifications*

There are several organizations providing certificates to green technology. Vendors are based on their product quality, material, life of the product and recycling capabilities. In future such certifications together with recommendations and government regulations will put more pressure on vendors to use green technology and reduce impact on environment.

#### B. *Cloud Computing*

Cloud Computing has recently received significant attention, as a promising approach for delivering Information and Communication Technology services by improving the utilization of Data Center resources. In principle, cloud computing is energy-efficient technology for ICT, provided that its potential for significant energy savings that have so far focused on only hardware aspects, can be fully explored with respect to system operation and networking aspects also. Cloud Computing results in better resource utilization, which is good for the sustainability movement for green technology.

#### E. *Leveraging Unused Computer Resource*

One of the exiting areas where Green Computing can grow is the share and use efficiently the unused resources on idle computers. Leveraging the unused computing power of modern machines to create an environmentally proficient substitute to traditional desktop computing is cost effective option. This makes it possible to reduce CO2 emissions by up to 15 tons per year per system and reduce electronic waste by up to 80%.

#### F. *Data Compression*

In enterprise, huge amount of data that is stored is somehow or other duplicated information. Information System backups are true example of such duplicated data. Intelligent compression techniques can be used to compress the data

and eliminate duplicates help in cutting the data storage requirements.

#### G. *Applications*

Green Computing is a diverse field and due to its nature and priority from all fields of life Green Computing has applications in every sector of computing as the goal is to save the environment and ultimately the life. The current main applications of Green Computing are covering following computing sectors :

- Equipment design;
- Equipment recycling;
- Data Center optimization and consolidation; Virtualization;
- Paper free environment;
- Application Architecture; and
- Power Management

#### **Findings & Conclusion:**

Green computing is not about going out and designing biodegradable packaging for products. Now the time has come to think about the efficient use of computers and the resources which are non renewable. It opens a new window for the new entrepreneur for harvesting with E-waste material and scrap computers. There is an alternative way to design a processor and a system such that we don't increase demands on the environment, but still provide an increased amount of processing capability to customers to satisfy their business needs. This research paper shows the importance, challenges and the need of Green computing. IT industry is putting efforts in all its sectors to achieve Green computing. Equipment recycling, reduction of paper usage, virtualization, cloud computing, power management, Green manufacturing are the key initiatives towards Green computing. The computing industry is more prepared and far more competent than almost any other industry when it comes to facing and responding to rapid change. Environmentally it is not a good thing that most PCs -- especially in companies -- have typically entered a landfill after only a few years in service. However, this reality does at least mean that a widespread mindset already exists for both adapting to and paying money for new computer hardware on a regular basis.

Hence, whereas it took decades to get more energy efficient cars on the roads, it will hopefully only take a matter of years to reach a state of affairs where most computers are using far less power than they needlessly waste today. Current challenges to achieve Green Computing are enormous and the impact is on computing performance. Efforts of Governments and Non-Government Organizations (NGOs) are also appreciate-able. Government regulations are pushing Vendors to act green; behave green; do green; go green;

think green; use green and no doubt to reduce energy consumptions as well. All these efforts are still in limited areas and currently efforts are mainly to reduce energy consumption, e-Waste but the future of Green Computing will be depending on efficiency and Green products. Future work in Green Computing discipline will also rely on research work in academics since this is an emerging discipline and there is much more need to be done. There is need for more research in this discipline especially within academic sector.

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