DIVERSITY AND ECOLOGY OF FRESHWATER FISHES IN SIDDHESHWAR RESERVOIR IN DISTRICT HINGOLI, MAHARASHTRA, INDIA

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Abstract

Diversity and Ecology of Freshwater Fishes in Siddheshwar reservoir shows relation between fishes with water temperature, pH and other parameters. The present study evaluated the ecology and diversity of fishes in different sites of Siddheshwar reservoir during January 2015 to December 2016. Total of 40 fish species belonging to 29 genera, 15 families, and 9 orders in Siddheshwar reservoir. The order Cypriniformes dominated with 18 species, followed by the orders Siluriformes (8), Channiformes(4), Preciformes(3), Clupeiformes and Mastcembeliformes (2) out of 52.5 percent of the species are least concern, 20 percent are not evaluated, 10 percent are near threatened, 5.00 percent are data deficient, 5.00 percent are lower risk near threatened and vulnerable, and 2.5 percent are lower risk least concern.

Keywords: *Diversity, Ecology, Freshwater Fishes, Parameters.*

Introduction

The study of biological diversity comprehends both the inherent and anthropogenic values and associated with it. Biological diversity is the base for maintaining the ecosystems and the functional aspects of the species that provide goods and services for human well-being. Fishes are important food resources and good indicators of the ecological health of the waters. Fish constitutes almost half of the total number of vertebrates in the world. Freshwater biodiversity constitutes a vitally important component of the planet, with a species richness that is relatively higher compared to both terrestrial and marine ecosystems (Gleick, P.H. 1996). Fresh water reservoirs built for this purpose are underutilized and do not have adequate water utility management.

Fish diversity has declined in recent years as a result of irrational fishing practices and environmental issues such as reduced water levels, dumping of solid wastes in water bodies, increased sedimentation, and water pollution. Few species of fish have been lost from India's freshwater ecosystem, and some are endemic, endangered, or threatened The diversity and abundance of fish fauna are represented by the ecosystem's ichthyofaunal diversity. Every water ecosystem with distinct abiotic features have direct effect on its diversity Water is the most significant and abundant compound of the environment. All living organisms on the earth require water for their survival and growth. Better quality of water Siddheshwar reservoir was built in 1968 on the Purna River, a tributary of the Godavari, near Rupur camp Tq, Aundha Nagnath, Dist, Hingoli, and close hamlet Siddheshwar Tq, Aundha Nagnath, Dist, Hingoli. The site is around 15 kilometres north-west of Hingoli. The reservoir is located between 19° 0' 20" north latitude and 76.57'30" east longitude.The ecology and diversity described by its physical, chemical and biological character many fish species have become critically endangered in freshwater settings where freshwater is in great demand. The reservoir not only provides water for drinking, agricultural operations, recreation, and sewage disposal, but it also sustains a significant fishery. It not only provides a nutritious food, but it also provides a source of income for the local or impoverished fishing population. As a result, knowledge of the fish species found in wetlands and other aquatic habitats is required for the development of both culture and capture fisheries. As a result of the combined and overlapping pressures of overexploitation, water pollution, flow modification, habitat destruction or degradation, and invasion by exotic species, freshwater fish diversity is altering and depleting at an alarming rate (Revenga et al., 2005). Freshwater fish are one of the mos threatened taxonomic groups (Darwall and Vie 2005) because of their high sensitivity to the quantitative and qualitative alteration of aquatic habits (Laffaille et al. 2005; Kang et al. 2009; Sarkar et al. 2008. The aim of this study was to assess the present status of fish diversity, ecology of the freshwater fishes in Siddheshwar reservoir shows relation between fishes with water temperature, pH and other parameters.

Materials and Methods

Study area

of fishes in different sites Siddheshwar reservoir during January 2015 to December 2016). Water samples will be collected from the fixed stations of various physicochemical parameters like water temperature, transparency and pH were recorded at the time of sample collection, by using thermometer and pocket digital pH meter.

Transparency was measured with the help of secchi disc. The water samples were immediately brought into laboratory for the estimation Fish study carried out by direct observation and engagement with local stakeholders, as well as internet search techniques, were used to acquire data on the quantity of various fish species, risks to the fish fauna, and economic relevance. The captured fish were preserved in 10% formalin and tagged according to their size. Standard keys created by (Hiware & Pawar, 2006; Jayaram, 1999; Jayaram, 2010; Talwar & Jhingran, 1991) were used to identify fish up to the species level (2015). Experts in the field of fish taxonomy validated the identification of the creatures. Day 1989, Jayaram, 1961; Nadel & Nelson, 1976 were used to classify the items (1976). The report of the Conservation, Assessment, and Management Plan (CAMP) workshop on freshwater fishes of India (Molur & Walker, 1998) and the IUC Red List Category of Threatened Species provided data on current conservation status of fish (IUCN, 2017)

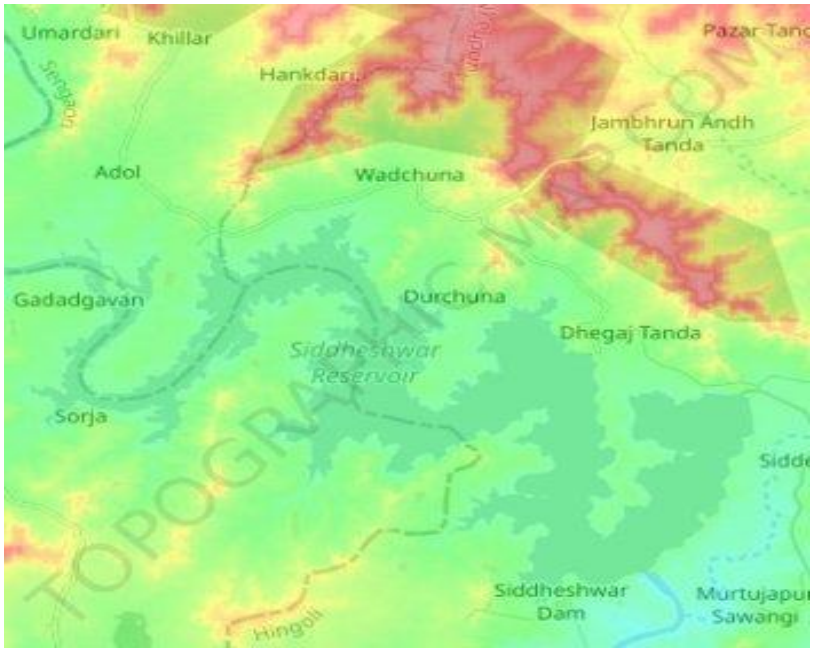

Figure1: Topographic map of Siddheshwar reservo

Results and Discussion

The health of reservoirs and their biological diversity that are directly related to health of almost all every component of the ecosystem (Ramesh *et al*., 2007). In freshwater bodies, the nutrients play a major role as their excesses lead to eutrophication. The physico-chemical characters of water is dependent on a variety of factors such as topography of an area, drainage pattern, types of vegetation, agricultural activities, industrial growth, urbanization etc.

The Siddheshwar reservoir water samples were analyze from three sampling stations for the period of two years (January 2015 to December 2016). The water temperature of reservoir ranged from 20 to 27 ^{0}C at all stations during both years. Minimum 20^{0}C temperature in the month of December and highest 27^{0}C in the month of May during the year 2015 at station first. .

During the present study mean turbidity ranged in Siddheshwar reservoir is 7.345 to 7.932 NTU at all stations from both years, lowest turbidity 3.0 NTU in the month of October during both years whereas Monitoring and assessment provide the very basic information on the condition of water bodies and which is the main first step that can lead to the management and conservation of aquatic ecosystems.

highest turbidity 13.21 NTU in the month of March in both years at all stations of reservoir.

Water transparency of Siddheshwar reservoir varied throughout the study period, the mean value of transparency ranged between 45.93- 48.69cm. Significant changes in pH it also occur due to disposal of drainages, seasonal variations done may be due to variation in the photosynthetic activity, which increases pH due to consumption of CO_2 in the photosynthetic process. In present study mean value range of pH from were recorded 7.9 to 7.96 at all stations during both years.

The maximum pH was (8.7) recorded in May (summer months) and minimum pH was (7.2) in October and November (winter months). The maximum dissolved oxygen was recorded (10.20mg/lit) in rainy season and minimum dissolved oxygen was recorded (5.2 mg/lit) summer

season at all stations of both years. Therefore, it was concluded that dissolved oxygen is maximum in monsoon season, moderate in winter season and minimum in summer season.

Out of 40 species, major percent (45.00%) of fish were lower risk near threatened according to CAMP, 1998 but from the remaining 20.00% are vulnerable and not evaluated respectively and 7.5% are endangered and lower risk least concern respectively. As per IUCN red list category

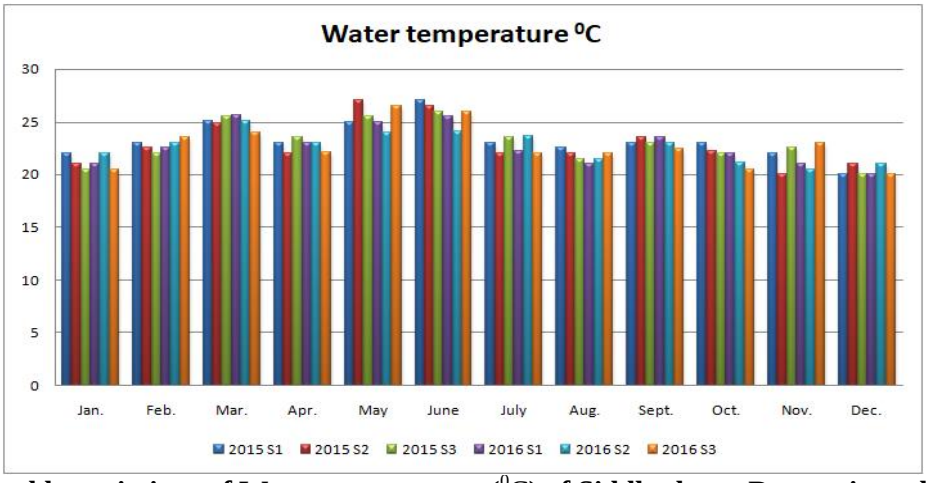

Figure 2.: Monthly variations of Water temperature (^{0}C) of Siddheshwar Reservoir at three sampling sites during the year January 2015 to December 2016

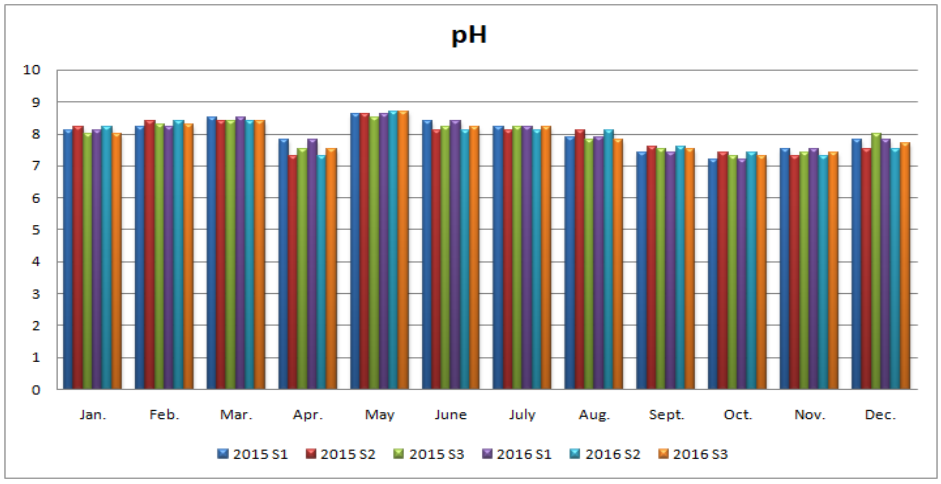

Figure 3.: Monthly variations of pH of Siddheshwar Reservoir at three sampling sites during the year January 2015 to December 2016

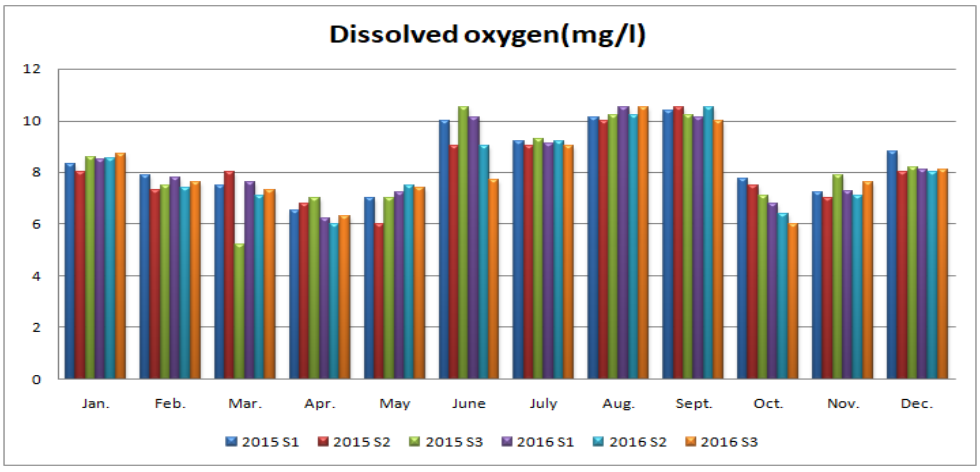

Figure 4.: Monthly variations of Dissolved oxygen (mg/lit) of Siddheshwar Reservoir at three sampling sites during the year January 2015 to December 2016

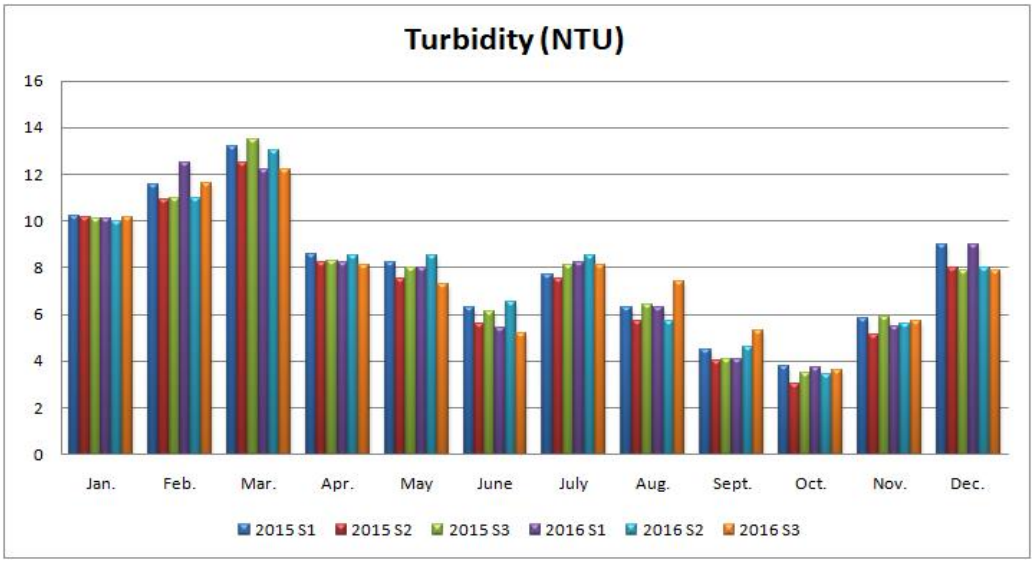

Figure 5.: Monthly variations of Turbidity (NTU**) of Siddheshwar Reservoir at three sampling sites during the year January 2015 to December 2016**

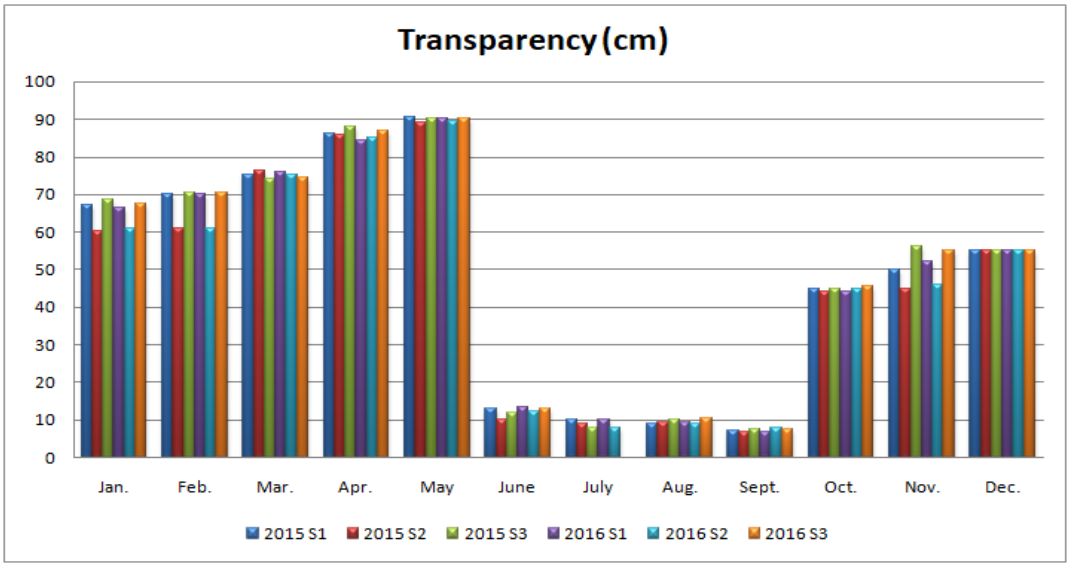

Figure 6.: Monthly variations of Transparency (cm**) of Siddheshwar Reservoir at three**

The ichthyofauna of Siddheshwar reservoir confirms the occurrence of 40 fish species belonging to 29 genera, 15 family to 9 orders. Out of 40 fish species order Cypriniformes was dominant with 18 (45.00%) species to be followed by order Siluriformes with 8 (20.00%) species, Channiformes with 4 (10.00%) species, Preciformes with 3 (7.5%) species while the orders of Osteoglossiformes and Mastcembeliformes each with 2 (5.00%) species, and rest of the orders, Angulliformes, Cyprnidontiformes and Mugiliformes each with 1 (2.5%) species Different types of fish fauna under threats of the Siddheshwar reservoir concern, habitat loss is the major threats causing severe damage to 50.00% of total species followed by pollution (40.00%), over fishing and trade (37.5%), over exploitation (17.5%), stable population (15.00%) and siltation (7.5%). A growing population and by increasingly intense land use in the reservoir led to rise in the polluting inputs, including industrial effluents, pesticides and fertilizers from aquaculture, agriculture and domestic sewage (Venot, J et.al. 2008). Intensive fishing of the species in the dry season should be strictly discouraged or totally prohibited (Mustapha 2010). Considerable efforts should be made for conserve the biodiversity of fish. In order to conserve the valuable biodiversity in fish fauna of Siddheshwar reservoir, that strategies should be adopted are to the restocking of economically important fish species,

Table 1: Number and percent composition of families, genera and species under various orders

Sr. No.	Order	Families	Genus	Species	% of families in an order	% of Genera in an order	% of Species in an order
1	Osteogossiformes	1	1	2	6.66	3.44	5.00
2	Angulliformes	1	1	1	6.66	3.44	2.5
3	Cypriniformes	2	15	18	13.33	51.72	45.00
4	Siluriformes	4	5	8	26.66	17.24	20.00
5	Cyprinodontiformes	1	1	1	6.66	3.44	2.5
6	Mugiliformes	1	1	1	6.66	3.44	2.5
7	Channiformes	1	1	4	6.66	3.44	10.00
8	Mastacembaliformes	1	1	2	6.66	3.44	5.00
9	Preciformes	3	3	3	20.00	10.34	7.5
Total		**15**	**29**	**40**			

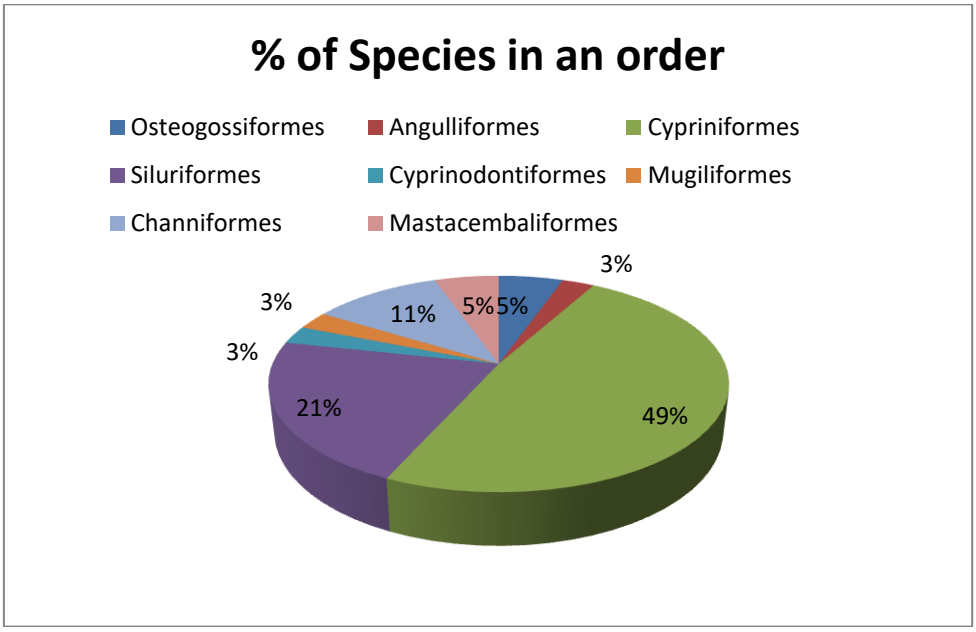

Figure7: Percentage (%) of Species in an Order

Table 2. Checklist of Ichthyofauna and Conservation status of Siddheshwar Reservoir during January 2015 to December 2016

Order/Family/Species		IUCN Status
Order	Osteoglossiformes	
Family	Notopteridae	
	1. *Notopterus notopterus*	LC
	2. *Notopterus chitala*	NT
Order	Angulliformes	
Family	Angullidae	
	3. Anguilla bengalensis	LC
Order	Cypriniformes	
Family	Cyprinidae	
	4. *Chela phulo*	NE
	5. *Chela sladoni*	LC
	6. *Cyprinus corpio*	NE
	7. *Catlacatla*	NE
	8. *Cirrhinusmrigala*	LC
	9. *Ambylpharyngodon microlepis*	LC
	10. *Labeo rohita*	LC
	11. *Labeo calbasu*	LRnt
	12. *Osteobrama cotio*	NE

	13. *Discohnathus lamta*	LC
	14. *Puntius saranasarana*	LC
	15. *Puntius sophere*	LC
	16. *Hypothalamichthys molitrex*	NT
	17. *Thynnichthys sandkhol*	DD
	18. *Ctenopharyngodon idella*	NE
	19. *Rasbora daniconius*	LC
Family	Cobitidae	
	20. *Lepidocephalichthys guntea*	LC
	21. *Nemacheilus botia*	LC
Order	Siluriformes	
Family	Bagridae	
	22. *Mystus aor*	LC
	23. *Mystus bleekeri*	LC
	24. *Mystus cavasius*	LC
	25. *Mystus seenghala*	LC
Family	Clariidae	
	26. *Clarias batrachus*	VU
Family	Heteropneustidae	
	27. *Heteropneustes fossils*	VU
Family	Siluridae	
	28. *Wallago attu*	NT
	29. *Ompak bimaculatus*	NT
Order	Cyprinodontiformes	
Family	Belonidae	
	30. *Xenentodon cancila*	LC
Order	Mugiliformes	
Family	Mugilidae	
	31. *Mugil cephalus*	LC
Order	Channiformes	
Family	Channidae	
	32. *Channa gaucha*	LC
	33. *Channa marulius*	LC
	34. *Channa striatus*	LRlc
	35. *Channa punctatus*	LRnt
Order	Mastacembaliformes	
Family	Mastacembelidae	
	36. *Mastacembelus armatus*	NE
	37. *Mastacembelus pancalus*	NE
Order	Preciformes	
Family	Anabantidae	
	38. *Anabas testudineus*	DD
Family	Gibiidae	
	39. *Glassogobius giuris*	LC
Family	Cichlidae	
	40. *Oreochromis mossambica*	NE
Threat Status :- LC- Least Concern, VU- Vulnerable, DD-Data deficient, NE- Not Evaluated, LRnt- Lower Risk near		

Conclusion

The present study shows relation between the physico-chemical changes affect the diversity and ecology of fish .The ecology and diversity of fishes in different sites of Siddheshwar reservoir being depleted fish faunal diversity is being harmed by excessive aquatic plant development, aquatic weeds, silt, predatory birds, and fishes should be controlled and eradicated.

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