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Zoology

FISH DIVERSITY OF THE GODAVARI RIVER FROM AHMEDNAGAR AND NASHIK DISTRICT (MS)

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ABSTRACT
The Gangapur dam located 36.59 m (120.0 ft) high altitude The volume content is 4,612 km (1,106 cu mi) and gross storage capacity is 215,880.00 km3 (51,792.37 cu mi).It is freshwater systems are among the habitats of aquatic biodiversity. The increasing needs in India for supplies of both fresh water and fish as a food source under the pressure of a rapidly growing population mandate identification of ways to conserve natural resources while meeting these human needs. Dams provide a partial solution for both water and food fish supplies, especially in monsoonal areas, although disruption of natural fish habitats may offset these benefits. To examine this phenomenon, the Godavari River basin in Ahmednagar and Nashik District was sampled at 6sites. There are about 16 fish species that were classified into 8 orders and 9 families. Cypridae dominated the fauna. Few introduced and cultured species were widely distributed in the river. Some native species were barely captured, suggesting they might be at risk of loss.

INTRODUCTION:-

The Gangapur dam, nandurmadhameshwar and Jaykwadi dam (Pravarasangam) are constructed on River Godavari, has ecological costs. As a result of activities in river catchments, many aquatic species have become highly endangered through diminishing of natural habitats Dams may also act as barriers that control migration of fish between populations in otherwise linked river segments and affect recolonizations after local extinction events. Consequently, aquatic species are bioindicators for impacts of changes in water quality, river network connectivity and flow regimes. Fish communities and species can also be excellent indicators of biological and ecological integrity because of their continuous exposure to changing water conditions. Fish display a wide array of biotic responses such as changes in growth, distribution and abundance in relation to water pollution, habitat degradation, eutrophication, organic enrichment, chemical toxicity, thermal changes and food availability.

Today, the assessment of fish diversity in relation to habitat management is a great challenge. Conservation measures intended to mitigate the impact of these pressures have largely been slow and inadequate, and as a result, many species are declining rapidly for Conservation of Nature in India, almost 95% of freshwater fish diversity is confined to seven major river basins. One of these is Godavari River basin, the second largest river system in India. The Godavari River basin extends over an area of 312 812 km2. It originates in the Western Ghats at Trimbakeshwar, in the Nashik District of Maharashtra, and flows eastwardly over 1465 km across the Deccan Plateau through the state of Maharashtra.

Study was aimed at documenting the fish fauna of the Gadavari River basin from Ahmednagar and Nasik District. This area has been relatively neglected on a river basin scale, and the few studies available (confined to certain regions) in the Godavari have been largely lacking standard methodological protocols.

METHODS

The study area the study was conducted over the Godavari River basin inAhmednagar and Nasik District which lies between latitude 16°16′0″N and 23°43′N and between longitude 73°26′E and 83°07′E.the climate of the region is mainly tropical with a well-defined rainy season between June and October, a mild winter between December and February, and a relatively dry premonsoon summer between March and May.

SAMPLING

The entire Godavari River basin was included for fish sampling, and 6sampling stations were selected to include representatives of many types of ecological regions from both the main river and its tributaries. Out of 6 sampling stations, 4 were from Nashik District and 2 from Ahmednagar District .The sampling stations located on the main river stretch comprise pre-dam regions, dam regions and post dam regions.

On the tributaries, the sampling stations were located at the upper stretch, middle stretch and lower stretches. Fish sampling was conducted over a period of 2 years (January 2018–December 2019). Three types of traditional fishing nets were used: gill, drag and cast nets with variable mesh size and dimensions. The sampling was carried out for 2 hrs for a particular sampling station over an area of 300 – 400 m at each site.Cast nets were used to fish in the shallow and uneven sites. Sampling was carried out across various seasonal, regional and day/night scales as detailed. For the study, a 'sample' is defined as the collection made at a particular habitat using a particular sampling tool (cast nets, gillnets or dragnets). For every station, a species accumulation curve was obtained for standardizing sampling efforts and deciding on successive cycles to ensure thorough sampling.

For morphological study, specimens were collected and preserved in 4% formaldehyde solution. Fish identification was based on the keys for fishes of the Indian subcontinent ([12]Talwar and Jhingran, 1991; Talwar and Jhingran, 1992; Jayaram, 1999; Nelson, 2006).

Database and statistical analyses a database of all individuals, theirmorphology attributes and sampling details was constructed in the data management and statistical analysis. The homogenization effect of cultured species, a similar matrix was calculated excluding most distributed cultured species (Labeorohita, Cirrhinuscirrhosus, Catlacatla and Cyprinus carpio) and similarly analysed. On the basis of the matrix of pairwise similarity indices of all species, clustering analysis by principal component analysis was carried out.

RESULTS:-

Fish diversity More than 500fish were sampled from 6 sampling stations, 4stations represent the main Godavari River, and 2 stations are from Gangapur Dam,Nandurmadhameshwar and Jaykwadi (Pravarasangam Back water)Two hundred and fourteen fish species were taxonomically identified representing 8 orders, 9 families and 15 genera. The table includes information on hierarchical taxonomy of each species, number of individuals captured, number of sites found in, native/introduced status and cultured/noncultured status. Few analyses were carried out to test the reliability and comprehensiveness of the data. The Gangapur and Nasik sampling sites are located at the on Godavari River in District Nasik. WhereasKopargaon and Pravara Sangam is located in Ahmednagar District.16species were found in this area. Indicates the reliability and thoroughness of the sampling procedures. This is also supported by the curve of the Chao 1 estimator of species richness, which coincides with the actual accumulated richness curve and gradually flattens. Further analysis showed that more fish and species wereoverall, 47% of the fish were sampled in the rainy season compared with only 18% in the summer. These proportions varied among sites because of water availability and sample efforts. These analyses suggest our dataset is reliable and the most comprehensive thus far to describe the fish diversity in a major Indian freshwater system. Seventy percent of our samplings belong to

three orders, namely, Cypriniformes, Perciformes and Siluriformes with the Cyprinidae as a dominant family comprising 50% (1000) of the individuals and 40% (20) of the species. The most abundant cyprinid species were Salmophasianovacula, Puntius ticto, Osteobramavigorsii, Thynnichthyssandkhol, C. catla, C. carpio and Rasbora daniconius. Cypriniformes were widely distributed and were found in all 4 sampling sites Among the 10 abundant species represented by 200 or more individuals almost half were Cypriniforms and each of these species was distributed in 15 sites or more. Siluriformes were found in 29 sampling sites, and the most abundant species of this order were Sperataaor, Sperataseenghala and Ompokbimaculatus. Among the Perciformes, Chanda nama, Channamarulia, Channa striata and Oreochromis mossambicus were the most abundant species and the distribution of the order encompassed 6 sampling sites.

Sr. No	Order	Family	Genus	Species	Locality
1	Cypriniforme	Cyprinidae	Puntius	Puntius ticto Puntius fraseri	Gangapur
			Labeo	Labeocalbasu	Trimbaleshwar
			Salmophasia	Salmophasia novacula	Pravarasangam
			Ctenopharyngodon	Ctenopharyngodonidella	Nandurmadhameshwar
		Balitoridae	Acanthocobitis	Acanthocobitisbotia	Kopargaon
		Cobitidae	Lepidocephalichthys	Lepidocephalichthysguntea	Gangapur
		Sisoridae	Erethistes	Erethistes hara	Trimbaleshwar
		Ariidae	Nemapteryx	Nemapteryx caelata	Nashik
2	Clupeiformes	Clupeidae	Tenualosa	Tenualosailisha	Nandurmadhameshwar
3	Mugiliformes	Mugilidae	Rhinomugil	Rhinomugil corsula	Kopargaon
4	Osteoglossiformes	Notopteridae	Notopterus	Notopterusnotopterus	Gangapur
5	Synbranchiformes	Mastacembelidae	Macrognathus	Macrognathuspancalus	Pravarasangam
6	Beloniformes	Belonidae	Xenentodon	Xenentodon cancila	Toka
7	Anguilliformes	Anguillidae	Anguilla	Anguilla bengalensis bengalensis	nandurmadhmeshwar
8	Gonorhynchiformes	Chanidae	Chanos	Chanoschanos	Kopargaon

Composition appears to be unique and hence not included for analyses that are focusing only for freshwater sites. We have further identified 10 native species that were represented by five or fewer individuals with a limited distribution. Nine of them were marine/brackish water species limited to Yanum. One example of this is the species Labeopotail, which is a critically endangered species according to the International Union for Conservation of Nature red list of threatened species. This indicates that the limited abundance and distribution of all 19 of these species should raise concerns for conservation efforts and warrants further assessment of their vulnerability. In the same way, conservation attention should be given to additional nine species that, although found with higher numbers of individuals, were also limited in distribution to single sites.

DISCUSSION:-

Although the literature on freshwater fishes (Family Cypridae) is abundant in western region of Narmada River. ([7]Faisal Ahmed and Shailendra,2019) In most cases, these studies are also restricted to a few sampling regions and address questions only related to conservation. A thorough assessment of an ecological system is mostly lacking from regions such as Southeast Asia ([14]Kottelat, 1984; Welcomme, 1995). Also, freshwater ecosystems are known to be sensitive to environmental changes, and in many cases, such habitats have been disturbed and exploited by direct and indirect human activities ([3]Sala et al., 2000; Casal, 2006; Dudgeon et al., 2006;

Nguyen and De Silva, 2006; Here, we studied the Godavari River basin and presented comprehensively, for the first time, the status of fish diversity and possible factors that affected the distribution of fish species in parts as an example of large monsoonal river system from Asia. As with other tropical rivers ([1&2]Bhat, 2003, 2004) the Godavari River has diverse fish fauna comprising 114 fish species representing 38 families and 12 orders and 77 genera. Most of the fish belong to the order Cypriniformes followed by the orders Perciformes and Siluriformes. Thus, the species composition in the Godavari River (particularly the Cyprinids) resembles that of other rivers in South Asia (Arunachalam, 2000; Bhat, 2003; ([5]De Silva et al., 2007; Raghavan et al., 2008b; Raghavan et al., 2008a; Kang et al., 2009) indicating the relevance of comparing data from this study to other river systems of the region. The areas with high species richness include the river delta site (Yanum) that was inhabited by fish from both the sea and the river's mouth. This includes anadromous, brackish water and marine fish species that were not found in the freshwater parts of the basin.

([8]RV Patil,2018) Nandurmadhameshwar dam is a rich source of fish diversity,with 24 species,21 genra,12 families,and 7 order,The fish papulation of Cyprinidae is 39 % papulation.

([11&12]Jhingran, 1992; Sugunan, 1995, 2000), and this could be a reason that the species-rich sites were more homogeneous in their species composition compared with species-poor sites. This observation is consistent with the previous observations ([10]Poff et al., 2007; Vileger et al., 2011) in regards to impacts of dams on homogenization of fish assemblages. Taken together, in this study, we identified a dual role for dams concerning fish diversity. On the one hand, dams contribute to the fragmentary nature of the water system; while on the other hand, their backwaters are home to the richest levels of fish diversity. While the fragmentation and homogenization effects of dams have been recorded in all parts of the world, their role in sustaining the fish diversity is less understood and needs to be further evaluated in other rivers. It may be logical to assume that dams play an important role in sustaining fish diversity in river systems with large fluctuations in water flow and quality such as monsoonal river systems, because the large reservoirs behind such dams act as buffers by providing a more stable habitat throughout the year. In conclusion, as there has been no previous comprehensive study of fish diversity of the river Godavari including parts of the whole river and for particular dam sites, this study can serve as a reference for future investigations involving this river. Similarly, previously, it has been difficult to draw correlations with potential effects of river alterations and the loss of natural diversity in this system. However, given the reality that in monsoonal areas, all major river systems are fragmented by dams or other types of flow disruptions that produce reservoirs; the implications of these man-made barriers on fish biodiversity should be carefully considered for the sake of future conservation. Here, we have shown that 95% of the freshwater fish species from the whole system could be found at only four dam sites, and these could become the most attractive places to focus efforts to conserve fish biodiversity.

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