

Fish Biodiversity – A Case of River Narmada in Central India

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Abstract: Studies on fish biodiversity are important for planning remedial measures for conservation of our rich aquatic biodiversity resources. The variability in life is largely governed by the genes they contain and the environment in which they live. Thus more than 99% of all species amounting to over five billion species that ever lived on earth are estimated to be extinct. Estimates on the number of earth's current species range from 10 million to 14 million of which about 1.2 million have been documented and over 86% have not yet been described. Unlike past mass extinctions, caused by events like asteroid strikes, volcanic eruptions, and natural climate shifts, the current crisis is almost entirely caused by us **humans**. In fact, 99 percent of currently threatened species are at risk from human activities, primarily those driving habitat loss, introduction of exotic species, global warming, Construction of dams and over fishing activities. Increasing demand for water, the damming of rivers throughout the world, the dumping and accumulation of various pollutants, and invasive species make aquatic ecosystems some of the most threatened on the planet, thus it is not surprising that there are many fish species that are endangered in both freshwater and marine habitats.

Key Words: Diversity, Species, River Narmada, Aquatic, Water, exotic, Human, extinction, Ecosystem.

Introduction: A river is a natural flowing water course, usually fresh water, flowing towards an ocean, sea, lake or another river. In some cases a river flows into the ground and becomes dry at the end of its course without reaching another body of water. Rivers are part of the hydrological cycle. Water generally collects in a river from precipitation through a drainage basin from surface runoff and other sources such as ground water recharge, springs and the release of stored water in ice and glaciers. The characteristics of the river, or rivers, within the total basin system are related to a number of features. These features include the size, form and geological characteristics of the basin and the climatic conditions which determine the quantities of water to be drained by the river network. Rivers have always been the most important fresh water resources. Biodiversity is a contraction of biological diversity. It reflects the number, variety and variability of living organisms and how these change from one location to another and over time. It includes diversity within species (genetic diversity) between species (species diversity) and between ecosystems (ecosystem diversity). It's frightening but true: Our planet is now in the midst of its sixth mass extinction of plants and animals, the sixth wave of extinctions in the past half-billion years. We're currently experiencing the worst spate of species die-offs. Although extinction is a natural phenomenon, it occurs at a natural "background" rate of about one to five species per year. Scientists estimate we are now losing species at 1,000 to 10,000 times the background rate, with literally dozens going extinct every day. It could be a scary future indeed, with as many as 30 to 50 percent of all species possibly heading toward extinction by mid-century. Biodiversity is essential to the health of natural systems. Thus conserving biological diversity is essential for protecting life on this planet. It becomes even more important to know about the fact that the current anthropogenic destruction of biodiversity is dangerous. Hence, conservation must be analyzed both scientifically and morally.

Keeping this in mind, a comparative study on Fish Biodiversity and its periodic reduction was done during 2013-2014. Diversity is commonly used to describe the number, variety and variability of living organisms.

Material and Methods:**Study area:**

Narmada is the largest west flowing river of India and one of the 13 prominent rivers of India, originates from a small tank called Narmada kund located at Amarkantak town in Maikal hill ranges from eastern part of Madhya Pradesh forms a traditional boundary between North India and South India over a length of 1,312 Km before draining through the gulf of Cambey (Khambat) into the Arabian Sea. The tributaries of River Narmada are of great importance in Central India as they provide an important source of water, irrigation and other resource based activities. When river Narmada emerges from the Marble Rocks it enters into its first fertile basin. This basin extends about 320 km with an average width of 35 km in the south. The northern part of the valley is the Barna-Bareli plain, where the Barna River flows.

The aim of this research was to determine the fish biodiversity loss of River Narmada in Central India. During the present study five sampling stations were chosen for sampling in the central zone of M.P.

Sampling stations:**(A) Indra Sagar Dam (S1)**

Indra Sagar Dam is 10km away from Punasa village in Khandwa district of western Madhya Pradesh. It is 653 m long concrete gravity dam with a slightly curved alignment. It is about 92 m high from the deepest foundation level. Its catchment area is 61542 sq. kms.

Its longitude is 76°28'00'' and latitude 22°17'00''.

(B) Omkareshwar (S2)

Omkareshwar is a famous place of pilgrimage situated 77 km from Indore in Khandwa District, Madhya Pradesh. This station has a religious importance and is visited by pilgrims from all over the country to seek blessing at the temple of Shri Omkar Mandhata.

Its Latitude 22°15, 1''N and Longitude 76°8', 48''E.

(C) Maheshwar (S3)

Maheshwar is a small town in Khargone district of Madhya Pradesh state in central India. It is located 91 km away from Indore, the commercial capital of the state. The town lies on the north bank of the Narmada River.

Its latitude 22°10', 60''N and longitude 75°34' 60''E.

Fish Collection and Identification:

In the present study fishes were collected from all sampling stations of the river stretch under study during winter, summer, monsoon and post monsoon seasons. Fishing was done at every sampling stations seasonally by using different types of nets having mesh size of 10,20,30,40,50,60,70,80,90 and 100 mm and area size of the nets (gill net, cast net) was 36 sq. ft. the strategy used for fishing was same as was used by the local fishermen of the area under study.

At least 10 fishing efforts were made at every station seasonally and the catch was then weighed by a balancer and was noted down at every station. Further the collected fishes catch was identified by using standard identifying keys of Jayaram (1999), Qureshi and Qureshi (1983) and Shrivastava (1998). The collected fishes were sorted species-wise and the numbers of individuals for each species were counted and then their percent composition was determined.

Results:**Present scenario of Fishdiversity of River Narmada:**

During the present study, a total **37 species** of fishes belonging to **1 Kingdom, 1 Phylum, 3 Classes, 5 Orders, 11 Families, and 24 Genera** were recorded from Shahganj to Holipur a 30 km river stretch in the Hoshagabad district of Madhya Pradesh. The fish species recorded are Amblypharyngodon, Anabas testudineus, Barilius bendelisis, Barilius barila, Chanda nama, Chanda ranga, Channa marulius, Chela

labuca, Cirrhinusmrigala, Clarias batrachus, Colisafasciata, Danio devario, Labeo bata, Labeocalbasu, Labeofimbriatus, Labeogonius, Mastacembeluspancalus, Mystusaor, Mystusbleekeri, Mystusseenghala, Nandus nandus, Nemacheilusbotia, Osteobramacotio, Oxygasterbacaila, Oxygasterclupeoides, Oxygastergora, Puntius amphibius, Puntius chrysopoma, Puntius conchonium, Puntius sarana, Puntius sophore, Puntius titius, Rasbora daniconius, Rita rita, Tor tor, Wallago attu and Xenentodoncancila respectively.

Table 1: classification of Fish species recorded during the study:

Kingdom	Phylum	Class	Order	Family	Gene	Species
Animalia	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Amblypharyngodon	mola
					Barilius	bendelisis barila
					Chela	labuca
					Cirrhinus	mrigala
					Danio	devario
					Labeo	bata
						calbasu
						fimbriatus
						gonius
					Osteobrama	cotio
					Oxygaster	bacaila
						clupeoides
						gora
					Puntius	amphibius
						chrysopoma
			conchonium			
			sarana			
			sophore			
			titius			
			Rasbora	daniconius		
			Tor	tor		
			Nemacheilidae	Nemacheilus	botia	
Perciformis	Anabantidae	Anabas	testudineus			
		Chanda	nama			
		Parambassis	chandaranga			
	Channidae	Channa	marulius			

			Nandidae	Nandus	nandus
			Clarridae	Clarias	batrachus
		Siluriformis	Bagridae	Mystus	aor
				Rita	rita
			Siluridae	Wallago	attu
		Synbranchef ormis	Mastacembel idae	Mastacembelu s	pancalus
		Beloniformis	Belonidae	Xenentodon	cancila
	Osteocthy es	*Perciformis	Anabantidae	Colisa	fasciata
	Teleosto mi	*Siluriformis	*Bagridae	*Mystus	seenghala

* indicates repeated ones.

Discussion:

Assessment of fish species diversity, abundance and distribution of established populations, provides indicative information of environmental impacts upon aquatic ecosystems. Hence an attempt has been made to determine the Fish Biodiversity and its periodic reduction – A Case of River Narmada in Central India. Karamchandani et al. 1967 while estimating fish diversity of river Narmada in central India and found that 17 fish species gets reduced from the river and these reducing fish species were Bariliusvarga, Cirrhinuslatia, Labeocalbasu, Labeopangusia, Oxygasterbacaila, Puntius stigma, Noemacheilusheiheilusbeavani, Ompokpabda, Mystustengara, Rita rita, Siloniasilondia, Channa striatus, Anabas testudineus, Colisafasciata, Oxygastergora, Hypopthalmichthysmolitris andCyprnuscario. Whereas another study was carried out in the same region by Vyas et al. in 2006 and found that 47 fish species gets reduced from the river and these reduced fish species are Hilsa ilisha, Gonialosamanmina, Bariliusvarga, Bariliusevezardi, Bariliusradiolatus, Catlacatla, Crossocheiluslatiuslatius, Cirrhinuslatia, Cirrhinusreba, Danio aequipinnatus, Danio rerio, Exomusdanricus, Parapsilorhynchustentaculatus, Garragotyla, Garralamta, Garramullya, Labeorohita, Labeoboggut, Labeopangusia, Labeodyocheilus, Puntius goganio, Puntius ambassis, Puntius pinnauratus, Puntius dorsalis, Puntius stigma, Puntius titius, Oreichthyscosuatis, Tor khudree, Tor putitora, Noemacheilusdavi, Noemacheilusevezardi, Noemacheilusheiheilusbeavani, Ompokpabda, Mystuscavasius, Mystusvittatus, Rita pavementata, Amblycepsmangois, Gagataitchkea, Glyptothoraxlonah, Glyptothoraxribeiroi, Laguviaribeiroi, Siloniasilondia, Channa punctatus, Badisbadis, Anguilla bengalensis, Hypopthalmichthysmolitris andCyprnuscario. The present study was also carried out in river Narmada in the year 2015. It was observed in this piece of study that there is a periodic reduction of fish species in the river to a great extent and in this piece of study 56 fish species gets reduced and these reducing species are Hilsa ilisha, Gonialosamanmina, Notopterusnotopterus, Bariliusvarga, Bariliusevezardi, Bariliusradiolatus, Catlacatla, Crossocheiluslatiuslatius, Cirrhinuslatia, Cirrhinusreba, Danio aequipinnatus, Danio rerio, Exomusdanricus, Parapsilorhynchustentaculatus, Garragotyla, Garralamta, Garramullya, Labeorohita, Labeoboggut, Labeopangusia, Labeodyocheilus, Puntius goganio, Puntius ambassis, Puntius pinnauratus, Puntius dorsalis, Puntius stigma, Oreichthyscosuatis, Tor khudree, Tor putitora, Lepidocephalichthysguntea, Noemacheilusdayi, Noemacheilusevezardi, Noemacheilusheiheilusbeavani, Ompokbimaculatus, Ompokpabda, Mystuscavasius, Mystustengara, Mystusvittatus, Rita pavementata, Amblycepsmangois, Gagataitchkea, Glyptothoraxlonah, Glyptothoraxribeiroi, Laguviaribeiroi, Clupisomagarua, Siloniasilondia, Heteropneustesfissilis, Channa gachua, Channa punctatus, Channa

striatus, Badisbadis, Glossogobiusgiaris, Mastacembilusarmatus, Anguilla bengalensis, Hypophthalmichthysmolitris and Cyprinuscarpio.

Conclusion:

Throughout the world, fisheries sector provides the basis for the livelihoods and nutrition of millions of people, and constitutes a significant source of income. Despite its considerable contributions to development, however, it is often not seen as a priority sector by policy makers or donor agencies, and all related activities are frequently seen as relatively low priority. This lack of attention to the fish diversity and production is problematic and fishes are currently being fished at capacity to take them to the complete exhaustion. There is, therefore, an important role for governments to play, both in managing fish stock to prevent its further depletion, and in regulating the development of fish production and diversity to ensure that it is both environmentally sustainable and pro-poor. The main aim behind this piece of research work was to determine the Fish Biodiversity and its periodic reduction – A Case of River Narmada in Central India. During this study it has been found that the diversity of fish species is reducing at an alarming rate. In the past less than 50 years a total of 56 species of fishes gets reduced in the river Narmada in Central India. The aquatic ecosystems are subjected to a variety of stresses due to varied land use patterns and water resources development processes. The ecological changes following the construction of dams on the river or its tributaries may be determined since it may restrict the fish migration and impeding their accessibility to breeding, nursery and feeding grounds thus leads to the loss of fish diversity besides, fishing activity was found common in the river Narmada. Thus the most widespread approaches to management involve some control of fishing activities. This takes two main forms, the banning of certain types of fishing methods as poisoning of water body and the restriction on using small mesh size nets further commercial exploitation of river bed for extraction of stones/pebbles should not be allowed in order to preserve the breeding grounds and food web of the fishery. Catch control measures must be applied in the river so as to enhance species diversity and to promote fisheries sustainably.

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