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# FISH DIVERSITY AND POPULATION IN GARHA DAM, MAUGANJ, REWA (M.P.)

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***ABSTRACT:*** - The Fish diversity is a good indicator of health of aquatic ecosystem. A good piscine diversity represents the balanced ecosystem. Taking this into consideration the fish diversity of Garha dam Mauganj is studied during present investigation. In all 22 species of fishes belonging to 16 genera, 9 families and 5 orders were identified from Garha dam. They are *Notopterus notopterus* under Osteoglossiformes, *Catla catla, Cirrhinus mrigala, C. reba, Cyprinus carpio, Labeo bata, L. calbasu, L. rohita, , Puntius amphibious, P. ticto,* and *Nemacheilus botia* under Cypriniformes, *Mystus cavasius, M. seenghala, Ompok bimaculatus, Wallago attu, Clarias batrachus,* and *Heteropneustes fossilis* under Siluriformes, *Mastacembelus armatus* under Synbranchiformes, *Nandus nandus, ,*and *Channa marulius, C. punctatus* and *Anabas testudineus* under Perciformes. The high production of 422.62 t (2003-2004) and 308.82 t (2004-2005) were achieved. In the present study highest productivity of fish in Garha dam was recorded 9.71 Kg./Ha./Year during the year 2004-05; while lowest productivity of fish recorded 2.16 Kg./Ha./Year during the year 2006-07. Rapid deforestation, sewage discharge, mining activities, thermal activities, anthropogenic activities and irrational fishing practices over the year, this aquatic diversity is on the way of decline. It is necessary to protect biodiversity in their natural habitat.

**KEYWORDS:** Fish Diversity, Population, Conservation Status, Species, Garha Dam.

## INTRODUCTION

In a developing economy context, open water inland fisheries not only plays an important role for the diet and health of the population, but also the livelihood of many people engaged in this activity. Broadly, the open water inland fisheries can be divided into five categories, namely, riverine fisheries, reservoirs, aquaculture water bodies, estuaries, and flood plain lakes. The fishing practices also vary in these ecosystems. Usually, riverine fisheries are based on capture activities where regeneration of fish is left to the nature. The large and medium reservoirs are generally managed as stocking-cum-capture fisheries resources, whereas, small reservoirs and aquaculture water bodies are usually managed through culture practices. Estuaries are based on capture fisheries and flood plain lakes have both the components of culture as well as stocking-cum-capture fisheries.

India is one of the countries in the South Asia that has a large share of open water with rich and complex fisheries. She has around 340 million hectares of riverine catchments for fisheries; another six million hectors area is under open water fisheries in different reservoir, aquaculture in small ponds, estuaries and flood plain system. Over the last fifty years, the extent and share of inland fisheries in total fish production has increased by many folds. Despite the significant increase in inland fish production, it seems impossible to meet the projected demand of 14 million tons by the year 2005, more than twice the amount of current production (Bhattacharya, 2002). Inland fisheries need specific attention in the context of India due to the following reasons. First, fish production through inland fisheries largely caters the needs of the domestic consumption as against marine fisheries, which is primarily produced for export. An estimate of resource potential by the fisheries division of Ministry of Agriculture, Government of India, suggests that inland sector has a potential of 4.5 million tones as against 3.9 million tons of marine sector (fisheries Statistics, 1993). Therefore, an increase in the production of inland fisheries would bridge the gap between domestic supply and demand while catering to the nutritional requirements of the populace. Second, inland fisheries are an important source of employment. There are about 2 million people in India engaged full time in fishing and another 4 million people as part-time or occasional fisherwomen or men (Fisheries Statistics, 1993). A third dimension relating to open water inland fisheries is that the relative importance of inland capture fisheries is declining with a corresponding increase in the culture fisheries. Government policies are partly responsible for such trend. Fourth, India has a vast potential of open water fisheries, which with proper institutional, technical and financial support could contribute to the fulfillment of multiple developmental goals. The learning process of institutional arrangements and requirements for open water fisheries would provide substantive understanding on the management of this sector, which is for a long time, has been neglected.

The procedure adopted for the fish Fish are the most species –rich of all vertebrates. Valid scientific

description exists for about 24600 living species of fishes in 482 families (Nelson 1994). One third of the fish families have at least one member spending at least part of their life in fresh water. Fresh water fish diversity is therefore large compared to other system since fresh water lakes and rivers account for only 0.8% of earth's surface and less than 0.01% of its water. Approximately 10100 species are fresh water during their life cycles (Helfman et al., 1997).

The 1996 IUCN Red list of threatened animals lists 617 freshwater fishes (Including euryhaline salinity-level tolerant-species), about 7% of known number of fresh water fish species. Studies that take into account of fact that the red list has evaluated only a fraction of freshwater fishes estimate conservatively that 29% of fresh water fishes are extinct, endangered or vulnerable; a more realistic estimate might reach 30-35% (Stiassny, 1996) production study in the reservoir was in accordance with methodology on reservoir fisheries investigation in India (Jhingran V.G. 1969) and APHA (1985).

Present study conducted Garha dam. Garha dam is a major anthropogenic dam in Mauganj. Garha Dam is an anthropogenic construction on the confluence of two small nallahas Garha and Atari on the right hand side of N.H.7 in Mauganj tahsil of Rewa district at 24 $^{0}$39' 30" N and 81$^{0}$'55'30"S.

## MATERIALS AND METHODS

The present investigation on fish diversity is carried out on the Garha Dam Mauganj from Jan 2011 to Dec 2011. The Garha dam is very big water dam. The fishes from the dam were collected with the help of local fishermen. The collected fishes were brought to laboratory, fixed in 5% formalin, cleaned with rectified spirit and preserved in 10 % formalin. The fishes were identified by standard keys of Day (1878), Jayram (1981), Talwar and Jhingaran (1991) and Jhingaran (2005).

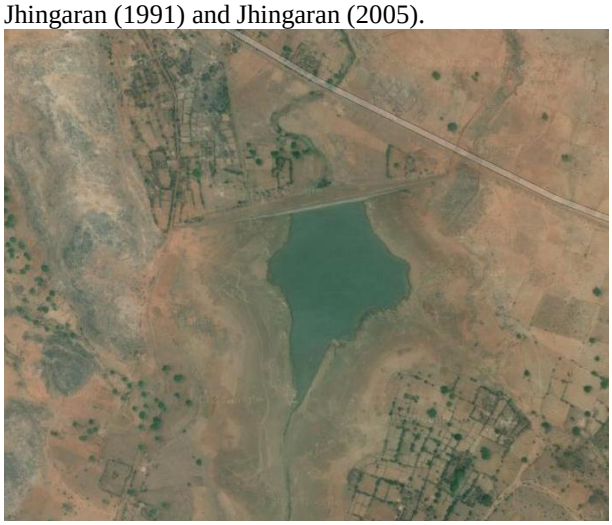

**Fig. 1. A Location Map of study site Garha Dam**

## RESULTS AND DISCUSSION

### Species composition of Garha Dam

In all 22 species of fishes belonging to 16 genera, 9 families and 5 orders were identified from Garha dam. They are *Notopterus notopterus* under Osteoglossiformes, *Catla catla, Cirrhinus mrigala, C. reba, Cyprinus carpio, Labeo bata, L. calbasu, L. rohita, , Puntius amphibious, P. ticto,* and *Nemacheilus botia* under Cypriniformes, *Mystus cavasius, M. seenghala, Ompok bimaculatus, Wallago attu, Clarias batrachus,* and *Heteropneustes fossilis* under Siluriformes, *Mastacembelus armatus* under Synbranchiformes, *Nandus nandus,* ,and *Channa marulius, C. punctatus* and *Anabas testudineus* under Perciformes. A systematic list of fishes observed from the dam has been tabulated in Table 1.1.

As far as the genera and families to different orders are concerned, order Cypriniformes consists of 6 genera (37.50%) under one families (10%), Siluriformes of 6 genera (26.09%) under 4 families (40%), Perciformes of 3 genera (18.75%) under 3 families (30%), Osteoglossiformes, Synbranchiformes and Synbranchiformes of single genus (6.25%) under single family each (10%) (Table 1.2). Order Cypriniformes has been found to be a major order with 10 species and percent contribution of 45.45%. Siluriformes comes next with 6 species and percent contribution of 27.27%, Perciformes with 4 species and percent contribution of 18.18%, Synbranchiformes with 2 species and per-cent contribution of 5.0%, Osteoglossiformes and Synbranchiformes with 1 species each and percent contribution of 4.55% follow the order (Table1.2).

### 1.3. Fish production in Garha Dam:-

The procedure adopted for the fish production study in the reservoir was in accordance with methodology on reservoir fisheries investigation in India (Jhingran et al. 1969) and APHA (1985). It is difficult to identify any specific trend associated with specific regimes in Garha reservoir since adequate information on stocking, production and distribution of income over a longer timeframe corresponding different regimes is not available. However, the available data show a fluctuating trend of production under MPFDC regime.

The commercial fishing started in 1975-76, by deploying fisherman. These fishermen were organized into a cooperative society, under the state patronage and provided with nylon yarn and other and other fishing inputs. Essential marketing infrastructure was also created Craft and Gear. The most common fishing gear in the reservoir is the surface gill net, operated from a boat. A normal fishing unit comprises 25 gillnets, each measuring50x6m, a boat and 2 to 4 fishermen. The boat

used in the reservoir is a flat- bottomed country craft, 7.3 m long and 1.2 m wide. A single 400 m long multi-meshed giant drag net was is 6 m wide at the middle and the tapering ends measure 2 m. The mesh size (bar) varies from 15 to 50 mm. The net is operated by 16 to 17 fishermen with the help of 2 boats and a single haul lasts more than two hours. Generally night time collection of fish is most efficient. Therefore, the counted gill nets were set in the evening and lifted out in the morning of next day. Fishes were collected and weight together sector wise. Total weight in Kg of fish collected from each sectors separately, were divided by total number of nets used, to get Catch per Uni Effort (CPUE) by weight.
The previous data of stocking; fish yield, nets used etc were collected from the office of ADF (Additional fisheries director) of Rewa, District M.P.
For the study of fish fauna of the reservoir, Major carp as well as local major and minor were collected by small mesh sized gill nets cost nets etc. with the help of local persons and fisherman**,** collected specimens were identified up to species level with the help of fisheries of India (Day, 1958), fish and fisheries of India (Jhingran 1985), fishes of eastern Uttar Pradesh (Shrivastava 1968).

**1.3.1 Fish production and fishing effort:-**
The data related to total fish catch, in terms of weight and number of major carps and only weight in case of local major carps and local minor and other fishes were collected for the period of 10 years, from 2001-02 to 2010- 2011 from the department of fisheries of Rewa District, the data thus collected was analysed and tabulated with is present in table No.1.3.1

Desai (Op.cit) describes an inverse relationship between the water level and fish yield in the reservoir. The high production of 422.62 t (2003-2004) and 308.82 t (2004-2005) were achieved (Table no1.3.1). Lower water level permits effective operation of gill net, especially in areas of the reservoir, where column setting of gill nets becomes possible.
In the present study highest productivity of fish in Garha dam was recorded 9.71 Kg./Ha./Year during the year 2004-05 ; while lowest productivity of fish recorded 2.16 Kg./Ha./Year during the year 2006-07 Table no.1.3.2.

**1.4 Fish Stocking Scenario in Garha Dam**
Stocking of fingerlings is the most fundamental factor in determining production. In the absence of adequate availability of fingerlings in the region, future production remains unknown. During the new institutional regime of Garha dam, dropping of fingerlings increased in the initial four years after which it declined marginally. Among the three types of fingerlings that are dropped in the reservoir, namely, Katla, Rohu and Mrigal, the first two are considered as major crops and the last one as local (major) crop. Fingerlings of local minor crops are not dropped into the reservoir. Over the last ten years, the proportion of each variety of fingerling is changing with Katla having the largest share (table no. 1.4).

**Table No.1.1**
Taxonomic account of fish fauna reported of Garha Dam Mauganj

| Class/Sub-class/ Order/Division/ Family/Sub-family | | Taxonomic Name | Local name | IUCN Category | |
|---|---|---|---|---|---|
| | | | | CAMP (1998) | CAFF (2006) |
| Class | Actinopterygii | 1. *Notopterus notopterus* | Patola | LR-nt | EN |
| Subclass | Neopterygii | | | | |
| Division | Teleostei | | | | |
| Order | Osteoglossiformes | | | | |
| Suborder | Notopteroidei | | | | |
| Family | Notopteridae | | | | |

| | | | | |
|---|---|---|---|---|
| Subdivision Euteleostei<br>Superorder Ostariophysi<br>Order Cypriniformes<br>Family Cyprinidae<br>Sub-family Cyprininae | 2. *Catla catla*<br>3. *Cirrhinus mrigala*<br>4. *C. reba*<br>5. *Cyprinus carpio*<br>6. *Labeo. rohita*)<br>7. *L. calbasu*<br>8. *L. bata*<br>9. *Puntius ticto*<br>*10. Puntius amphibious*<br>*11. Oxygaster bacaila* | Catla<br>Mrigal<br>Naren<br>Common carp<br>Rohu<br>Kriya<br>Bata<br>Khadia<br>Khadia | VU<br>LR-nt<br>VU<br><br>LR-nt<br>LR-nt<br>LR-nt<br>LR-nt<br>NE | LR-nt<br>LR-nt<br>VU<br><br>LR -lc<br>LR-nt<br>LR-nt<br>LR-nt<br>DD |
| Order Siluriformes<br>Family Bagridae | 12. *Mystus seenghala*<br>*13. Mystus. Vitatus* | Tengara<br>Katuwa | NE<br>VU | LR-nt<br>VU |
| Family Siluridae | 14. *Ompok bimaculatus*<br>15. *Wallago attu* | Pauda<br>Padin or Lonch | EN<br>LR-nt | EN<br>LR-nt |
| Family Clariidae | 16. *Clarias batrachus* | Mangur | VU | VU |
| Family Heteropneustidae | 17.*Heteropneustes fossilis* | Singhi | VU | VU |
| Order Synbranchiformes<br>Sub-order Mastacembeloidei<br>Family Mastacembelidae<br>Sub-family Mastacembelinae | *18 .Mastacembelus armatus* | Baam | NE | VU |
| Order Perciformes<br>Sub-order Percoidei<br>Family Nandidae<br>Sub-family Nandinae | *19. Nandus nandus* | Dhebari | LR-nt | LR-nt |
| Family Anabantidae | *20. Anabas testudineus* | Kabai | LR-nt | LR-nt |
| Sub-order Chanoidei<br>Family Channidae | *21. Channa marulius*<br>22.*Channa punctatus* | Padam Sauri<br>Sauri | LR-nt<br>LR-nt | VU<br>LR-nt |

*EN=Endangered, Vu (Vulnerable), LR-nt= Lower risk near threatened, LR-lc (Lower risk least concern), NE (Not evaluate), DD (Data deficient), *Exotic fish*.

**Table no.1.2**
Number and percent composition of families, genera and species under various orders

| S. No. | Order | Families | Genera | Species | % of families in an order | % of genera in an order | % of species in an order |
|---|---|---|---|---|---|---|---|
| 1. | Osteoglossiformes | 1 | 1 | 1 | 10 | 6.25 | 4.55 |
| 2. | Cypriniformes | 1 | 6 | 10 | 10 | 37.50 | 45.45 |
| 3. | Siluriformes | 4 | 5 | 6 | 40 | 31.25 | 27.27 |
| 4. | Synbranchiformes | 1 | 1 | 1 | 10 | 6.25 | 4.55 |
| 5. | Perciformes | 3 | 3 | 4 | 30 | 18.75 | 18.18 |

**Table No.1.3.1 -**
Fish production and fishing effort in Garha dam (2001-02 to 2010-11)

| Years | Total catch (t) | Number of nets | Number catch/ of 50 m gill net | Percentage Increase | | |
|---|---|---|---|---|---|---|
| | | | | 50m unit(kg) | Effort | Catch |
| 2001-2002 | 142.20 | 105125 | 74280 | 2.35 | -14.25 | +29.78 |
| 2002-2003 | 164.15 | 126597 | 75285 | 2.44 | -15.75 | +30.25 |
| 2003-2004 | 422.62 | 105029 | 626556 | 3.87 | -16.77 | +31.77 |
| 2004-2005 | 308.82 | 245626 | 147375 | 2.23 | +95.76 | +78.57 |
| 2005-2006 | 150.35 | 150644 | 90386 | 1.78 | +20.06 | +12.67 |
| 2006-2007 | 58.23 | 139442 | 95513 | 0.71 | +26.87 | -62.97 |
| 2007-2008 | 80.49 | 144095 | 86457 | 0.96 | +14.84 | -54.65 |
| 2008-2009 | 28.87 | 34249 | 20549 | 1.21 | -72.71 | -86.48 |
| 2009-2010 | 145.25 | 410106 | 246063 | 0.60 | +226.84 | -19.54 |
| 2010-2011 | 75.52 | 225449 | 135269 | 0.58 | +78.08 | -56.81 |

Effort = Number of 50 m gill net

**Table No.1.3.2 -**
**Fish productivity in Garha dam (2001-02 to 2010-11)**

| Years | Fish Productivity (Kg./Ha./Year) |
|---|---|
| 2001-2002 | 4.25 |
| 2002-2003 | 5.21 |
| 2003-2004 | 6.75 |
| 2004-2005 | 9.71 |
| 2005-2006 | 4.73 |
| 2006-2007 | 2.16 |

| | |
|---|---|
| 2007-2008 | - |
| 2008-2009 | 4.92 |
| 2009-2010 | 3.84 |
| 2010-2011 | 2.64 |

Source- Department of fisheries of Rewa District

**Table No.1.4.**
Fish stocking Scenario in Garha Dam (2001 -02 to 2010-11).

| Years | Proportion of Varieties of Fingerlings | | | |
|---|---|---|---|---|
| | ***Catla*** ***(%)*** | ***Rohu*** ***(%)*** | **Mrigal (%)** | **Total Fingerlings** (In thousands) |
| 2001-2002 | 52.75 | 18.40 | 28.85 | 2675 |
| 2002-2003 | 42.90 | 28.86 | 28.24 | 2792 |
| 2003-2004 | 45.73 | 33.04 | 21.23 | 2946 |
| 2004-2005 | 41.01 | 35.23 | 23.76 | 3225 |
| 2005-2006 | 54.12 | 26.73 | 19.15 | 3115 |
| 2006-2007 | 39.25 | 33.13 | 27.61 | 2735 |
| 2007-2008 | - | - | - | - |
| 2008-2009 | 42.98 | 26.40 | 30.62 | 2658 |
| 2009-2010 | 40.25 | 32.25 | 27.50 | 2547 |
| 2010-2011 | 41.13 | 33.35 | 25.42 | 2611 |

Choudhary (1977) observed 39 species of Gandhi Sagar reservoir. Singh (1993) observed 84 species from Sardar sarovar dam of Narmada River. Saxena (1997) reported 42 species from upstream region and 35 species from downstream region in river satluj. Solanki et.al, (2010) reported 29 species from Tapti river of Betul. district Rapid deforestation, sewage discharge, mining activities, thermal Activities, anthropogenic activities and irrational fishing practices over the year, this aquatic diversity is on the way of decline.

Kharat et al. (2012) had recorded 51 species of fishes belonging to the 14 families and 35 genera during their study on Krishna River at Wai (M.S.). Jayabhaye and Lahane (2013) observed the 21 species of fishes belonging to 6 families and 13 genera during their study period on Pimpaldari tank, Dist. Hingoli (M.S.). Our findings are corroborating with observations of Sakhare (2001), Sarwade and Khillare (2010), Kharat et al. (2012) and Jayabhaye and Lahane (2013).

## CONCLUSION

It is concluded from the present investigation that the quality of the Garha dam water system is continuously degrading. The source of water pollution in this pond, municipal, domestic and agricultural wastes. Fish population and production in Garha dam is gradually decreasing due to the heavy pollution load in dam created by various human and agricultural activity around the dam. Heavy silt load and total solids are the effective agents to decrease the fish population and production.

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