Environment Conservation Journal 10(1&2) 127-133, 2009
(ISSN 0972-3099)

ASEA

Fish and fisheries of Virla Reservoir of West Nimar, District M.P., India

S.K. Pathak[1] and K. Mudgal[2]

Received on : 08-08-2008 Revised on : 15-02-2009 Accepted on : 30-04-2009

Abstract

During course of study on virla reservoir West Nimar (Kargone) M.P., India, total 29 species of fish biodiversity were recorded these belong 6 orders, 10 families and 16 genera were observed. On the basis of economic importance fishes weredivided into three major groups *viz.* catfish (*Mystus seenghala, Mystus tengara, Wallago attu* and *Ompok bimaculattus*), major carp (*Catla catla, Labeo rohita* and *Cirrhinus mrigala*) and miscellaneous (*Channa* sps., *Mastacembelus* sps. and *Notopterus notoptereus*). The water body was divided into three zones *viz.* upstream zone, reservoir zone and downstream zone for fish catch. Tha total annual fish catch computed in this water body was 2465.40 kg. and 2576.40 kg. during the 2001-02 and 2002-03 respectively. The minimum catch were observed in August while maximum in May. The percentage composition of major carp shows decline trend and catfishes shows increasing trend during two years study time. Catch per unit effort (CPUE) ranged between 0.015 to 0.191 kg/ hrs. The water level fluctuations and fish production show inverse relationship.

Keywords:- *Fisheries, Virla reservoir, Economical, Fish production*

Introduction

India ranked third in inland fish production in the world . The total fish production is 47.89 lakh tones contributed 20.97 lakh tones from inland and 26.92 lakh tones from marine sector respectively in the year1994-95 (Pandy and Unyal 1907-1998). The contribution of inland sector is was nearly one third of the total fish production with 57% of total domestic consumption supply. The major portion of protein rich food of domestic consumption come from inland fish production. Madhya Pradesh occupy 2.75 lakh hectares area with 60 reservoir and got second position in India. The total fish catch is 2619 is about tones per year from reservoir s of M.P. the state fishery department governs the development of reservoir fisheries since 1962 and has only 40 % stocking facility of total production at major reservoirs. The management of reservoir fisheries in India is not well developed when we compare with other countries. So many impending factors *i.e.* regular monitoring of reservoir, excessive growth of aquatic vegetation, introduction of commercial fish seed, use of fishing gears, untrained staff, transportation and marketing facilities are responsible for development of reservoir fisheries in the country. A numbers of national and foreigner researchers (scientists) have contributed our knowledge in the fisheries aspects. Review of literature indicates that not much work has been done on the reservoir of M.P. and no attempt has been made on Virla reservoir in this aspect. The first limnological study on this reservoir has been conducted and details of fish biodiversity and potential structure were observed, which is helpful for the management and development of fishery in the reservoir.

Materials and Method

The present study was done for a period of two years from July 2001 to June 2003. Four collection centers was selected in the studied water body *viz.* one at upstream site, two at reservoir site and one

Author's Address
[1]Department of Zoology, Govt. P.G. College, Mhow
[2]Govt. Girls P.G. College, Moti Tabela, Indore ✉

at downstream site. Besides this, fish collection and marketing survey were done in one week of every month during the study period. The main fishing gears operated in the reservoir were gillnets of mesh ranging from 23- 180 mm bar. Further the fish caught by small meshed gill net, cast net and traps. The fishes soon after collection were cleaned and preserved in 5 % formaline. The fishes were identified to genus/ species with the help of keys provided by Day (1958) and Jhingram (1992). Catch per unit effort (CPUE) is calculated based (by) on the mean monthly fluctuation of fish landings.

Results and Discussion

The reservoir receives rainwater through local nalla started from Jalabad of Satpura ranges. The west of the reservoir is covered by the agriculture fields and remaining three by hill and village of Virla. The reservoir is mainly used for culturing of fishes. The near by villagers also use water for irrigation, bathing, washing and drinking for domesticated animals. The dam is constructed by cement concrete and is provided with one small siphon to let out the excess water from the reservoir particularly during rains. The length of dam is 270 m and height is 19.29m. The above details of morphometry and

I Morphometric and hydrological Characteristics Particular of the Dam

Water elevation: Maximum water level-154.40 m Full reservoir level- 153.20 m river bed level- 36.91 m.
Capacity: Gross storage- 4.47 M.CuM. Live storage- 4.29 M.CuM.
State: M.P.
District: Khargon
Tehsil: Segon
River: Local nala
Location: Near village Virla
Total length: 270 m Maximum height – 19.29
Area: Gross storage level- 525 Hectares, full reservoir leve- 445 Hectares, average level- 495 Hectares
Depth: Maximum at FSL- 16.29 Maximum at DSL- 9.69.

hydrology of rservoir denote the static value. The water volume and water level changed seasonally and depend upon rainfall, water inflow and erosion inputs from catchment area.

II Fish diversity

The fish diversity is mainly depend on the type of habitat and its abiotic and biotic factors. During the study at Virla reservoir of west Nimar (Khargone) 29 species of fishes were noted which belong to 6 orders, 10 families and 17 genera (Table 1). Choudhary (1977) observed 39 species after the impoundment of Gandhi Sagar reservoir. Kartha (1987) reported 41 species of fish from Gandhi Sagar reservoir. Singh (1993) reported 84 species from Sardar Sarover dam of Narmada River. Saxena (1997) reported 42 species from upstream region and 35 species from down stream region in river Satluj. While comparing this Virla reservoir consist very less quantity of fish diversity. As there is no previous data available on Virla reservoir therefore it is not possible to evaluate the quantity of fish depletion in this reservoir.

Commercial fisheries

Due to lack of knowledge of fisheries management techniques in Virla reservoir the commercial fishery is unorganized. The history of Virla reservoir represents the natural stock. The commercial fishes of Virla reservoir were dominated against non commercial fishes. In the present study fishes were classified as major carps, cat fishes and a group of miscellaneous fishes. The dominated fisheries include *Catla catla*, *Labeo rohita*, *Mystus seenghala*, *Cirrhinus mrigala*, *Wallago attu*, *Channa* sps. *Notopterus notopterus* and *Mastacembelus* sps.

The commercially important species of fishes of virla reservoir were grouped according to their economic importance into three major categories viz. major carp (*Catla catla*, *Labeo rohita* and *Cirrhinus mrigala*) cat fish *(Wallago attu*, *Mystus tengara*, *Mystus seenghala*, *Ompok bimaculatus*).

Table 1 : List of fishes recorded in Virla Reservoior during July 2001 to June 2003

Order	Family	Genera
Cupriniformes	Cyprinidae	*Catla catla* (Ham)
		Cirrhinus Mrigala (Ham)
		Cirrhinus reba(Ham)
		Labeo rohita(Ham)
		Labeo calbasu (Ham)
		Labeo bata(Ham)
		Puntius ticto (Ham)
		Puntius sophore(Ham)
		Rasbora doniconius (Ham)
		Nemacheilus botia (Ham)
		Nemacheilus beavani (Ham)
		Nemacheilus aurius (Ham)
	Siluridae	*Ompok bimaculatus* (bloch)
		Wallago attu (Schn)
	Bagridae	*Mystus seenghala* (Skyes)
		Mystus tengara (Ham)
		Mystus aor (Ham)
	Schielbeidae	*Eutropiichthys vacha* (Ham)
	Saccobranchidae	*Heeropneustes fossilis* (Bloch)
Clupeiformes	Notopteroidae	*Notopterus notopterus* (pallus)
Belniformes	Belonidae	*Xenentodon cancila* (Ham)
Ophiocephaleoremes	Ophiocephalidae	*Channa marulius* (Ham)
		Channa gachua (Ham)
		Channa striatus
		Channa punctatus
Perciforemes	Cenyropomidae	*Ambasis ranga* (Ham)
		Ambasis nama (Ham)
Mastacembeleformes	Mastacembelidae	*Mastacembelus armatus*
		Mastaccembelus pancalus (Ham)

and miscellaneous (*Notopterus notopterus*, *Channa* species and *Mastacembelus*). Dubey and Mehra (1959) reported 70 species from Chambal river in which 46 species were identified as commercially important fishes. Rao *et al.* (1988) noted 9 commercially important fishes from Gandhi sagar reservoir. Kartha (1987) reported 77% growth rate of *Catla catla* during the period of 1980-81 to 1985-86 in Gandhi sagar reaservoir. Gandhi Sagar Reservoir is known as Catla sagar because of increased landing of *Catla catla* in this reservoir. In the present study of Virla reservoir the precentage contribution of commercially important fishes like *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* shows 7.57%, 6.93% and 3.79% of the total catch respectively. There are no storage facilities available for catched netted fishes from the reservoir. Hence, after catching they have to sold out at any rate. The seed of major carps should be introduced for the enhancement of further production of commercially important fishes in the virla reservoir. Kartha (1987) in Gandhi Sagar and Pandey (1998) made similar observations in Gambhir dam.

Annual fish yield

For the fisheries output, hydrological characteristics of the collection centers play an important role to a greater extent. In the present

study of Virla reservoir four sampling station were identified according to their morphometry, water flow and hydrobiological charecteristics. The sampling station I exhibits lotic condition to some extent. This centers contributed 26.85% of total fish catch of Virla reservoir. The sampling station II and III represents lentic habitat and contributed total fish catch 28.33% and 34.27% respectively. The sampling station IV (downstream) exhibits rapid water current very similar to river during rainy season. It contributes 10.55% to the total fish catch. The sampling station wise data of annual catch showed minimum 251.87 kg/year at collection station IV and maximum 873.58 kg/year at collection station III (Table 2). In the present study fish catch includes 4.69 and 4.90 kg/ha/yr. landings were estimated in 2001-02 and 2002-03 respectively. The present results indicate that the total fish yield/ha/yr. shows increasing trend. Similarly the total fish yield at Virla reservoir also showed increasing trend i.e. 2465.40 kg/yr. in 2001-02 and 2576.24 kg/yr. in 2002-03. Kartha (1987) reported the total fish landings at Gandhi Sagar reservoir 2437.0 tons/yr. and 13420 tons/yr. in 1984-85 and 1985-86 respectively. According to all India coordinator reservoir research project the annual fish production from important reservoir during 1983-84 were 1.4, 4.1, 41.2, 1.1, 25.3, 4.3 and 2.8 kg/ha/yr. from Ukai, Nagarjunsagar, Getal Sud, Kangabati reservoir respectively (Saxena, 1990). Kumar (1990) reported 78.4 kg/ha/yr. annual landing from Govind Sagar reservoir during 1988-89.

Table 2: Annual fish yield in Virla reservoir Zone and Site wise during July 2001 to June 2003

Name of the zone	Name of the site	2001-02		2002-03	
		Yield	%	Yield	%
Up stream	Site No. 1	654.39	26.54	699.73	27.16
Reserv-oirzone	Site No. 2	705.93	28.64	722.26	28.03
Reserv-oirzone	Site No. 3	853.21	34.62	873.58	33.92
Down stream	Site No. 4	251.87	10.21	280.67	10.89
Total		2465.40	100	2576.24	100

Species wise percentage composition

In the present study composition of *Catla catla* was 48.88% and 49.36% to the total fish landings during 2001-02 and 2002-03 respectively. *Labeo rohita* was recorded 20.44% in 2001-02 but in 2002-03 it was decreased upto 19.80%. *Cirrhinus mrigala* contributed 7.38% during 2001-02 and it incrased upto 7.39 during 2002-03. Among the catfishes *Mystus seenghala* was 8.05% in 2001-02 and this increased upto 8.16% in 2002-03 the presentage contribution was *Mystus tengara* 6.78% and 6.73% in 2001-02 and 2002-03 respectively. *Wallago attu* contributed 2.975 in 2001-02 and 3.00 in 2002-03. *Ompok bimaculatus* contributed 1.82% in 2001-02, which further increased upto 1.90% in 2002-03.

Among the miscellaneous group the *Channa* sps. contributed 0.77% and 1.03%. *Mastacembelus* sps., 1.46% and 1.36% and Notopterus sps. 0.62% and 0.61% during 2001-02 and 2002-03 respectively. Other small fishes shared 0.83% in 2001-02 and 0.66% in 2002-03 (Table 3).

Kartha (1987) reported maximum contribution of *Catla catla* (58.67%), *Cirrhinus mrigala* (22.18) and *Labeo rohita* (17.14) in Gandhi Sagar reservoir. Singh (1993) reported the maximum Catch of *Tor tor* (23.84 to 26.66%), *Labeo fimbratus* (18.1to 18.8%), *Labeo calbasu* (5.2 to 5.66%), *Cirrhinus mrigala* (2.26 to 3.06%), *Mystus seenghala* (7.7 to 8.6%), *Mystus tengara* (0.26 to 0.4%), *Wallago attu* (7.3 to 8.14% and Miscellaneous species (5.1%) in Sarover of Narmada river. Pandey (1998) reported maximum contribution of *Mystus seenghala* (49.35 to 49.64%), *Mystus tengara* (19.45 to 20.12), *Wallago attu* (8.80 to 10.35%), *Catla catla* (6.78 to 7.45%), *Labeo rohita* (4.33 to 4.72%), *Cirrhinus mrigala* (3.65 to 3.77%), *Ompok bimaculatus* (1.58 to1.66%), *Channa* species (0.99 to 1.185), *Mastacembelus* sps.

Table 3: Percentage composition of fishes at Virla reservoir: Group wise during July 2001 to June 2003

Group of fishes	2001-02		2002-03	
	Catch (Kg)	% Composition	Catch (Kg)	% Composition
Major carps	1891.04	76.70	1971.85	76.55
Cat fishes	483.70	19.62	509.90	19.79
Miscellaneous	70.26	2.85	7741	3.00
Other small fishes	20.40	0.83	17.08	0.66
Total	2465.40	100	2576.24	100

(0.69 to 1.46%) and *Notopterus notopterus* (1 to 1.21%) and other small fishes (0.77 to 0.98%), in Ghambir dam. In Virla reservoir the major carps were the most dominant followed by catfish and miscellaneous group. The percentage contribution of major carps showed increasing trend except labeo rohita. Similarly, among catfishes except Mystus tengara. Other fishes showed decreasing trend. It is therefore, suggested that for further increase in the production of fishes appropriate fish seed stocking is required. Special attentation is needed for *Labeo rohita* and *Mystus tengara.*

Water level variation and fish catch

The impact of water level variation on total fish landings were observed at Virla reservoir (Table 4 Fig. 1). The value of average water level and total fish landings were recorded 145.59 m. and 2465.40 kg. during 2001-02 respectively and in 2002-03 the value of average water and total fish landing were 140.80 m. and 2576.24 kg. respectively. The impact of water level variation on total fish landings is inversely proportional.

Catchper Unit Effort (CPUE)

On the basis of monthly mean value of fish catch the catch per unit effort has been calculated. The abiotic biotic factors, volume of water and velocity

Table 4: Water level variation and fish catch at Virla Reservoir During the year 2001-02 and 2002-03

Water level in meter	Year	
	2001-02	2002-03
Maximum	149.30	145.20
Minimum	142.68	136.40
Average	145.99	140.80
Fish catch (kg)	2465.40	2576.24

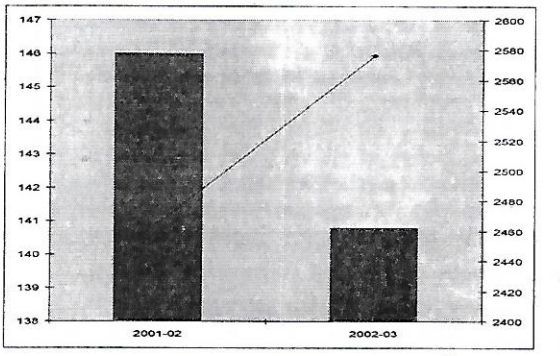

Fig. 1: Average water and fish landings in Virla reservoir during July 2001 to June 2003

of current also affect the CPUE. In the present study CPUE was estimated in four study sites of Virla reservoir. The CPUE values ranged 0.015 to 0.191 kg/h the highest value of CVPUE in the month of May at site III and lowest in August at site IV (Table 5, Fig.2).the value of CPUE ranged 21.57 to 31 kg/hr. at Gandhisagar reservoir (Kartha, 1987). Singh (1993) observed CPUE f4rom 3.3 to 3.41 kg./hr. at Sardar sarover dam. Shyam Sundar *et al.* (1995) recorded CPUE in between 0.35 to 639 gms/ h at river Guala. Pandey (1998) reported 0.375 to 1.137 kg/hr. at Gambhir dam. The Value of CPUE uis very less ihn Virla reservoir when compared with above findings. Probable reason of less CPUE value might be due to non-avilability of Stocking facility in this reservoir.

Table 5: Catch Per Unit Effort (CPUE) in Kg. at four sites of Virla Reservoir During July 02 to June 03

Month	Site-1		Site-2		Site-3		Site-4	
	Production	CPUE	Production	CPUE	Production	CPUE	Production	CPUE
July 02	30.10	0.040	28.50	0.038	30.60	0.041	14.35	0.019
Aug.	27.68	0.037	15.90	0.021	27.00	0.036	11.22	0.015
Sept.	32.26	0.044	22.45	0.031	35.60	0.049	15.30	0.021
Oct.	36.41	0.048	30.24	0.040	42.50	0.057	18.40	0.024
Nov.	45.70	0.063	48.62	0.067	64.63	0.089	21.20	0.029
Dec.	60.35	0.0081	52.30	0.070	75.25	0.101	24.50	0.032
Jan.	67.40	0.090	62.44	0.083	88.20	0.118	26.65	0.035
Feb.	73.00	0.108	82.60	0.122	99.35	0.147	28.15	0.041
March	82.21	0.110	107.35	0.144	108.50	0.145	30.75	0.041
April	86.50	0.120	118.60	0.164	120.40	0.167	35.20	0.048
May	89.95	0.121	134.15	0.180	142.75	0.191	42.85	0.057
June	38.27	0.053	19.11	0.026	38.80	0.053	12.10	0.016

Acknowledgement

The authors are thankful to the principal, govt. P.G. College, Khargone for providing laboratory facilities.

References

Choudhary, D.K., 1977. Case study of Gandhi Sagar reservoir Fisheries (M.P.). News Letter, C.I.F.E. Bombay, July- August. pp: 31.

Day, F., 1958. The fisheries of India. William Dawson and Sons. Ltd. London. Vol. I, P777 and Vol. II, P198.

Dubey, G.P. and Mehera, R.K., 1959. fish and fisheries of Chambal river. ***Proc. All India Zool. Congr.***, 1(2): 647-665.

Fisher, A., Hanemman, W.N. and Keelar, A.G., 1991. Integrating fishery and water resource management: a biological model of a California Salmon fishery. ***J. Environ. Econ. Manage.***, 20(3): 234-260.

Jhingram, V.G., 1982. Fish and Fisheries of India . 2nd Edn. Hindustan publishing Corp., (India) Ltd., Delhi.

Jhingram, V.G., 1992. Fish and fisheries of India.3rd Edn. Hindustan Publishing corp., (India) Ltd., Delhi.

Johnson, D.M. and Walsh, R.G., 1989. Effect of participant skill on the value of alternative fishery management practices, in the Transactions of the 54th North American Wild Life and Natural Resources conference, P.247-254, WMI, Washington D.C.

Kartha, K.N., 1987. Studies on Experimental trawl Fishing in Gandhi Sagar reservoir. Mandsaur (M.P.), India Ph.D. thesis, Vikram University, Ujjain, India.

Kumar, A., 1990. Management and development of Govind Sagar Reservoir: A case study. Reservoir Fisheries in India. Ed. A.G. Jhingram and B.K. Unnithan. P.13-20.

Pandey, Ail, 1998. Hydrobiological studies on Gambheer dam, Ujjain (M.P.) including up and down stream with special reference to fisheries Ph.D. thesis, Vikram University, Ujjain, M.P.

Rawat, V.S. and nautiyal, P., 1995. National history of hillstream cyprinid barilius bendelisis: fod and feeding habits in relation to growth rate. ***J. Inland. Fish Soc. India***, 27(2): 6-13.

Saxena, B.S., 1990. Potentialitis production and problems of Indian reservoir fisheries. Reseervoir Fisheries in India. Ed. A.G. Jhingran. pp: 79-84.

Saxena, P.K., 1997. Impact of pollution on the fisheries of river Satluj. ***Environ. Manag. Int.***, 1(1): 69.

Singh, A.K., 1993. Pre impoundment studies on Sardar Sarovar Area of Narmada River (Western Zone) with special reference to Fisheries. Ph.D. Thesis, Vikram University, Ujjain, India.

Srivastava, G.J., 1980. Fishes of Eastern Uttar Pradesh. Viswavidyalaya Prakashan, Varanasi. pp: 207.