

# EXPLORATORY FISHING EXPERIMENTS IN HIRAKUD RESERVOIR — ORISSA STATE (1967—70)

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Suitable areas for fishing have been located in the middle and upper regions of the Mahanadi course of Hirakud reservoir. In the former the suitable period is during summer and beginning of monsoons, and in the latter in summer and winter months. The fishery of the reservoir is contributed by four species namely *S. silo-ndia*, *L. fimbriatus*, *C. mirgala* and *C. catla*.

## INTRODUCTION

Eventhough exploratory fishing, to a limited extent have been carried out in a few Indian Reservoirs like Stanley reservoir (Tirpathy *et. al.* 1964), Tungabhadra reservoir (Krishnamoorthy *et. al.*, 1964) and Bhavanisagar (Ranganathan and Venkataswamy, 1967), post impoundment studies are scanty. Znamensky (1962) reviewing the fishing techniques in Indian reservoirs has stressed the need and necessity for such studies, with particular reference to Hirakud reservoir. The present communication, therefore incorporates the results of investigation carried out in the Hirakud reservoir (Area - 74,592 hectares at F. R. L.) with a view to chart out different fishing grounds, their shifting according to seasons and the relative abundance of the different species.

The present studies are restricted to Mahanadi Course of the reservoir. The

area was arbitrarily divided into three major regions as the upper, middle and lower ones corresponding approximately to the riverine (lotic): mixed and laccustrine (lentic) conditions. In each of these regions different zones were fixed. Thus in the lower region there is only one zone (zone No.1): in the middle region four zones (zones 2 to 5) and one zone (zone No. 6) in the upper region (Text Fig.1).

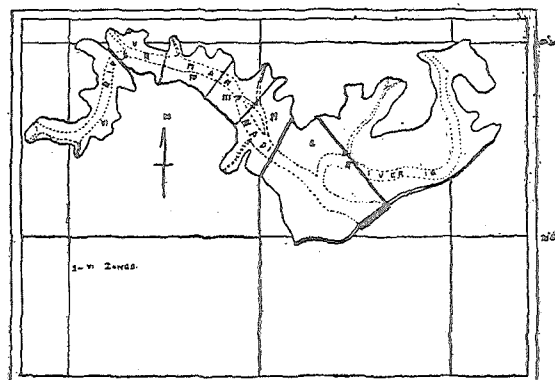


Fig. 1. HIRAKUD RESERVOIR.

Table I

Frequency of fishing observation in the different zones for the years 1967-70

Month	Zone I	Zone II	Zone III	Zone IV	Zone V	Zone VI	Total
April	6	4	5	8	1	1	25
May	8	19	5	2	5	4	43
June	17	63	8	—	—	—	88
July	—	74	19	2	—	—	95
August	—	—	—	—	—	—	—
September	—	1	1	—	—	—	2
October	10	5	2	8	4	3	32
November	14	12	6	17	6	16	71
December	5	15	3	16	—	—	39
January	17	6	—	9	4	9	45
February	6	9	5	5	—	6	31
March	7	10	1	8	3	9	38
Total	90	218	55	75	23	48	509

#### MATERIALS AND METHOD

Simple gill net, Vertical lines net and Frame gill net (75mm. bar) described by Sulochanan *et. al*; (1968) formed the gear for the investigations. The fleet of nets consisted of three shots in each of the above types and two fleets were operated simultaneously at two different zones. The nets were set at the bottom, midwater or surface as the conditions permitted. Nets were laid in the afternoon and hauled up on the following day morning. Fishing operations were suspended during the period of heavy flood (second half of July to end of September).

Details of catch as to the species, size and weight of each fish, temperature of surface water and turbidity were collected during the course of the study. Information on water level in the reservoir was obtained from the Research Station of the Hirakud Dam Project. The catch per unit effort (CPUE) expressed is the catch in kilogrammes for 1000 square metre of net per day irrespective of the net type. Five hundred and nine effective fishing operations, spread over a period of 39 months were conducted.

#### RESULTS.

The number of observations in each zone for the years 1967 to 70 are shown in Table - I. The CPUE with reference to six zones for the different months is given in Table - II. The percentage composition of catch for the three years (1967 - 70) is indicated in Table - III. Table IVa to d presents the zone-wise and month wise distribution of *Silondia silondia*, *labeo fimbriatus*, *Cirrhina mirgala* and *Catla catla* for the various months in the different zones along with size groups and their frequency. The monthly water level of the reservoir, surface water temperature and turbidity are shown in Tables V, VI VII respectively.

#### DISCUSSION

Seasonal abundance: From Table - II it should be clear that the month - wise and zone - wise catch show a discernible trend and certain seasonal and zonal abundance. The maximum abundance was during the pre-monsoon months of April to June and towards the beginning of monsoon in July. This is due to the reduction in the volume of the water in the reservoir aided by spawning migration. Instances

Table II

Average catch per unit effort for the years 1967-70

Months	Zone I	Zone II	Zone III	Zone IV	Zone V	Zone VI	Average
April	1.888	2.539	4.223	6.029	6.591	2.469	3.956
May	1.662	3.880	3.481	2.671	3.796	2.747	3.039
June	1.664	6.939	6.854	—	—	—	5.152
July	—	5.165	4.556	8.962	—	—	6.227
August	—	—	—	—	—	—	—
September	—	0.111	0.462	—	—	—	0.289
October	1.146	1.565	1.046	1.699	0.907	1.378	1.290
November	1.513	1.266	2.967	1.850	1.142	2.302	1.840
December	0.944	1.186	1.018	1.358	—	—	1.126
January	0.841	0.555	—	1.439	1.813	2.683	1.466
February	0.659	1.155	1.988	0.998	—	2.424	1.444
March	0.660	0.876	0.081	0.853	0.846	3.021	1.056
Average	1.220	2.294	2.688	2.873	2.516	2.432	2.388

Table III

Percentage composition of catch for the years 1967-70

Species	1967-68	1968-69	1969-70	Average
<i>Silondia silondia</i>	46.00	50.10	29.70	41.90
<i>Labeo fibriatus</i>	14.30	14.80	23.20	17.40
<i>Cirrhina mirgala</i>	9.20	10.20	20.70	13.40
<i>Catla catla</i>	16.30	8.30	3.80	11.20
<i>Eutropichthys vacha</i>	4.60	5.20	6.80	5.70
<i>Labeo rohita</i>	2.70	3.20	1.80	2.60
<i>Labeo calbesu</i>	1.30	1.40	3.80	2.20
<i>Notopterus chitala</i>	1.50	2.90	1.10	1.80
<i>Mystus sp.</i>	1.00	2.20	1.70	1.60
<i>Barbus tor</i>	1.90	1.00	0.90	1.30
<i>Wallago attu</i>	1.10	0.50	0.60	0.70
<i>Miscellaneous species</i>	0.10	0.20	0.80	0.40

Table IV a

Percentage representation of *S silondia* monthwise, zonewise and size frequency for the year 1967-70.

Month	Percentage	Zone	Percentage	Size group	Frequency
April	5.20	I	7.06	31-40	2.10
May	10.26	II	64.60	41-50	4.00
June	30.20	III	13.06	51-60	9.00
July	37.43	IV	3.96	61-70	28.50
August	0.00	V	1.80	71-80	38.10
September	0.03	VI	4.50	81-90	13.20
October	2.80			91-100	4.10
November	3.46			101-110	1.00
December	2.96				
January	1.73				
February	2.60				
March	3.30				

identical to the latter have been observed in Tungabhadra Reservoir (Krishnamurthy *et. al; op. cit.*) and Bhavanisagar (Ranganathan and Venkataswamy *op. cit.*). During the rest of the period the catches were at a lower level. However, during this lean period relatively better yield was obtained from upper region more especially in the month of November. A higher catch rate was obtained during the same period in Bhavanisagar reservoir due possibly to the constant water level and return of voraciously feeding species (Ranganathan and Venkataswamy, *op. cit.*)

Zonal abundance: On the whole zone IV was first in the order of abundance with the maximum CPUE during the months of April and July. Zone V ranked second, better catches being during the months of April and May. Zone III was ranking third, the peak period being April to July. Zone VI ranked fourth with the peak season during March to May. Zone II was next in the order of abundance relatively better catches were obtained during the pre-monsoon and towards the commencement of monsoon. Zone I was consistently poor in CPUE in all the months and ranked lowest.

From the above it could be inferred that better CPUE was obtained in the middle and upper regions. A similar observation was made in Stanley reservoir as well (Tirpathy *op. cit.*)

Relative abundance of species: In all eleven species were caught (Table III), with some of lesser important ones included under miscellaneous. Of the 11 species *S silondia*, *L fimbriatus*, *C. mirgala* and *C. catla* constituted about 33% of the total catch by weight. *S. silondia* was the major species exploited and contributed to about 42% of the total catch. The seasonal abundance of the species was from the months of April to July and the fish were well represented in the middle region particularly in zones II and III. The predominant size groups were 61-70, 71-80 and 81-90 cms.

*L. fimbriatus* was second in the order of importance constituting about 17%. The seasonal abundance was from May to July and were caught especially in zones II and III. The two predominant size groups were 41-50 and 51-60 cms. In Tungabhadra reservoir this species was reported to be abundant during winter

Table IV b

Percentage representation of *L. fimbriatus* monthwise, Zone-wise and size frequency for the years 1967-70.

Month	Percentage	Zone	Percentage	Size group	Frequency
April	0.53	I	4.13	41 - 50	23.70
May	3.46	II	83.23	51 - 60	72.60
June	61.73	III	8.23	61 - 70	3.70
July	26.00	VI	1.00		
August	00.00	V	1.63		
September	00.20	IV	1.43		
October	1.80				
November	1.33				
December	0.23				
January	1.90				
February	1.53				
March	1.26				

Table IV c

Percentage representation of *C. mirgala* month-wise, Zone-wise and size frequency for the years 1967-70.

Month	Percentage	Zone	Percentage	Size group	Frequency
April	1.66	I	10.90	41 - 50	0.90
May	5.00	II	54.56	51 - 60	17.90
June	34.20	III	9.00	61 - 70	69.00
July	18.40	IV	8.40	71 - 80	11.30
August	0.00	V	1.36	81 - 90	0.90
September	0.00	VI	15.76		
October	0.66				
November	17.93				
December	6.23				
January	13.40				
February	1.90				
March	0.60				

Table IV d

Percentage representation of *C. catla* month-wise, Zone-wise and size frequency for the years 1967-70.

Month	Percentage	Zone	Percentage	Size group	Frequency
April	3.00	I	8.70	31 - 40	2.50
May	3.33	II	48.80	41 - 50	45.20
June	22.86	III	15.23	51 - 60	20.60
July	26.63	IV	14.23	61 - 70	16.10
August	0.00	V	1.43	71 - 80	10.70
September	0.00	VI	11.60	81 - 90	3.70
October	5.46			91 - 100	1.20
November	26.30				
December	5.26				
January	4.20				
February	2.06				
March	0.86				

Table V

Water level of Hirakud Reservoir in metres for the years 1967 - 68, 1968 - 69 and 1969 - 70.

Month	1967-68	1968-69	1969-70
April	182.31	185.60	183.52
May	181.11	133.25	181.61
June	180.03	180.88	180.57
July	182.34	183.00	182.41
August	183.96	185.27	185.06
September	190.88	185.73	190.00
October	192.05	190.91	191.96
November	191.60	190.47	191.30
December	190.80	189.75	190.64
January	189.86	188.51	189.36
February	188.64	186.92	188.23
March	187.69	185.34	186.82

Table VI

Surface water temperature of the Hirakud Reservoir in 0°c for the years 1966-68, 1968-69 and 1969-70.

Month	1967-68		1968-69		1969-70	
	Min	Max	Min.	Max.	Min	Max.
April	24.5	30.0	27.5	30.2	27.6	29.6
May	28.0	30.5	27.5	34.0	27.8	32.2
June	25.0	30.5	26.0	32.0	31.0	32.0
July	27.5	34.0	27.5	31.0	30.0	30.0
August	—	—	—	—	—	—
September	29.0	34.0	—	—	—	—
October	24.5	29.8	—	—	23.0	31.0
November	20.2	27.2	22.0	29.8	25.0	27.5
December	22.0	25.6	20.0	22.5	21.0	24.0
January	20.0	23.0	17.0	20.0	20.1	24.0
February	20.5	27.8	22.5	25.8	24.2	27.0
March	23.0	23.5	25.3	28.4	27.0	29.8

months (Krishnamoorthy *et. al. op cit*) *C. mirgala* ranked third contributing about 13% of the total catch. This species was caught during the summer, premonsoon and winter months. Further the fish had a fairly wide distribution in all the zones, the catches from zone II were particularly significant. The representative size groups were of 51 - 60, 61 - 70 and 71 - 80 cms. *C. catla* contributed 11% of the catch. This fish occurred in two seasons namely monsoon and winter, and was well distributed in almost all zones with slight preference to zones II, III and IV. There were four predominant size groups namely 41 - 50, 51 - 60, 61 - 70 and 71 - 80 cms.

#### PHYSICAL FACTORS AND ITS INFLUENCE ON THE CATCH:

As seen from table - V the water level showed a uniform trend during the three years. The level increased from July, the onset of monsoon floods, reaching the maximum in October. From October the level declined due to discharge and the lowest was recorded

in the month of June of the succeeding year. Surface water temperature varied from 17°c to 20°c during winter and 24.5°c to 34°c in summer months (table - VI). The lowest transparency was during the monsoon due to the influx of turbid flood water and the highest transparency was noticed during winter months.

As discussed earlier the CPUE was on the ascending rate from April and it was from this period the water level decreased significantly. This reduction in water level causes the corresponding decline in the water spread of the reservoir bringing the sparsely distributed population of fish in relatively better concentration resulting in increased catch. For commercial exploitation of the reservoir it is therefore advisable to intensify fishing operations in zones IV, III and II during summer and commencement of monsoons, in zone VI during summer and winter and during summer alone in zone V.

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Table VII

Transparency in cms. of the Hirakud Reservoir for the years 1967-68, 1968-69 and 1969-70.

Month	1967-68		1968-69		1969-70	
	Min.	Max.	Min.	Max.	Min.	Max.
April	43	151	48	165	54	180
May	42	105	41	121	40	138
June	10	68	10	76	12	60
July	4	8	0	12	0	12
August	—	—	—	—	—	—
September	10	13	—	—	—	—
October	15	225	—	—	16	115
November	34	250	24	225	24	140
December	120	195	54	220	44	70
January	100	152	115	135	68	94
February	68	185	67	224	66	143
March	116	234	92	158	70	122

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