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ResearchArticle

A PROPOSAL FOR IMPROVING THE SOCIO ECONOMIC STANDARDS OF FISHERMEN OF DOWLESWARAM RESERVOIR OF GODAVARI RIVER - A CASE STUDY

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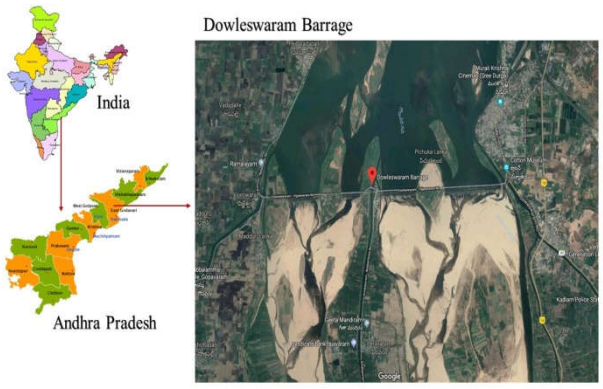
ABSTRACT

The present investigation was carried out in Dowleswaram Reservoir, Andhra Pradesh, for a period of 24 months from 2015 April to 2017 March. Study of the ecosystem was carried out by analysing water quality parameters and the diversity of fish fauna. Socio economic status of fishermen and type of fishing activity was also surveyed. This paper elucidates for an approach towards initiation of Cage Culture at Dowaleswaram reservoir.

INTRODUCTION

Cage culture is generally practiced worldwide in both freshwater and marine environments, including open ocean, estuaries, lakes, ponds and reservoirs (Beveridge1987, Huang.*et.al*.2012). Cage cultured fish are completely dependent on formulated diets (Phuong 1998). Cage culture of fish is one of the proven methods of aquaculture. Cage culture is being looked up as an chance to utilize existing inland water sources with immense production potential to enhance production from inland open waters and posed as an answer to the mounting demand for animal protein in the country (Karnatak and Kumar, 2014). To sustain the world per capita fish consumption at the current 19.1 kg by 2025, an addition of 62 million tons of aquatic products will be required and much of it will have to come from inland waters including reservoirs (Petr, 2007). Reservoirs play a major role in drinking water, agricultural use, fishery and electricity production, so protection of water quality is a very significant issue and it should be kept at acceptable levels (Venkatesharaju*et al*., 2010).

Study Area



Dowleswaram Reservoir is located between Longitude 81.7524° E Latitude 16.9369° N near Dowleswaram village in the mandal of rural in East Godavari district of Andhra Pradesh. This village is adjacent to the Rajamahendravaram city and is also known as Sir Arthur Cotton Reservoir.

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MATERIAL AND METHODS

Water quality parameters were studied by using Standard Methods for Estimation of Water and Waste water 21st Edition, 2005 (APHA). Fish faunal diversity studies were conducted by collecting and identifying the specis by following standard literature (Jayaram, 1999; Talwar and Jhingran, 1991). For collecting data on various aspects of fishing implements and socio-economic condition of fishermen, field survey was conducted in the sampling sites. Data was collected by using two methods: Physical observation and Questionnaire survey. Data was collected by personal interviews through questionnaire. The collected data were also crosschecked by collecting data from the NGO's working in that area and Government officials. The field work was not to count the opinions or the number of people, but rather to explore the range of opinions and the different representations of the issue.

RESULTS AND DISCUSSION

The present study focussed on fish faunal diversity, water quality parameters, fishing implements and socio economic status of the fishermen of Dowleswaram Reservoir. Data related to socio-economic condition such as religion, caste, age group, marital status, house type, electricity and drinking water facilities, educational status, communication asset possessed, main occupation, fishing experience, monthly income and credit source of the fishermen were collected. Water quality parameters results are shown in TableI. From the results it can be said that the ecosystem is healthy.

A total of 47 species belonging to 34 genera, 19 families and 9 orders were recorded from the Dowleswaram Reservoir of Godavari river. Cypriniformes was the most predominant order, contributing to 36.17 % of fish species, followed by Perciformes with 25.53 %, Siluriformes with 19.14%, Synbranchiformes with 8.51%.

Cyprinidae is the most abundant family, contributing 36.17%, represented by 17 species, followed by the family Bagridae and Mastacemblidae were represented by four species each. Channidae and Cichlidaewere represented by three species each. Pangasiidae and Gobiidae were represented by two species each. Clariidae,Heteropneustidae,Siluridae,Notopteridae, Anguillidae, Engraulidae,Mugilidae, Latidae, Clupeidae,Belonidae,Ambassidae and Anabantidaeare represented by one species each (Fig.I).

According to the IUCN Red List of threatened species.Version 2017.3. 21% of fish species are not evaluated, 68% of species are least concern, 7% of species are Near Threatened, 2% of species are Vulnerable and 2% of species are Data Deficient.The study revealed that a variety of fishing crafts and gears were operated throughout the study period in the Dowleswaram Reservoir. The crafts that are used for fishing at Reservoir are coracle, palm canoe, plank boat, rubber tube platform, thermocol raft, fibre glass boat and engine boat and gears are used for fishing are gill net, cast net, scoop net, hook and line,seine and drag net. (Suresh reddy*et.al.,*2018).

From the present investigation on socio economic status of fishermen it is observed that there is semi moderate development (TableII& Figure IIa,IIb,IIc,IId). This is to be considered seriously, since the next generation will take up the same profession and even till today there are no changes in their occupation or could find any other economical duties, other than fishing. Hence this will lead to serious accumulation of the backwardness of economic status of their region. Here the government should intervene and support the fishing community by prohibiting fishing during the breeding season of the fish. Dowleswaram has an estimated 12,000 fishermen, and society was formed in 1951 in the name of Dowleswaramboatsmen and fishermen co operative society bearing Registered Number.1105, among which 3,000 registered fisher men operate under the society. During the years 2015 and 2017 approximately 35 lakh seed was released into reservoir by the Government, B.C and S.C corporations. According to the fishermen opinion that this, activity should happen every year, and the number of seed released should be around 1crore which may be sufficient. They are also of the opinion that, they are similar to the tribal people inhabiting the forest since they spend most of their life in and around water and most of their livelihood is dependent upon the bodies of water surrounding them

Table I Water quality parameters variation of sample water collected from Dowleswaram reservoir of Godavari river.

	Highest value	Lowest value
Temperature Oc	32.7	23.2
p^H	8.76	7.7
Alkalinity(mg/L)	109	52
Hardness(mg/L)	141	71
DO(mg/L)	8.1	5.4
BOD(mg/L)	2.2	1
Nitrates(mg/L)	0.89	0.32
Phosphates(mg/L)	0.79	0.31

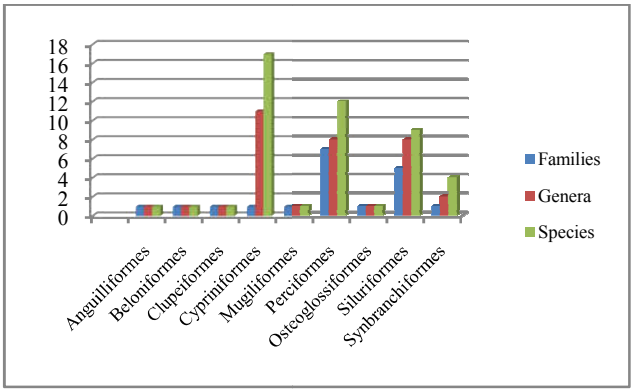

Fig I Diagrammatic representation of Number of families, genera, species in an order wise distribution in Dowleswaram barrage of Godavari river

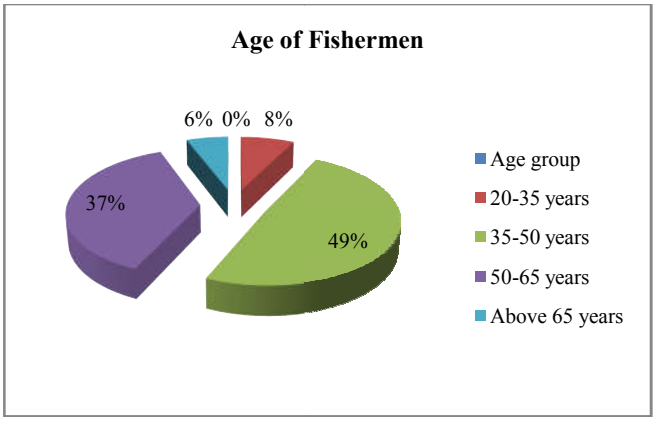

Fig IIa Age of fishermen in Dowleswaram Reservoir

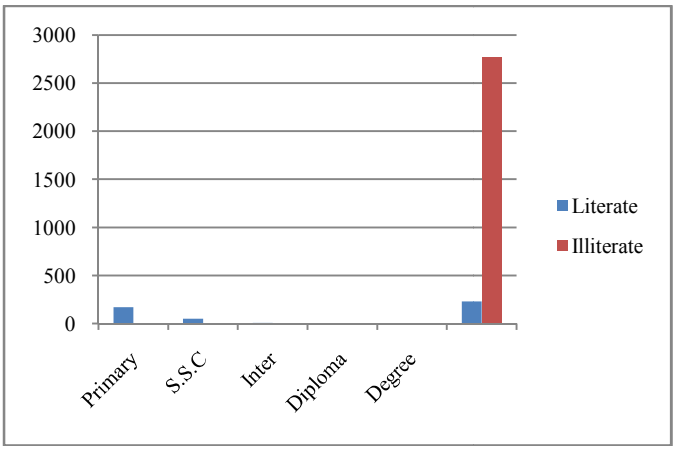

Fig IIb Educational status of fishermen in Dowleswaram Reservoir

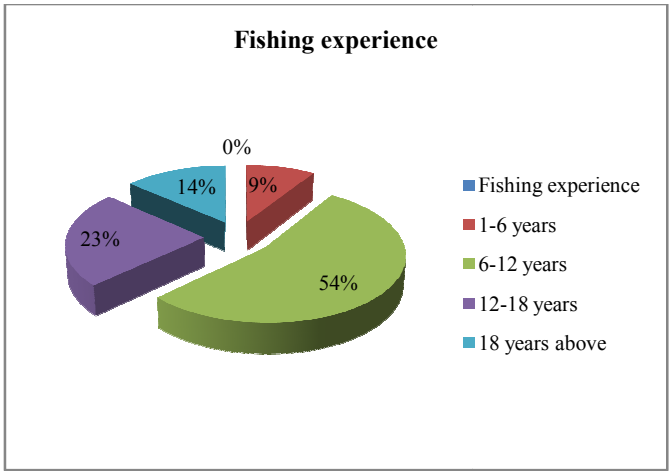

Fig IIc Fishing experience of fishermen in Dowleswaram Reservoir

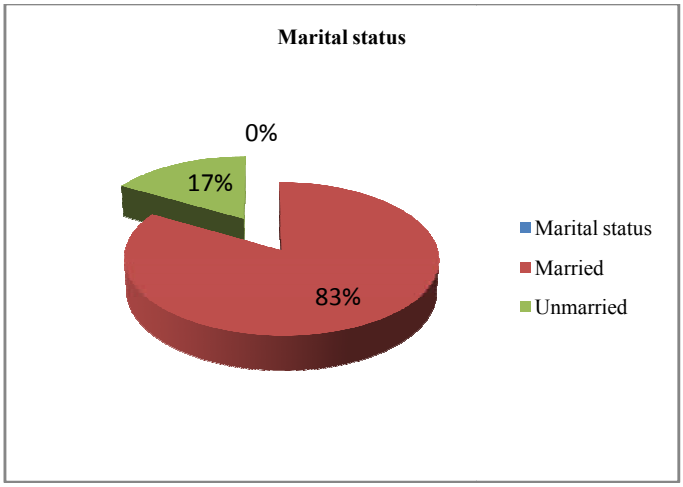

Fig IId Marital status of fishermen in Dowleswaram Reservoir

TableII Socio – economic status of Dowleswaram Reservoir of Godavari river

S.no	Parameters	Number	Percentage %
1	Total number of fishermen	3000	
2	Society name		
3	Caste	Vaddilu , Jalarlu	
4	Age group		
	20-35 years	224	7.46
	35-50 years	1478	49.26
	50-65 years	1123	37.43
	Above 65 years	175	5.83
5	Marital Status		
	Married	2640 members	88
	Unmarried	360 members	12
6	Type of house	Kaccha, Pukka	
		Kaccha	5
		Pukka	95
7	Electricity	Present	100
8	Drinking	Present	100
9	Educational status		
	Illiterate	2772 members	92.4
	Literate	228 members	7.6
	Primary school	169 members	74.12
	10^{th}	49 members	21.49
	Inter	7 members	3
	Diploma	3 members	1.31
	Degree	0 members	0
10	Communication asset possess	Mobile phone	100
		Television	98
		Television& Radio	30
11	Main occupation		
	Fishing	3000 members	100
	Construction labour	750 members	25
	Labour work	500 members	16.66
	All above (as per availability)	100 members	3.33
12	Fishing experience		
	1-6 years	270	9
	6-12 years	1620	54
	12-18 years	705	23.5
	18 years above	405	13.5
13	Monthly income of the family with age distribution		
	20-30 years	Rs 5000-10000	
	30-40 years	Rs 8000-14000	
	40-50 years	Rs 8000-17000	
	50-60 years	Rs 6500-16000	
	Above 65 years	Rs 4000-6000	
14	Credit source	Banks, Village finance	

The reservoirs of India have a combined surface area of 3.25 million hectares (ha), mostly in the tropical zone, which makes them the country's most important inland water resource, with huge unexploited potential. Fish yields of 50 kg/ha/year from small reservoirs, 20 kg/ha/year from medium-sized reservoirs and 8kg/ha/year from large reservoirs have been realized while still leaving scope for enhancing fish yield through capture fisheries, including culture-based fisheries. The success rate of auto-stocking is very low in Indian reservoirs, especially in smaller ones. Many of the smaller reservoirs dry up during the summer, partly or completely, with no stock surviving. A policy of regular, sound and sustained stocking would greatly augment fisheries in such water bodies. The prime objective of cage culture discussed here is to rear fingerlings measuring >100 millimetres (mm) in length.

Stocking with the right fish species, using seed of appropriate size and introducing it at the right time are essential to optimizing fish yield from reservoirs. Though 22 billion fish fry are produced every year in India, there is an acute shortage

of fish fingerlings available for stocking reservoirs. Where fingerings are available, transporting them to reservoirs usually incurs high fingerling mortality. In this context, producing fingerlings in situ in cages offers opportunity for supplying stocking materials, which are vital inputs towards a programme of enhancing fish production from Indian reservoirs.

The selection of site for cage culture is very important, as success often depends largely on proper site selection. Potential sites vary according to the size and shape of the reservoirs where cages are to be installed. The critical issues in selecting sites are the following: The depth of the water column should be at least 5 metres, Water quality and circulation should be good, free from local and industrial pollution, in large and medium-sized reservoirs, sites should be in sheltered bays for protection from strong winds. They should be safe from frequent disturbance from local people and grazing animals. There should be access to land and water transportation. They should be devoid of algal blooms to avoid fouling, which can cause oxygen stress. Sites should be secure. Based on our observation above mentioned conditions exist in Dowleswaram Reservoir and the water quality parameters also suitable for fish culture.

Devi *et.al* (2015) reported that in Poondi reservoir, Tamil Nadu water and sediment samples were collected from the reservoir at point and non- point sources of the cage culture units and were analyzed for their physico-chemical parameters. The total microbial load, *E. coli* and feacal streptococci population were also assessed from the reservoir. During their study period, pH, sulphate, nitrate and BOD values were found within the permissible range for drinking water quality. The alkalinity values were found optimum in the reservoir water. The sediment characteristics such as pH, electrical conductivity, total organic carbon and available phosphorus values were also found to be within the standard limit. The optimum water and sediment quality characteristics and the absence of *E. coli* and feacal streptococci observed in the cage culture unit clearly showed that the small cage farming in the reservoir does not have major environmental impacts on the water and sediment quality.

CONCLUSION

Cage culture is suitable to a wide range of open freshwater ecosystems, especially reservoirs. It efficiently exploits water bodies, tapping their natural productivity and thereby reducing pressure on other resources. It uses simple technology and locally available resources for cage construction and operation, making it economically, socially and environmentally sound. It makes effective use of manpower, as daily maintenance routines and monitoring are relatively simple, and harvesting is rapid, easy, sure and complete. As cage culture can be practiced intensively, high yields can be achieved very cost effectively. Since most reservoirs in India are designated for multiple uses, including supplying drinking water, cage culture is appropriate because it is minimally polluting and maintains the ecological health of the reservoir.

Setting a stage for the Blue Revolution, the Central Marine Fisheries Research Institute (CMFRI) has kick-started a major project for boosting the open sea cage farming in Indian waters.According to CMFRI Director A Gopalakrishnan, the cage fish farming technology has proved 70 times more productive than the normal methods of the fish farming in ponds.

The fishermen at Dowleswaram reservoir also expressed the view that Government should support the fishermen by providing them with the equipments improving the market opportunities, regulating fishing seasons, releasing of fish seed into reservoir.

In the light, of the above observations the authors are of the opinion that Government can take initiation in implementing cage culture in the Reservoir and encourage fishery development in natural reservoirs which makes it economically and environmentally viable.

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