



## Economic Valuation of Reservoirs in Terms of Agricultural Productivity and Fishery in Dry Region of Sangli District, Maharashtra

*Alaka Patil*

*Department of Botany, Padmabhushan Dr. Vasantraodada Patil Mahavidyalaya, Tasgaon District, Sangli, (M.H)*

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**ABSTRACT :** The paper reports significance of man made reservoirs in agricultural productivities and fishery in arid tahsils of Sangli district of Maharashtra. Cropping pattern was found changed from rainfed crops to cash crops like wheat grapes and grams. Water is also useful for inland fishery by some community as a income source. Fishery is one of the important extractive uses of the wetlands. It is one of the additional economic dimensions of farmers having wetland availability.

**Keywords :** Agricultural productivity, Fishery, Sangli district.

### INTRODUCTION

Water is the prime natural resource, a basic human need and a precious national asset. The quality of water is of vital concern for mankind since it is directly linked with human welfare. Water is utilized for domestic purpose, for industrial applications, agriculture purpose, as well as for inland fishery.

Agricultural productivity is very complex phenomenon dependent on various physical, edaphic, socio-economical and technological factors. It is expressed in terms of output per unit of input. It is also a measure of agricultural efficiency depending upon the man made framework to exploit the reservoirs. The availability and supply of water through different modes of irrigation is key factor in determining the agricultural production in general.

In Maharashtra, 13% agricultural land is under irrigation. There are 14 districts come under drought prone situation, Sangli is one of them.

Simultaneously, fishery is also one of the important productivity of water bodies. It is an additional source of income to fisherman community. The present work is on three water reservoirs of Sangli District with respect to agricultural productivity and fishery.

The present work, therefore, is an attempt to assess the productive potential in terms of agricultural and fishery of a fresh water reservoirs of arid tahsils of Sangli district,

### STUDY AREA

Geographically, Sangli district is divided into two zones. Krishna river basin area and eastern drought prone region of the district which is away from river basin with low rainfall and with typical geographical set up.

The eastern part of the district shows low fertile soil because of natural set up where man-made reservoirs have become source of irrigation besides the well. This region includes Khanapur, Atpadi, Kavathe-Mahankal, Jath and

eastern part of Tasgaon tahsil. This eastern region shows scarcity of water leading to general dry climate. The present work is restricted for the study of man-made reservoirs of the drought prone eastern part of the Sangli district.

These tahsil have some minor irrigation reservoirs constructed where rain water is stored from adjoining catchment area. This stored water is being utilized in dry months for many purposes.

Attempts have been made to know the significant role in social and financial upliftment of local inhabitants with special reference to agricultural and fishery.

### MATERIAL AND METHODS

The socio-economic aspects of these reservoirs have been studied during July 2008 to August 2010. Local people from the respective villages were interviewed with the help of questionnaire. The data obtained through questionnaire is analysed in laboratory and used for discussions and further results. Other visual observations were also made for these reservoirs. Secondary data was obtained through survey with respect to fishery and agricultural productivity.

The socio-economic survey was conducted adjoining the nearby villages of reservoirs randomly. The household head considered as unit of analysis of profile.

The fishes captured by fishermen were observed during the regular visits of study period. Fishermen and their family members were interviewed about their whole activity and their profit. Fishes were identified following the state keys of Jhingran (1982, 1991), Jayaram (1999).

### RESULT AND DISCUSSIONS

The stored rain water in the reservoirs is used for drinking, irrigation as well as for domestic purpose. The fishing activity by the adjoining villagers and farmers is the additional income source. From human civilization, irrigation is an age old art, to increase the crop production

for growing population. The government policies encouraged the farmers to utilize surface water, ground water resources by providing financial support. Doshi and Pujari (1997) reported that in the drought prone districts of Maharashtra, there is changing crop pattern and crop yield. The quantity and quality of human efforts modify the farm practices at farm as well as regional level.

Singh and Dhillon (1984) reported the significance of the use of water resources. Irrigation system is regional economic development. Any future planning of irrigation depends upon the basic and essential aspect of supply of agricultural water from ground and surface resources

After construction of the reservoir, the farmers started cultivation of crops like wheat, sugarcane, gram and cotton. Some farmers are cultivating grapes, vegetables etc. The farmers were initially cultivating rain fed crops only jowar, maize, tur and urid before construction of reservoir.

In the survey of Atpadi town, majority farmers are cultivating pomegranate, cotton and side by side wheat and jowar on large scale while, sugarcane and gram on small scale (Fig. 1).

Fig. 2 represents changing crop pattern at Sidhewadi after construction of Sidhewadi reservoir. Here majority of the farmers are cultivating export quality grapes, wheat, and gram. Comparatively sugarcane and vegetable growers are very less.

Borgaon villagers were earlier growing only the rain fed crops and cereals. But currently, those farmers are cultivating wheat, sugarcane, gram, grapes on a large scale, while vegetables and betel leaf on small scale (Figure 3). The scenario has been changed totally in the studied area.

All surveyed villages were initially cultivating rain fed crops like *Sorghum bicolor* (L.) Moench var *bicolor*, *Cajanus cajan* (L.) Millsp., *Vigna mungo* (L.) Hepper, *Vigna unguiculata* (L.) Walp. Subsp. *cylindrica* (L.) Eseltine, *Vigna radiate* (L.) Wilczek, *Vigna aconitifolia* (Jacq.) Morechal, *Eleusine coracana* (L.) Gaertn., *Pennisetum americanum* (L.) K. Schum, etc. but now they are shifted to fruit crops and cash crops. Because the water supply was low especially, during March, April and May due to dead storage of water in reservoir.

Datye *et al.* (1988) have noticed similar type of changes in drought prone region of Sangli district. Sathe *et al.* (2006) have reported changing pattern of rain fed crops to sugarcane, wheat and grapes in Ped, Pundi, Morale villages of Tasgaon tahsil. Doshi and Pujari (1997) have also observed that farmers are shifted to cultivate fruit crops like ber, pomegranate, mango and grapes depending up on nature of land and water resources. The changing crop pattern and further economy is entirely based on available water resources.

Thus, based on the studies it can be suggested to recharge, to maintain and to increase the water resources

in drought prone areas is the need. Further, their management and conservation will lead to sustainability.

Niranjan Kumar *et al.* (2008) have reported the ground water of Gajwel is excellent for agriculture purposes.

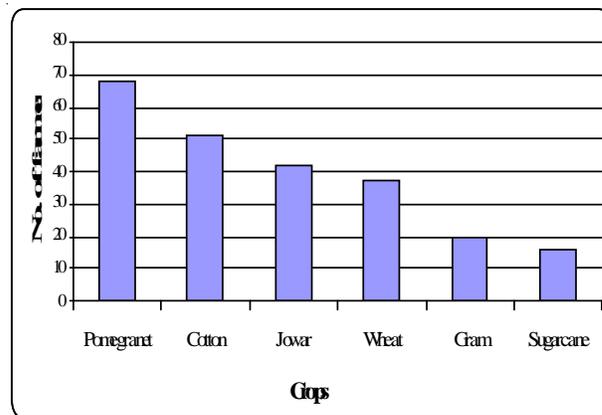


Fig. 1. Cropping pattern of Atpadi.

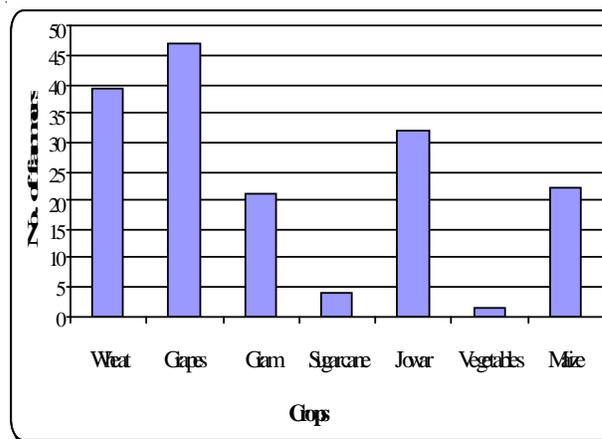


Fig. 2. Cropping pattern of Sidhewadi.

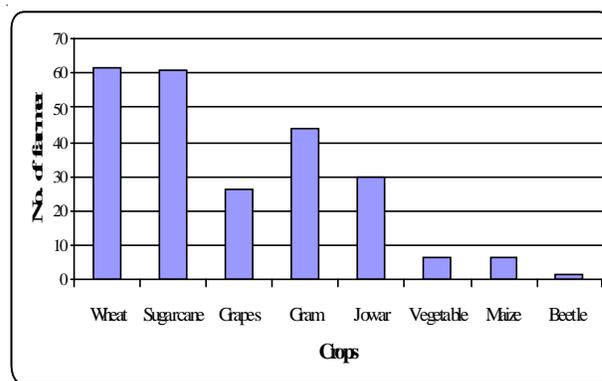


Fig. 3. Cropping pattern of Borgaon.

**Fishery and Lively hood :** In India, especially during last four decades fishery is adding considerably to the already existing rich water potential for the development of country's fishery resources. Fish fauna of various reservoirs have been reported by David (1969), Dey (1978), Jhingran (1982), Sharma *et al.* (2004), Hujare (2005) and Dakhad *et al.* (2008). Basically, these reservoirs were constructed for

irrigation. Earlier, fishery was neglected, but developments related to fishery were initiated last few years.

Fishermen community of Bhoi, Bagadi and Koli races and also muslim people generally, do the fishing at all reservoir. Nearly 10-12 families of fishermen migratory community located along the bank of Sidhewadi reservoir for three-four months. All the fishermen communities are poor and uneducated. The new generation has got 3-4 years of basic education. The involvement of children in fishing is often noted. These children are withdrawn from schools and are involved in fishing.

At Atpadi, Borgaon and Birnal local Hindu people do the fishing from last five years.

Sreekantha and Ramachandra (2005) have reported the very poor fishermen community permanently located along the banks of Linganamakki reservoir of Sharavati River.

**Fishermen co-operative society :** The fishermen have established the co-operative societies. These societies obtain the right of fishing from government authorities for a period of five years on lease. If a tank is on lease by person or supported by co-operative society then, fisherman has to pay 10 Rs. per kg per day to lease man or co-operative society. The collected amount is used to purchase the seed of carp. The societies are actively engaged in fishing as follows:

1. Jay malhar fishery co-operative society, Atpadi.
2. (i) Sidheshwar fishery co-operative society, Savlaj.  
(ii) Shri R.R. Patil fishery co-operative society, Waiphale.

These both the societies working for Sidhewadi.

3. Samrat fishery co-operative society, Borgaon.
4. Jyotirling fishery co-operative society, Kumbhari at Birnal.

Sreekantha and Ramachandra (2005) have observed fishermen co-operative society located at Sagar taluk of Shimoga district in Karnataka.

**Occurrence and Diversity :** Fishes make up most of the abundant classes of vertebrates, both in terms of number of species and number of individuals. 21723 species of fish under 4044 genera, 445 families and 50 orders has been recorded in the world (Hora 1921).

Talwar and Jhingran (1991) estimated 2546 species of fish belonging to 969 genera, 245 families and 40 orders. According to Jayaram (1999), among 2500 species, 930 are fresh water inhabitants in the Indian region alone. Biodiversity is essential for stabilization of ecosystem, protection of environmental quality, for understanding intrinsic worth of all species on the earth (Gadgil and Kar 2000). In the recent past much literature has been generated about pollution effects of various chemicals on different

organs of different fishes (Saksena 1987, Sadhu 1993, Banarjee and Bhattacharya 1995, Gautam and Ritesh 1995, Nagrajan and Yuvarani 2006).

Table 1 highlights fish fauna in Atpadi, Sidhewadi, Borgaon and Birnal reservoir. During this study 5 species of cultivated carps have been identified. There are about 10 local fish species found in the reservoir along with a crab variety.

The prominent major carps are *Labeo rohita* (Rohu), *Catla catla*, *Cirrhinus mrigala* (Mrigal). The common carp is *Cyprinus carpio*. The Chinese carp is *Hypolithalimichthys molitrix* (silver carp).

The local fish varieties like (Tambir) *Labeo fimbriatus*, (Kanas) *Labeo calbasu*, *Chana gachua* (Dokrya), *Chana marulius* (Murel), *Mastocembelus* (Vam), *Ompok bimaculatus* (Khaprya), *Glossogobius girris* (Putia), *Barbus minor* (Singi), *Mystus malbaricus* (Shingati) and *Ambasis ranga* (Kanchki). *Crabs Barytelphusa spp.* found only in Sidhewadi.

*Labeo rohita* is commonly occurring fresh water major carp fish, available in the local ponds and rivers (Saradhamani *et. al.* (2007).

The catch from rivers and reservoirs includes two species of family *Masacembalidae* that is *Mastocembelus armatus* and *Mastocembelus aculatus*, from which *Mastocembelus armatus* species was found more common. Chavan *et. al.* (2005) have reported that *Mastocembelus armatus* species was already enlisted in the threatened checklist of *Ichthyofauna* from Marathwada region of Maharashtra.

*Cirrhinus mrigala*, *Catla catla*, *Labea calbosu*, *Labeo rohita*, *Ompok*, *Mastocembelus armatus* were recorded in the 11 water bodies of Assam by Kar *et. al.* (2009).

The present investigation reveals that a slightly seasonal variation occurs in physico-chemical parameters which can thrive well in environmental conditions and towards conservation of valuable fish resources.

**Table 1 : Diversity of Fishes from reservoirs.**

Local name	Scientific name	A	S	Bo	Br
Rohu	<i>Labeo rohita</i>	+	+	+	+
Catla	<i>Catla catla</i>	+	+	+	+
Mrigal	<i>Cirrhinus mrigala</i>	+	+	+	+
Cyprinus	<i>Cyprinus carpio</i>	+	+	+	+
Silver carp	<i>Hypolithalimichthys molitrix</i>	+	+	+	+
Tambir	<i>Labeo fimbriatus</i>	+	+	-	-
Kanas	<i>Labeo calbasu</i>	+	+	-	-
Dokrya	<i>Chana gachua</i>	+	+	-	-
Murrel	<i>Chana marulius</i>	+	+	-	-
Vam	<i>Mastocembelus armatus</i>	+	+	+	-

Khaprya	Ompok bimaculatus	-	+	-	-
Putia	Glossogobius girris	+	+	-	-
Singi	Barbus minor	-	+	-	-
Shingati	Mystus malbaricus	+	+	-	-
Kanchki	Ambasis ranga	-	+	-	-
Crabs	Barytelphusa sp.	-	+	-	-
Total		12	16	06	05
A: Atpadi reservoir		S: Sidhewadi reservoir			
Bo: Borgaon reservoir		Br: Birnal reservoir			

**Productivity :** In rainy season (July-August) about 5 thousand fingerlings per year of carps are released in each reservoir by co-operative societies.

The fishing season initiates in the month of January and extends up to May. Nearly 200 days out of 365 days are used for fishing.

Fishing activities usually done by gill nets locally known as kandimini, besides these the cast nets are also used for fishing.

Average weight of single fish ranges between 250 g to 500 g. A team of fishermen collect about 10 to 20 kg fishes per day.

**Marketing and Income :** Collected fishes brought to the shore and sorted according to the species and size of fish. Small and medium sized fishes got better demand and market value. The fishes were sold at the rate of 40-50 Rs/kg in the market. The fishes were purchased by the merchants or whole salers at lower prices. Sometimes, the fishermen would do the retail selling of fishes and gain the profit of 20 to 40% (Table 2).

**Table 2 : Average fish catch and profit of fisherman and lease man.**

Duration	Fish catch	Profit of fisherman (Rs)	
		40-50 Rs/kg	10 Rs/Kg
1 Day	10- 20 kg.	400-1000	100-200
3 Days of week	30- 60 kg.	1200-3000	300-600
1 Month	120-240 kg.	4800-12000	1200-2400
5 Months	600-1200 kg.	24000-60000	6000-12000

## CONCLUSION

The stored water from reservoirs is utilized for agricultural irrigation. Cropping pattern is changed in nearby villages. Majority of farmers have shifted from dry land agriculture to horticulture and commercially important cash crop cultivation. The reservoirs are found more beneficial especially to marginal land owners. Majority of farmers have improved their financial status.

The reservoirs are significant for in land fishery. The fisherman community is dependent on these water bodies

for fish catch as income source.

Few local fishes are identified from the water bodies *i.e.* local diversity of aquatic ecosystem has maintained well.

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