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Status of Kolleru Lake fishers in Chettunnapadu village, Andhra Pradesh

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Abstract

Objective: The study would try to find out fishers socio-economic status, fishing as a means of livelihood and its economic viability and income equality among them in order to suggest measures to improve their living conditions.
Methods: Primary data were collected from the fishers by using pre-tested interview schedule, B:C ratio to see the economic viability, Lorenz curve and Gini index in order to find out the income inequality among them.
Findings: The Kolleru being largest freshwater lake in India is recognised as internationally important wetlands by the RAMSAR convention. It not only renders eco services but also as an important means of livelihood for nearby villages. Nearly for 6-7 months fishers are getting direct benefits by fishing. The living condition is quite satisfactory as majority of them are living in pucca houses. Their monthly average income is about ₹11740 which is significantly different from the income obtained from alternative livelihood sources (₹10572) as p value of Z test is less than 0.05. The B:C ratio of 1.33 reveals that fishing is profitable for them. The income equality among fishers is measured by using Lorenz curve and Gini index and their respective values of 0.086 and 0.173 tell that inequality among them is very less.
Application: Encouraging women to take part in post-harvest works and preparation of value added products will increase their monthly income. Provisions for the agriculture development will provide alternative livelihood during off season. Communities must bear the responsibility to keep the Lake healthy in order to act not only as a means of livelihood for fishers but also for the eco services it renders. The extension services for creation of such responsibility among communities and fishers through department of fisheries are highly recommended.
Keywords: Kolleru Lake, Fishers, socio-economic status, B:C ratio, Lorenz curve and Gini Index.

1. Introduction

The Lake Kolleru is the largest freshwater lake in India with 39 km length and 22 km width. It is situated between Krishna and West Godavari districts of Andhra Pradesh. Out of the total catchment area of 6121 km^2, 4763 km^2 is upland area and 1358 km^2 is deltaic [1]. Depending up on the seasonal inflows and outflows the lake area will vary hence has no definite boundaries as like all other inland wetlands. The lake could extend up to +10 feet contour with 901 km^2 water-spread area and 3-4m average depth during monsoon. It contrasts to +3 feet contours with 135 km^2 water spread area during summer. The lake acts as a natural flood-balancing reservoir for the rivers Krishna and Godavari [2]. During 1999, about 308 km^2 of the Lake area which fall below +5 feet above MSL contour line was declared as Kolleru Wildlife Sanctuary (KWS). It is declared as an internationally important wetland by the RAMSAR convention in November 2002 for conservation. It is a prominent habitat for a number of residents and migratory birds including the vulnerable grey pelican. Barman, 2004 [3] reported that the lake is endowed with 51 freshwater fish species belonging to 35 genera, 21 families and 9 orders. Apart from these natural services, it is also providing a livelihood for nearby villagers. Human settlement in the lake is spread over the islands, bed area and the marginal (borderline) area.

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Fishing is the Primary occupation of bed villagers due to immense presence of aquatic fauna and agriculture has second priority [4]. Very recently the chief minister of AP announced for the exemption of 20,000 acres of land from the lake protection area that leads to shrinkage of lake area to 58000 acres (timesofIndia.com). Considering the lake management decisions of Government and dependency of local people on the lake for livelihood, a study has been conducted to observe fishers living conditions.

1.1. Study area and sampling

The study has been done in Chettunnapadu, a bed village of Bhimadole Taluk, West Godavari district. A sample of 50 fishers has been surveyed using a semi-structured interview schedule.

2. Materials and Methodology

1. Fishing equipments and Fishing method

The Kolleru lake fishers are basically traditional fishers hence use traditional non-motorised and gears. However, in some villages the motorised boats could be seen. But in the study area only the traditional crafts and gears are being used. The dugout canoe and boats made of iron sheet are commonly seen in the study area. Most commonly used gears include gill nets, cast nets, traps, hook and lines etc. Many of the fishers spend 8-10 hours in a day on an average in fishing. Community organisation prevails in the study area and plays a critical role in the management of the lake. Hence the fishers are allowed to fish only for 4-5 months in a year and thereafter the communities leased out the parts of lake water area to individuals through open bidding process where the interested local people are actively participate. Since the fishers are actively engaged in fishing for 4-5 months, the cost-returns have been estimated. The primary data has been collected from them from October to December, 2017. Samples of 50 fishers who have gone for fishing during survey time are randomly selected and cost-returns of fishing activity are estimated. Various costs associated with their fishing activity are defined as follows:

The investment comprises of cost of boat, gears and other miscellaneous costs.

2. Fixed costs

A cost which remains same irrespective of the level of output is called fixed cost. The fixed costs include the following items;

Depreciation on fixed assets: Calculated using straight line method

$$Depreciation\ (perannum) = \frac{Originalcostofasset - Junkvalue}{Usefullifeoftheasst}$$

Note: The junk value is the value of asset after its useful life which is assumed as zero

Interest on fixed capital: Calculated @ 12% per annum

Costs incur on repair and maintenance of fixed assets is estimated as per the information collected from sampled fishers.

3. Variable cost

These costs vary with the level of output. The daily expenses which spent by the fishers for fishing are categorised under variable costs. These costs include; cost of gears, interest on working capital (@8.5% per annum), imputed labour charge and miscellaneous charges for purchasing torch lights, sweaters etc.

4. Gross income

It is calculated by multiply the average fish catch and price

$$\text{Gross income} = Q*P$$

Where;

Q = average monthly catch

P = price received (₹/Kg)

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5. Net income

It is the portion of total earnings left with the fisher after deducting all expenses (fixed costs and variable costs).

Net Income= GI-TC

GI = Gross Income
TC= Total Cost
TC= Total Fixed Cost (TFC) +Total Variable Cost (TVC)

6. Benefit Cost Ratio (B-C Ratio)

It is the ratio between Gross Income (GI) and Total Costs (TC) of fishing and algebraically it is shown as;

$$B-CRatio = \frac{GrossIncome}{TotalCost}$$

7. Income inequality among fishers

According to [5], fisher's income depend on daily fish catch which varies time to time hence their income is found to be less. However, there is little variation in fisher's income itself which is dependent upon number of earners in a family, type of gear used and other sources of income for each family. In order to see income equality among fishers, the Lorenz curve and Gini Index techniques are used.

The Lorenz Curve is a graphical representation of income distribution and it tells us which proportion of total income is in the hands of a given percentage of population [6]. The Lorenz Curve intended to relate the cumulative proportions of income and individuals (fishers). The cumulative proportion of population (fishers) based on their ranking order has been taken on the X-axis and its range is in between 0 to 1. The cumulative proportion of incomes of a given population is taken on Y-axis. The income share is calculated by taking the cumulated income of a given population divide by the total income. The formula for the same is as follows:

$$\boldsymbol{L}\left(\frac{\boldsymbol{k}}{\boldsymbol{P}}\right) = \frac{\sum_{i=1}^{k} y_i}{Y}$$(Value range between 0 and 1)

Where;
$\sum y_i$ is the cumulated income up to the k^{th} individual
K=1……n is the position of each individual in the income distribution
I=1…….k is the position of each individual in the income distribution
P is the total number of individuals in the distribution
Y_i is the income of the i^{th} individual in the distribution

8. Gini index

The Gini coefficient/index is a measure of inequality of a distribution [7]. It is defined as a ratio and the value found in between 0 (perfect income equality) and 1 (perfect income inequality). The numerator is the area between the Lorenz curve of the distribution and the equidistributional line (marked with letter A) and the denominator is the entire area under the equidistributional line (marked with letter B and the value is 0.5). The index is expressed in percentage. The Gini coefficient is equal to half of the relative mean difference. This index assumes that no individual has a negative net wealth/income. The Gini index is given by:

$$Gini = \frac{Area\ (A)}{0.5}$$

The area A (area between the Lorenz curve and the equidistributional line) is the difference between total area under the equidistributional line (i.e. 0.5) and area B where B is calculated by using the formula;

$$Area\ (B) = \frac{X_{i-1} + X_i}{2} * \frac{1}{n}$$

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3. Results and discussion

1. Socio-economic condition of fishers

Out of 50 sampled fishers about 80% had nuclear families and 64%had small family size comprising 4 members. About 62% of fishers belonged to the social group OBC and remaining are fall under Scheduled Caste. The housing condition is found to be satisfactory as 60% are living in pucca houses. The majority of fishers (44%) are in the age group of 31-40 and 14% of fishers have more than 50 years of age. The literacy rate is found to be low as 44% of them had not experienced school. About 30% of fishers studied up to primary level. The percentage of fishers obtained higher education (who studied up to higher secondary) was only 10%.

None of the fishers have their own land to provide income on regular basis. A negligible per cent (4%) of fishers have taken land for lease and using it for paddy cultivation. About 98% of total respondents go for fishing and 88% of them are fulltime fishers. The part time fishers who do fishing during peak season comprise 10% and the remaining are occasional fishers as they do fishing only in leisure time as and when they do not find any other work on that particular day. The monthly average income of fishers household was ₹11740 which is mainly depend on season, type of gear used, number of hours spent on fishing and also on the market price for a particular fish species on that day. The daily average catch is in the range of 4 Kg to 20 Kgmaximum. The catch comprises locally important species like Tilapia, Singhi, Magur and high priced Channa species etc. The lake remain a major livelihood source for 5 to 7 months in a year and the remaining months they engage in other occupations such as labour in aquaculture ponds and agriculture fields, rearing livestock and self-employed in post-harvest works like preparing dry fish and selling the same in local markets etc.

The average income obtained from these alternative sources is ₹10572 which is slightly less than the average income obtained from fishing. The p value of Z test is 0.047 which is less than 0.05; hence there is a significant difference between two income sources.

2. Cost and returns of fishing activity

2.1. Initial investment

The initial investment associated with the fishing activity comprises only the cost of boat. It is found that there are only two types of traditional viz. dugout canoe and the boat made of iron sheet that are in use. The average costs of traditional and iron boats are ₹8825 and ₹12,803.57 respectively.

2.2. Economic evaluation of fishing

Fishing is considered to be the primary occupation for about 85% of households in the village. The daily average catch is in the range of 4 Kg to 15 Kg with an average of 8 Kg. The catch will be sold in fresh form to the local venders or direct marketing in nearby cities.

Table 1. Cost-returns

Item	Cost (₹)
Fixed investment	
Cost of boat	10814.29
Interest on Fixed capital	1297.71
Depreciation	889.88
Repair and Maintenance	2524.16
TFC (A)	4711.76
Variable Costs	
Cost of gears	5422.79
Interest on Working Capital	544.84
Misc. charges	1126.26
TVC (B)	7093.89
Imputed labour charge ©	35493.79
TC (A+B+C)	47299.43
Gross Income from fishing	62908.48
Net income from fishing	15609.05
B-C Ratio	1.33

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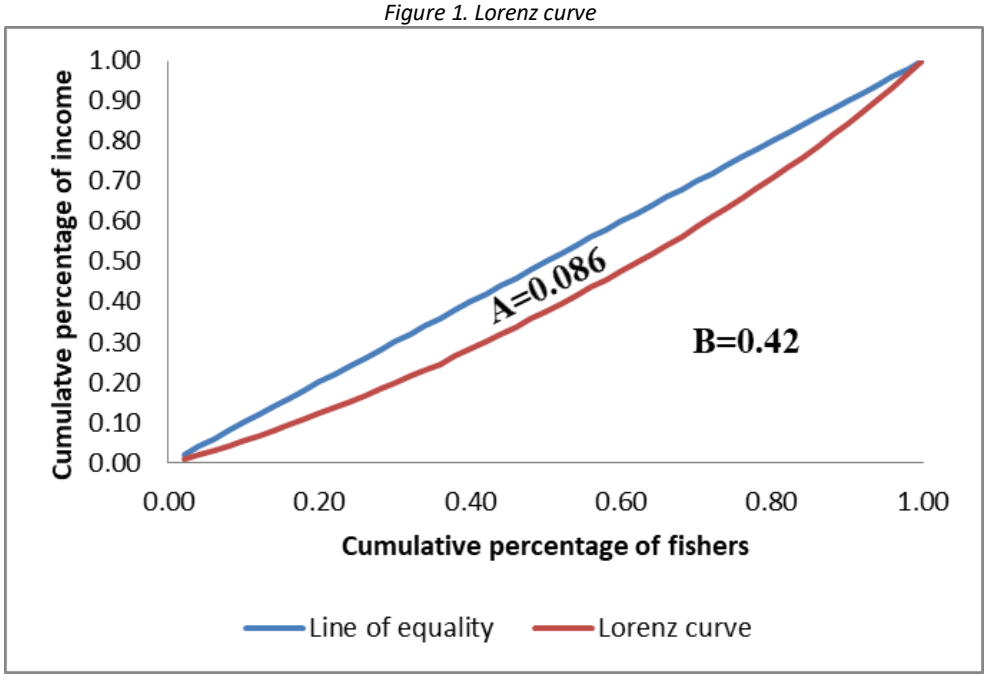
The gross income obtained was ₹62908.48 which is arrived by multiply average daily catch with price received for fish. The imputed labour charge is assumed as wage received by a daily labour in the village from any means of livelihood. The B-C ratio (1.33) of fishing activity is found to be positive hence the fishing is profitable for them. The details of various costs along with the B:C ratio is portrait in Table 1.

3. Income equality among fishers (Lorenz curve)

Income inequality among fishers is graphically represented by plotting cumulative percentage of income against cumulative percentage of fishers and depicted in the Figure 1. The straight line (45^o line) is the line of equality that explains all the fishers have same proportion of income (i.e. their incomes are equal). The Lorenz curve (curved line) tells that the proportion of income owned by a given proportion of population. From the origin if we pass through the curve, the proportion of income owned by a given proportion of population is usually less (i.e. first 10% of the population hold only 5% of the total income). This means there are another 10% of population which holds more than proportionate income. The area between the line of equality and Lorenz curve is calculated and the value is 0.086 that indicates inequality among fishers is less. The household income of sampled fishers is almost same hence inequality among them is found to be less.

Figure 1. Lorenz curve



4. Gini index

It shows the inequality among fishers. The value is estimated using the formula and is found to be 0.173. The Gini index value is close to zero; hence inequality among fishers is less.

4. Conclusion

The study highlights the socio-economic status, cost-return of fishing activity and income equality among fishers of Kolleru Lake to understand their living conditions. It is found that about 66% of fishers are living in Pucca houses. Literacy is found to be low (44%) which has to be focussed and they must be encouraged towards higher education through proper policy. Since 88% of respondents are fulltime fishers, they all are happy with the income they get through fishing. But on the other hand they are the major sufferer's due to off seasons and enforcement of community regulations on fishing for certain period hence they have to search alternative livelihood source. Lack of agriculture and being aquaculture dominating village, availability of labour work is quite difficult. Even though males get labour work on fish/shrimp ponds and other similar kind of works, females have to set back at homes though they are willing to work as they get no work which leads to migration of latter in search for same.

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The monthly average income of fishers is ₹11740 which is significantly different with the income obtained from alternative livelihood sources (₹10572) as p value of Z test is less than 0.05. The local demand is that there must be a provision for agriculture development which will provide not only additional income but also employment during off season. Women can be encouraged to start up dry fish processing units which are already being practiced at small scale by few of them and production of value added fish products such as preparation of fish pickles etc. Production of ornamental fishes could be another income generating and employment option for them. Since the community management is being followed, responsibility of keeping the Lake healthy should be borne up on them itself in order to act not only as a means of livelihood for fishers but also for the eco services it renders. The extension services for creation of such responsibility among communities and fishers through department of fisheries are highly recommended.

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