Impacts of Capture Fishery on Income and Its Equity among Fisher Households' of Tripura

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ABSTRACT

The study has assessed the income distribution pattern across fisheries households involved in capture fishery in the state of Tripura. The study is based on the responses of 90 fishers involved in capture fishery and 140 households involved other fisheries activities. The study has revealed that the fishers involved in capture fishery, improving equitable distribution of income across the fishers than households involved in other fishery related activities. The study has suggested proper management of capture fishery will leads to brings more income to the fishers and also it will help to bring more equal distribution of income.

1. Introduction

Tripura is one of the North Eastern Hill (NEH) States of India and economy of the state is dependent on agriculture and allied activities. Fisheries considered as one of the vital sectors for economic development of the state. Fisheries sector in the state has witnessed an impressive growth in recent past and transition is underway from a traditional activity to well developed commercial activity. The state has potential resources in the form of 25,661 ha water area under culture fisheries and 7,879 ha under capture fisheries (Government of Tripura, 2015). In spite of 23 percent contribution of capture fishery in state fisheries resources, its contribution in fish production is only 2 per cent of the total fish production in the state during the year 2014-15 which is very negligible. Considering the increasing role of capture fishery in the state, the state government has implemented various development programmes (Katiha *et al.,* 2005). The state government of Tripura is also investing lots of money for development of capture fishery resource and its productivity (GoT, 2015). But whether this investment of the government is helping in enhancement of income of fisheries households, if yes then whether increase of income is equally distributed or not is matter of the policy interest.

With this background of importance of capture fishery, the study has examined the impact of capture fishery on income generation and its distribution.

2. Materials and Methodologies

2.1 Data

The study used primary data collected through multi-stage stratified random sampling of rural households related to fisheries. Four among the eight districts of the state *viz.* Dhalai, South, North and West Tripura districts were selected based on high and low fish production performance record during last few years. Two sub-divisions from each selected district and one rural development block from each selected sub-division was selected randomly. Thus a total of 8 rural development blocks were selected randomly. From each of the selected rural development blocks, 4 villages were selected randomly. A village wise list of households directly or indirectly involved in fisheries activities like production, fishing, fish retailing, wholesaling and other facilitative activities like ice providers, packaging, etc. were prepared. A total of 90 sample households involved in capture fishery and 140 sample households were selected those are directly or indirectly related to fisheries related activities. Thus a total of 230 sample households were selected from the study area.

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The data from sample households was collected by personal interview method with the help of pre-tested schedules specially designed for the study. The collected data was analyzed using following methods to achieve the objectives.

2.2 Gini Concentration ratio

Gini Coefficient (Giovanni, 1990) as a measure of inequality of income distribution, can be derived from Lorenz curve. It gives the area enclosed between the observed Lorenz curve and the line of absolute equality as a proportion of the total area under the line of absolute equality.

Thus,

Gini Coefficient = Area between Lorenz curve and diagonal/Total area under diagonal

Obviously, the Gini Coefficient has the maximum value of unity (absolute inequality) and a minimum value of zero (absolute equality). The quantitative measures of Gini concentration ratio is given as follows;

$$L = 1 - \sum_{i=1}^{n} P_i \left(I_i + I_{i-1} \right)$$

Where,

P_i = Cumulative proportion of fisher households at i^{th} class

I_i = Cumulative proportion of total income at i^{th} class

i = 1, 2, 3....n

n = Number of classes in the distribution.

L = Gini Coefficient

Gini coefficient was estimated to determine the income distribution among the sample households under both categories *i.e.* households involved in capture fisheries and households not involved in capture fisheries.

2.3 The Lorenz curve

Lorenz curve is used in the calculation of degree of inequality/disparity. It plots cumulative percentage of total income against cumulative percentage of total income of recipients, starting with the small income recipients. On horizontal axis percentage of groups of individuals is taken and on the vertical axis percent share of total income is taken. Typically, a point on the curve gives the percentage of the population that accounts for a given percentage of total income. The Lorenz curve assumes the characteristics of 45^0 line, if all the income recipients have equal shares, *e.g.* 10 percent of population have a 10 percent of share in

total income. The extent to which the measured Lorenz curve deviates from the hypothetical line of absolute income equality, called egalitarian line, indicates the degree of income inequality with the sample population. The area enclosed between the egalitarian line and Lorenz curve is called area of concentration and is an indicator of concentration of income. In this study Lorenz curve technique was used to determine the impact of capture fishery on income distribution in the study area.

3. Results and Discussion

As capture fisheries contribution to overall total income of household is 6.21 per cent and playing significant role in total households income. In this regard it becomes very important to know whether this sector is also helping in equal income distribution among rural households of the study area. Against this background the study aims at estimating the magnitude of income inequality among sample households in both who are generating income from common pool resources by involving themselves in capture fisheries and without involving capture fisheries, Gini-coefficient and Lorenz curve for net income were estimated. For this purpose, all the sample households were arranged in ascending order of their annual net income of the household's. After that, grouping of households were made for those engaged in capture fisheries and those not involved in capture fisheries. Gini coefficient and Lorenz curves were estimated for each group and the same have been presented in subsequent tables and graphs. It can be viewed from the table 1 that among the households engaged in capture fisheries consists of 90 households, the bottom 10 per cent of them accounted for only 5 per cent of net total income, while the top 10 per cent of farms enjoyed 16 per cent of total net income, which is an indication of the extent of inequalities prevailing among the sample households who are engaged in capture fisheries. Another important observation pertaining to degree of inequalities households' engaged in capture fishery was that 70 per cent of households accounted for approximately 55 per cent of the total net income, while remaining 45 per cent of the total net income was shared by 30 per cent of households. The graphic presentation of the prevailing inequalities of total net income among the households those are involved in capture fisheries is depicted through Lorenz curve in fig 1. The lying of Lorenz curve below 45^0 line (egalitarian line) shows the existence of income inequality among the households those are involved in capture fisheries.

Table 1. Concentration ratio of income distribution among households involved in capture fisher

Sl. No	Number of households	Proportion of households to total no. of households (P_i)	Cumulative proportion of households to total no. of households	Total income from resource collection (Rs.)	Proportion of income from resources to total income	Cumulative proportion of income from resources to total income	(I_i+I_{i-1})	$P_i((I_i+I_{i-1})$	Gini coefficient
1	9	0.1	0.1	5879	0.05356476	0.05356476	0.05356476	0.00535648	
2	9	0.1	0.2	6573	0.05988793	0.11345269	0.16701745	0.01670174	
3	9	0.1	0.3	7655	0.06974625	0.18319894	0.29665163	0.02966516	
4	9	0.1	0.4	7895	0.07193294	0.25513188	0.43833083	0.04383308	0.20793677
5	9	0.1	0.5	9876	0.08998223	0.34511412	0.600246	0.0600246	
6	9	0.1	0.6	10242	0.09331693	0.43843105	0.78354517	0.07835452	
7	9	0.1	0.7	12350	0.11252335	0.5509544	0.98938545	0.09893854	
8	9	0.1	0.8	14530	0.13238577	0.68334017	1.23429457	0.12342946	
9	9	0.1	0.9	16879	0.15378798	0.83712815	1.52046832	0.15204683	
10	9	0.1	1	17876	0.16287185	1	1.83712815	0.18371281	

Table 2. Concentration ratio of income distribution among households not involved in capture fishery

Sl. No	Number of households	Proportion of households to total no. of households (P_i)	Cumulative proportion of households to total no. of households	Total income from resource collection (Rs.)	Proportion of income from resources to total income	Cumulative proportion of income from resources to total income	(I_i+I_{i-1})	$P_i((I_i+I_{i-1})$	Gini coefficient
1	14	0.1	0.1	2433	0.0432402	0.0432402	0.0432402	0.0043240	
2	14	0.1	0.2	2650	0.0470968	0.0903371	0.1335774	0.0133577	
3	14	0.1	0.3	3890	0.0691346	0.1594718	0.2498089	0.0249808	
4	14	0.1	0.4	4010	0.0712673	0.2307391	0.3902109	0.0390211	
5	14	0.1	0.5	4245	0.0754438	0.3061830	0.5369221	0.0536922	
6	14	0.1	0.6	4255	0.0756215	0.3818046	0.6879876	0.0687987	0.33122256
7	14	0.1	0.7	4387	0.0779675	0.4597721	0.8415767	0.0841576	
8	14	0.1	0.8	4580	0.0813976	0.5411697	1.0009419	0.1000941	
9	14	0.1	0.9	5064	0.0899994	0.6311692	1.1723390	0.1172339	
10	14	0.1	1	20753	0.36883075	1	1.63116925	0.16311692	

In addition to Lorenz curve, Gini concentration ratio was also worked out to assess the extent of income inequality among the households which were involved in capture fisheries. Gini coefficient was calculated to be 0.207, which indicates high degree of income inequality among the households involved in capture fisheries. When the net income of households those were not involved in capture fisheries was examined (Table 2), it was found that the bottom 10 per cent of households had only 4 per cent of total net income, while the top 10 per cent of households were commanding 37 per cent of total net income. This is symptomatic of presence of income inequality among the households those were not involved in capture fisheries. Further, it can be viewed that 70 per cent of the households were possessing only 46 per cent of total net income while the remaining 30 per cent of households had 64 per cent of net income confirming the presence of high degree of inequality in income distribution among the households not involved in capture fisheries. The graphic presentation of the net income of households not involved in capture fisheries is depicted through Lorenz curve in fig 2. The line below 45^0 line (egalitarian line) shows the existence and extent of income inequality among the households. However, the magnitude of Gini coefficient (0.331) in this case was higher than that in case of households involved in capture fishery resources, signifying the fact that income distribution is more even among households dependent on for their income capture fisheries in comparison to other common pool resources. This is also clear from the comparison of Lorenz curve for households those were involved in capture fishery resources and households those were involved in other fisheries related activities, showed
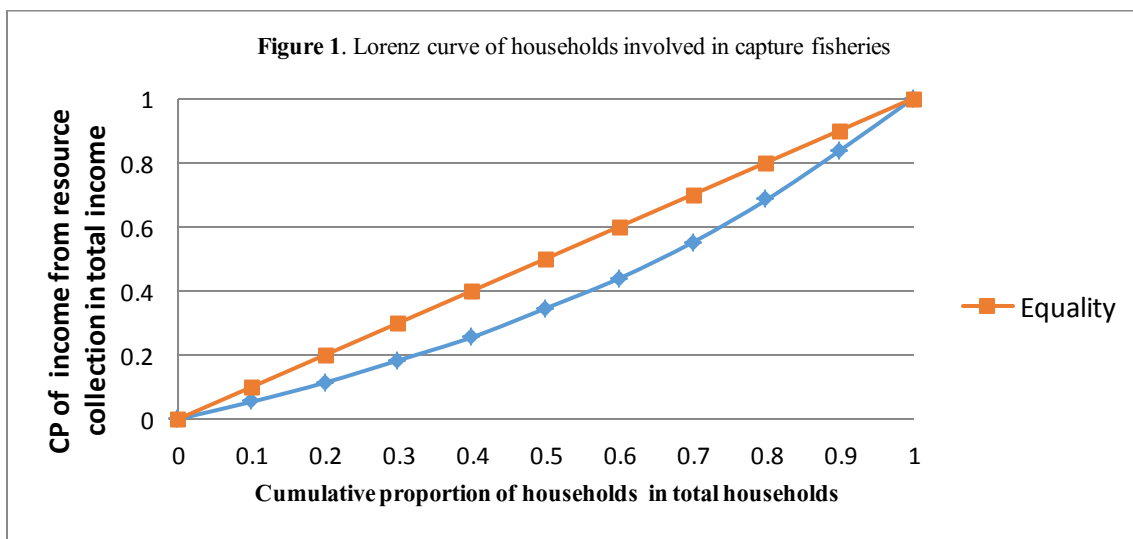
that income distribution pattern is more equal for households involved in capture fishery than others (Fig 3) . This findings of the study also coorborates the study of Das and Kumar (2014) and Singh (2006) where they have found that income generated from fishery also brings more equal distribution of income among the rural households of Tripura.
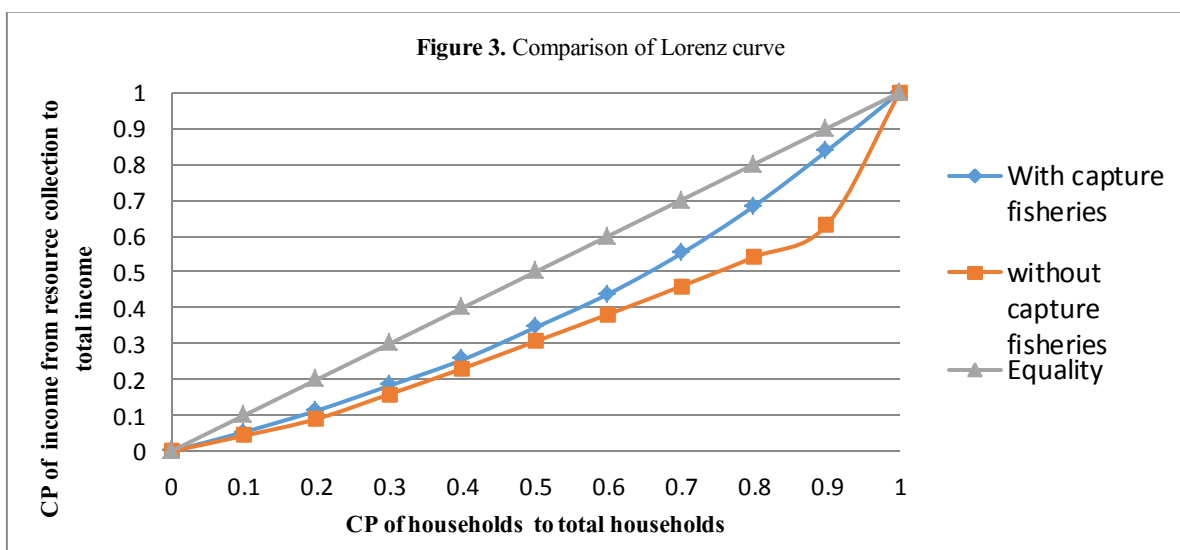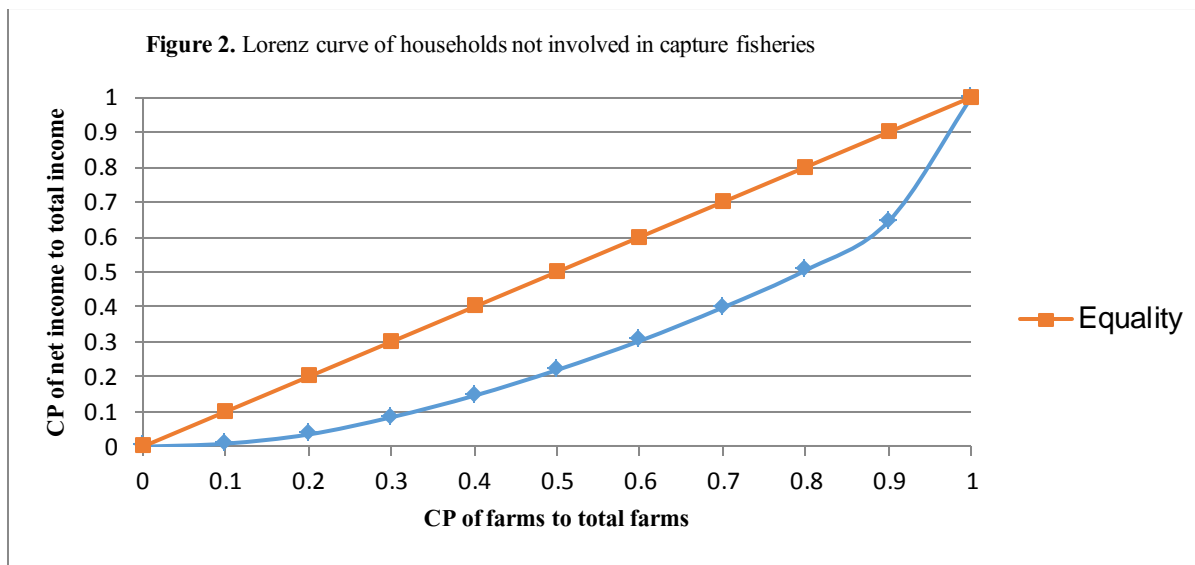
Conclusion

Thus the present investigation of households involved in capture fishery resources for their livelihood generation bringing up equal distribution of income which is good symbol as per income distribution is concerned. Thus gradually with the increase in level of resource collection from capture fishery, income equality may increase among the fishers of the area. Thus capture fishery plays important role for rural households of the state in adding additional income to the households and also to bringing up equality in income distribution pattern.

Acknowledgements

Figure 1. Lorenz curve of households involved in capture fisheries

Figure 2. Lorenz curve of households not involved in capture fisheries

Figure 3. Comparison of Lorenz curve

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