



Common pool resource dependency and its impact on current income and its equity among fisher households in selected districts of Tripura State, North-east India

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ABSTRACT

The study has assessed the common pool resource dependency and income distribution pattern across households involved in fisheries in the North-east Indian state of Tripura. The study was carried out based on the responses of 230 sample households involved in common pool resource collection. The findings of the study revealed income quartile-wise households dependency on different common pool resources to total current income. The dependence on common pool resources does not decline with total current income, instead there was evidence of a decline first and then increase in dependence on common pool resources. The contribution of income from capture fisheries was 18.84, 14.32, 6.70 and 3.6% to the total income of lowest quartile, 25-50% income quartile, 50-75 income quartile and top 25% income quartile respectively. Considering the importance of income generated from capture fisheries resources, the study attempted to find out Gini concentration and Lorenze curve for 90 households involved in capture fisheries. The Gini concentration ratio of 0.207 revealed almost equitable distribution of income across the households involved in capture fisheries. Considering these facts, the study suggested policy measures for sustainable management of open water bodies in the state which will lead to bring in more income to the fishers which would also help to bring equity among households income.

Keywords: Capture fisheries, Gini ratio, Income equity, Lorenz curve

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 is considered as one of the vital sectors for economic development of the state. Fisheries sector in the state has witnessed an impressive growth in the 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 (GoT, 2015). In spite of 23% share of capture fisheries in state fisheries resources, its contribution in fish production is only 2% of the total fish production in the state during the year 2014-15 which is very low. Considering the potential of capture fisheries in increasing fish production in the state, the state government has implemented various development programmes (Katiha *et al.*, 2005). The state government of Tripura is also investing lots for development of capture fishery resources and its productivity (GoT, 2015). Whether this investment is helping in enhancement of income of fisher households and whether the increase in income is equally distributed; is a matter of policy interest. With this background, the present study assessed the common

pool resource dependency and income distribution pattern across fisher households involved in capture fisheries in Tripura State in North-east India.

Materials and methods

Data

The study used primary data collected through multi-stage stratified random sampling of rural households involved in capture 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 recorded during the recent 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 randomly selected. From each of the selected rural development blocks, 4 villages were randomly selected. A village-wise list of households involved in common pool resource collection and are directly or indirectly involved in fisheries activities like production, fishing, fish retailing, wholesaling and other facilitative activities like ice production and packaging, were prepared. A total of 230 sample households consisting of 90 households involved in capture fisheries and 140

households not involved in capture fisheries were selected for the study. The data from sample households were collected by personal interview method with the help of pre-tested schedules specifically designed for the study. Gini concentration ratio and Lorenz curve were used to determine the impact of capture fisheries on income distribution and inequality in the study area.

Gini concentration ratio

Gini coefficient (Giovanni, 1990) as a measure of inequality in 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, 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;

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

where, P_i = Cumulative proportion (CP) of fisher households at i^{th} class; I_i = CP of total income at i^{th} class; $i = 1, 2, 3, \dots, n$; n = Number of classes in the distribution; L = Gini Coefficient

Gini coefficient was estimated to determine the income distribution among the sample households involved in capture fisheries.

Lorenz curve

Lorenz curve is used in calculation of degree of inequality/disparity. It plots cumulative percentage of total income against CP of households. 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° line, if all the income recipients have equal shares, e.g. 10% of population have a 10% 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 in 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.

Results and discussion

The composition of total current income from all sources was derived for 230 sample households and based on the total current income of the households, sample households were divided into income quartiles. Current quartile-wise households income from several common pool resources were estimated based on the study of Narain *et al.* (2008). Perusal of Table 1 indicates large disparity between the lowest income quartile and top income quartile. It is also evident that lowest income quartile had household income of ₹13,946/- per annum from common pool resources and top income quartile had household income from common pool resource collection of ₹11,708/- per annum. The dependence on common pool resources does not decline with income. Instead, there was evidence of decline first, and then increase in dependence on common pool resources. This is in contrast to the findings of Jodha (1986); Reddy and Chakravarty (1999); Bahuguna (2000); Cavendish (2000); Beck and Nesmith (2001); Fisher (2004); Adhikar *et al.* (2004); Adhikari (2005) and Narain *et al.* (2008). This could be attributed to the fact that, owing to free abundance, the resources were more consumed by the lower income quartile. Income from capture fisheries was higher in case of lower income quartile which indicates that the poor were generating more income from these sources since low investment or

Table 1. Composition of current income and demographic characteristics of the sample households (₹ per annum per household)

Source of income (₹)	Current income quartile				Overall
	Lowest 25%	25-50%	50-75%	Top 25%	
Sample size (Nos.)	27	154	37	12	230
Total income	29716.66	52330.19	80879.72	124708.33	58044.56
Income from common pool resources	13946.29	10240.58	10855.40	11708.33	10851.08
Fuel wood collection	559.25	409.41	440.54	466.66	435.00
Dung collection	283.33	358.76	366.21	266.66	346.30
Fodder collection	651.85	714.28	108.10	500.00	598.26
Timber wood collection	3777.77	2198.05	3675.67	2000.00	2610.86
Fruits collection	400.00	249.02	278.37	100.00	319.78
Tuber crops from forest	777.77	866.88	545.94	441.66	794.34
Capture fisheries	5598.69	7496.29	5424.67	4572.97	6725.00

almost no investment was needed in this sector. It has also been observed that top income quartile was also exploring capture fishery resources. The contribution of income from capture fisheries was 18.84, 14.32, 6.70 and 3.6% to the total income of lowest quartile, 25-50% income quartile, 50-75% income quartile and top 25% income quartile respectively.

As capture fisheries contribution to overall total income of household is 11.58% and is playing significant role in total sample households income, it becomes very important to know whether this sector is also helping in equitable distribution of income among rural households in the study area. Against this background, the study estimated the magnitude of income inequality among sample households who are generating income from common pool resources by involving themselves in capture fisheries. For this purpose, all the households involved in capture fisheries were arranged in ascending order of their annual net income and grouping of households were done to estimate Gini coefficient and Lorenz curves. The Gini coefficient has the maximum value of unity (absolute inequality) and a minimum value of zero (absolute equality).

It can be viewed from Table 2 that households engaged in capture fisheries consists of 90 households, the bottom 10% of them accounted for only 5% of net total income, while the top 10% of fishers enjoyed 16% of total net income, which is an indication of the extent of less inequalities prevailing among the sample households involved in capture fisheries.

Another important observation pertaining to degree of inequality in households was that 70% of the households accounted for approximately 55% of the total net income, while remaining 45% of the total net income was shared by 30% of households. The prevailing inequalities of total net income among the households involved in capture fisheries

is depicted through Lorenz curve in Fig. 1. The fact that the Lorenz curve is lying below 45° line (egalitarian line) indicates the existence of less income inequality among the households involved in capture fisheries.

In addition to Lorenz curve, Gini concentration ratio was also worked out to assess the degree of income inequality among the households involved in capture fisheries. Gini coefficient was calculated as 0.207 which also indicates low income inequality among the households involved in capture fisheries. Thus the results as shown by Gini concentration ratio and Lorenz curve, signify that the income generated from capture fisheries display almost equitable distribution of income among households involved in capture fisheries. The findings of the study also corroborates the findings of Das and Kumar (2014) and Singh (2006) who reported that income generated from fishery brings more equal distribution of income among the rural households of Tripura.

Results of the present investigation clearly indicated that the households involved in capture fisheries for their

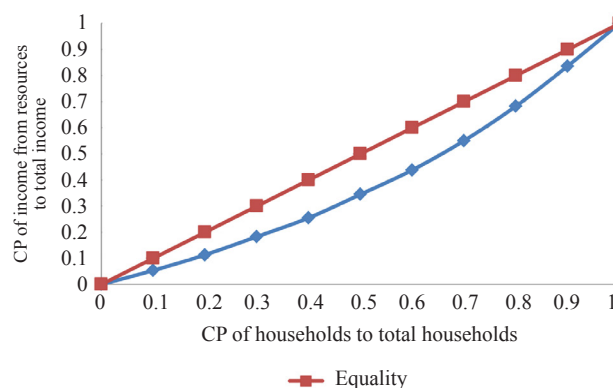


Fig. 1. Lorenz curve of households involved in capture fisheries.
CP - Cumulative proportion

Table 2. Concentration ratio of income distribution among households involved in capture fisheries

No. of households	Proportion of households to total no. of households (P_i)	CP of households to total no. of households	Total income from resource collection (₹)	Proportion of income from resources to total income	CP of income from resources to total income	$(I_i + I_{i-1})$	$P_i(I_i + I_{i-1})$	Gini coefficient
9	0.1	0.1	5879	0.05356476	0.05356476	0.05356476	0.00535648	0.207
9	0.1	0.2	6573	0.05988793	0.11345269	0.16701745	0.01670174	
9	0.1	0.3	7655	0.06974625	0.18319894	0.29665163	0.02966516	
9	0.1	0.4	7895	0.07193294	0.25513188	0.43833083	0.04383308	
9	0.1	0.5	9876	0.08998223	0.34511412	0.600246	0.0600246	
9	0.1	0.6	10242	0.09331693	0.43843105	0.78354517	0.07835452	
9	0.1	0.7	12350	0.11252335	0.5509544	0.98938545	0.09893854	
9	0.1	0.8	14530	0.13238577	0.68334017	1.23429457	0.12342946	
9	0.1	0.9	16879	0.15378798	0.83712815	1.52046832	0.15204683	
9	0.1	1	17876	0.16287185	1	1.83712815	0.18371281	

livelihood generation exhibit almost equal distribution of income, which is a good indication as far as income distribution is concerned. Thus gradually with the increase in level of resource collection from capture fisheries, income equality may increase among the fishers of the area. Thus capture fisheries play important role for rural households of the state in offering additional income as well as equitable income distribution and hence needs to be encouraged through institutional and financial support

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