

Case Study

Artisanal Fishing in Kerala backwaters: A Socioeconomic Assessment of Indian Coracles

Abstract

While considering the pollution and economic losses caused by modern fishing systems/fleet to the natural environment, traditional fishing techniques has its own relevance as the sustainable way of harvesting systems with least negative impact to fishing environment.

Aims: The study focuses on economic analysis of one of the major time tested method of sustainable fishing, Indian coracles, operated in the Vembanad backwaters of Kerala.

Study design: An exploratory study was conducted among the migrated coracle fishers.

Place and duration of the study: “Kochi Kaayal” area of Vembanad estuary, Ernakulam district, Kerala during February – May, 2017.

Methodology: Primary data collected from 15 coracle fishers selected randomly, which forms around 75 per cent of the total migrant coracle fishers operating in the area. Fishers were personally interviewed by using a well-structured interview schedule. Major parameters considered include personal as well as family details, education status, income details, asset particulars, savings, indebtedness, expenditure pattern, details of migration, reasons for migration, problems during migration, and major socio economic achievements through migration. Surrette ranking method and other major econometric tools were used to analyse the problems of and reasons for their migration as well as fishing operation.

Results: It is found out that disguised unemployment and competition prevailing in their native place had made them to migrate to Kerala coast decades ago. Fishers achieved betterment in socioeconomic conditions with their migration to Kerala coast. Also, the technique is found to be eco-friendly and hence relevant as a sustainable fishing technique.

Conclusion: The immense scope of tourism as well as the importance of spreading awareness among the local fishermen about coracle fishing as a sustainable fishing technique is highlighted in the study. The study is relevant as a first of its kind done in the area and in the technique.

Key words: Coracles, Fisheries, Sustainable fishing, Migration, Socio-economics, Kerala, Fishermen

1. Introduction

Indian fisheries sector, constituting about 6.3 per cent of global fish production, contributes to around 1.1 per cent of total GDP of the country. Total marine fish landings from mainland of India during 2016 were estimated as 3.63 million tonnes, with Kerala being the fourth largest producer contributing about 14.4 per cent (5.23 lakh tonnes) of total landings [1]. The inland sector of India contributes around 65 per cent of the total fish production of the country whereas that of Kerala bestows around 29 per cent of the fish production of the State. Also, Kerala contributes around 2.65 per cent of the nation's inland fish production. The state is beatified with 49 inter connected backwaters, which have an area of 46,129 ha and 84 estuaries in it. Vembanad backwaters is the largest lake of Kerala which is around 2, 33,50 ha of area and spread across three districts viz., Alappuzha, Kottayam, and Ernakulam. The district of Ernakulam holds around 9762 ha of Vembanad backwaters of which some part around Kochi area is known as Kochi kaayal which is having the Vembanad estuary [2]. Amongst the various districts, Ernakulam is the top producer of inland fish with a production worth of 0.4 lakh tones and second largest in total fish production(1.2LT), following the district of Kollam, in 2015 [3]. Annual average fish production in Vembanad Lake and other backwaters of Kerala was estimated at 14000- 17000 t [4]. Brackish water fishery resource of the state consists of 75 species comprising 57 species of fish, 6 species of shrimp, 1 species of prawn, 5 species of crab and 6 species of bivalves.

The usage of crafts and gears for fisheries is mainly based upon topography, ecology, and habitat of the available resources. Design of a craft will be typical to the region where it has to be used and tailored to the hydrographical features of water body as well as the targeted fishery resources [5,



47 6].Coracles, a crude form of boat made up of reeds, bamboo, plastic sheets, and tar, are being used in
 48 various parts of the world viz, England, India, Vietnam, Iraq and Tibet, for eons. This keel-less boat has a
 49 long history bridging over a thousand years and even evidenced in cave paintings of Bronze age.The
 50 Indian coracles, locally called as ‘‘Vattavanchi or Kuttavanchi’’ in Kerala, were exclusively used for
 51 water transport in swift flowing rivers of South Indian states such as Karnataka and Tamil Nadu, dated
 52 back from the 15th century. These primitive non-motorized crafts are nowadays used extensively for
 53 fishing as well as tourism. The application of indigenous traditional knowledge is a key element of social
 54 capital of the poor providing sustainable development to them. The coracles are traditional, cost effective,
 55 eco-friendly and up to an extent ensure a sustainable use of scarce fishery resources [7-9].

56 Fishing operations using coracles are found even in shallow waters due to the unique flat bottom
 57 of the craft which evenly spread the weight across the boat. Coracle ride is one of the major tourist
 58 attractions in many rivers of Karnataka and Tamil Nadu for years. Even though, the major crafts and
 59 gears in North Indian rivers like Ganges, the Brahmaputra as well as those employed along the West and
 60 East coasts of India, are well documented in literature [10-13], an economic analysis of the coracles in the
 61 Vembanad lake, which has become one of the major fishing technique employed in the estuary, is absent.
 62 Hence, this study is carried out as an attempt to evaluate the coracle fishing technique employed in
 63 Vembanad estuary for past many decades.

64 2. Methodology

65 2.1 Location: An exploratory study was conducted among the migrated coracle fishers operating in
 66 Vembanad estuary located in the ‘Kochi Kaayal’ area of the Vembanad backwaters of Ernakulam district,
 67 Kerala. The much productive Cochin estuary is found to be one of the major fishing grounds where
 68 numerous local fishers, Chinese dip nets, shoreline fishers, etc operates. The coracles started appearing in
 69 the Vembanad estuary of the Ernakulam district some decades ago, as part of the migration of fishermen
 70 from nearby states.



71 **2.2 Data collection:** Study was conducted by using the primary data collected randomly from among the
 72 migrant coracle fishers operating in the Vembanad estuary of Ernakulam district, using simple random
 73 sampling method. A total sample of 15 coracle fishers selected randomly, which forms around 75 per cent
 74 of the total coracle fishers operating in the estuary, were personally interviewed by using a well-structured
 75 interview schedule. The major parameters considered in the study includes personal as well as family
 76 details, education status, average income, asset particulars, savings, indebtedness, expenditure pattern,
 77 details of migration, reasons for migration, problems during migration, and major socio economic
 78 achievements through migration.

79 Descriptive statistical analysis was done on the data using excel and R language. The Garette
 80 ranking technique is used to analyze the rankings given by the respondents for both reasons and problems
 81 of migration.

82 **3. Results and Discussion**

83 **3.1 Socio-economic characteristics:**

84 The survey was conducted among the heads of fishermen families. The respondents of age between 20
 85 and 40 were found to be in more (50 per cent), followed by those from 40 to 60 (30 per cent) and less than
 86 20 (15 per cent). Meanwhile, considering the families, it was found that they migrated with whole family
 87 including children of age ranging from four months to 14 years old. Majority of the families are of size
 88 less than three (40 per cent) followed by size seven (35 per cent) and three to five (25 per cent). The
 89 families were found living in groups under the bridges and rented rooms. The living places were found to
 90 be less hygienic with lack of basic amenities and insecure.

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94 **Table 1:** Socio-economic characteristics

Age Distribution (years)		Education status		Family size	
Age range	Frequency	Grade	Frequency	Size range	Frequency
<20	3 (15)	Illiterate	11 (55)	<3	8 (40)
20 to 40	10 (50)	Primary	6 (30)	3 to 5	5 (25)
40 to 60	6 (30)	High School	3 (15)	5 to 7	7 (35)
>60	1 (5)	Higher Secondary	0 (0)		

95 Figures in parentheses indicates percentage to total

96 The details furnished in Table No.1 clearly depicts that more than half of the respondents were
 97 illiterate while 30 per cent of them possessed primary education. All of them were following their
 98 traditional occupation and were interested in migration. Hence, providing even the primary education to
 99 the children was of the least concern.

100 3.2 Religion and nativity:

101 Present study found out that all the coracle fishers operating in Ernakulam district are from Hunsur taluk
 102 of Mysore district, Karnataka. All of the respondents are traditional inland fishers, who were operating in
 103 various reservoirs and dams of Karnataka. Due to disguised unemployment emerged with the turn up of
 104 Tamil fishermen in the area, they migrated to various parts of Kerala, decades ago. All of them were
 105 found following Hindu religion.

106 3.3 Asset creation, Valuation and Savings:

107 All of the respondents were found having their own houses and vehicles (two wheelers) at their native
 108 place. It was difficult to find out the savings of them, still it is reported that most of them are having their
 109 own agriculture fields which is leased out for corn cultivation and allied activities at an average annual



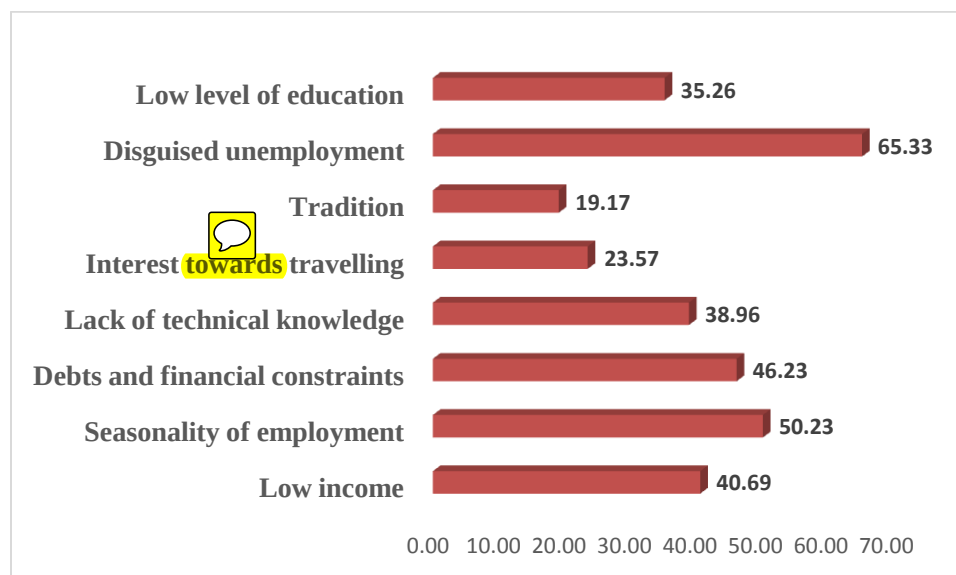
rent of amount **Rs 50,000**. No much money is spent on clothing and accessories as they were found least interested in extravagance.

3.4 Details of migration:

The present investigation revealed that the coracle fishermen reached the backwaters of Kerala around 15 years ago along with their family. They had travelled through almost all the coastal districts of the state and had finally settled **at district** of Ernakulam. The group consists of a lot of children including infants.. The children are not given any school education and are supposed to follow the migratory tradition and coracle fishing. The major reasons for migration opined are analyzed and explained under reason analysis.

3.5 Reason analysis:

Reason analysis was done using Garrett ranking technique on the basis of opinions provided by the respondents as the reasons for their migration. Garrett's ranking technique is usually used to rank preference indicated by the respondents on different factors. Ranks assigned by the respondents for different factors are converted into scores. Factor with highest mean value or Garrett score was considered to be the most important factor.



125 **Fig 1: Reasons for migration**

126 Accordingly the most important reason for migration conceived by the respondents was disguised
 127 unemployment, with highest Garrett score of 65.33, as depicted in figure 1. The fishers reported that the
 128 encroachment of fishermen from Tamil Nadu in to their areas gave rise to disguised unemployment and
 129 competition in their native places. The second most reason believed by them is seasonality of employment
 130 (50.23), followed by debts and financial constraints (46.23), low income (40.69), etc. Lack of technical
 131 knowledge or alternative avocations was also reported as one of the major reasons, with a Garrett score of
 132 38.96. Even though they were not much worried about their low level of education affecting their life, it
 133 was also pointed out as one of the reason (35.26) for migration. Finally, the interest towards travelling
 134 (23.57) as well as their tradition of migration (19.17) was also mentioned by the respondents.

135 3.6 Details of fishing operation:

136 The study found out that all of the respondents are traditional coracle fishers and fishing is their main
 137 occupation. Even though they have agriculture fields as family property, they are keener to do fishing in
 138 various areas. The fields are all leased out for corn farming and allied activities. Each family owns at least
 139 one coracle and some gill nets. Cane, bamboo, tar, tarpaulin, plastic sheets etc are the major raw materials
 140 used to build up the coracles. Coracles are found to be low-cost, simple, and durable which are in tune
 141 with the findings of Manna et al, 2011. Major details regarding the fishing operations in Vembanad
 142 backwaters are furnished in table 2.

143 **Table 2: Fishing operation**

Parameter	Coracle	Gear (net)
Average cost (Rs)	10,000	4,000
Average life (years)	1	0.5

Average number of nets used in a coracle	10	
Type of gear used	Gill net	
Average maximum catch yet	Quantity (Kg)	Amount (Rs)
	50	970
Average fishing trips per day	2	
Major species caught and respective average price per kg	Species	Price per kg (Rs)
	 Cat fish	90
	 Catla	170

144
145 According to the study, average cost of constructing a coracle amounts Rs 10,000 which may lasts for an
146 average of one year. Gill nets are the most popular fishing gear in coracles which costs around Rs 4,000
147 and lasts for about six months depending upon operations. An average number of 10 fishing nets are used
148 in each coracle which carries out around two fishing trips daily. According to the respondents, major
149 species harvested from the backwaters are cat fish and catla which is having an average market price of
150 Rs 90 and Rs 170 respectively. Average maximum quantity yielded per day is found to be 50 kg till time,
151 which earned them an average of Rs 970 per day, from a single coracle. The fishes are sold at roadsides
152 near to their living place.

153 3.7 Problem analysis:

154 Only an efficient paddler can ride a coracle as high riskiness is involved in riding. Coracle is very light,
155 tippy and highly affected by wind and hence will go 'where the wind blows' and also where the stream
156 takes her. A coracle, if capsizes, offers no floatation and hence it is highly dangerous. The fishers found in

the Vembanad backwaters are traditional coracle paddlers and hence are highly efficient. They seldom faced any accidents while fishing and the major constraint for them is the polluted backwaters. Also, no health issues were reported from them, even though they are living in unhygienic conditions under the bridges. Analyses were done over the extensive problems and constraints opined by the fishers through Garrett ranking technique and are represented in table 3, from which a clear picture of the problems can be retrieved.

Table 3: Problems at work place

Parameters	Score	Rank
Pollution	60.56	1
Marketing	55.14	2
Difficulty in language	42.00	3
Cultural lag	32.57	4
Competition	26.54	5
Risk in fishing	13.21	6

The fishermen were found worried not about the riskiness of coracle operation but with polluted backwaters. Apart from the micro plastic pollution in Vembanad lake reported by Sruthy *et al* (2016) [14], the backwaters were found deeply deteriorated with plastic debris, thermocols, sanitary pads, etc. Presence of water hyacinth in huge quantities is also noted as a menace to coracle fishers. The scenario is found problematic to local inland fishers as well as Chinese dip nets operating in the estuarine area also.

Fishes were sold on roadside nearer and are not taken to the markets. Marketing is also expressed as one of the problems due to lesser varieties of catch available. A comparatively good number of consumers are found for coracle-caught fish due to its freshness. According to fishers, the local fishermen are behaving very friendly and there is no much considerable competition in fishing ground. Also, the

respondents were not found worried the climatic changes happening, as they reported that it seldom affect their lives.

3.8 Effect of migration on socioeconomic status:

According the respondents, their socioeconomic status has much improved through migration, which can be ascertained with analyses done in the study. The major achievements through migration, according to the details collected are depicted in figure 2, which shows that all the families had earned well enough to conduct the marriage of their dependents on time. Lifestyle of coracle fishers is found really simple and less expensive. Hence they are found to be having a good amount as savings, but they were not much ready to reveal savings details. Around 80 per cent of the families opined savings as their second major achievement followed by better living conditions (60 per cent), renovation of house (50 per cent) and repayment of debts (50 per cent).

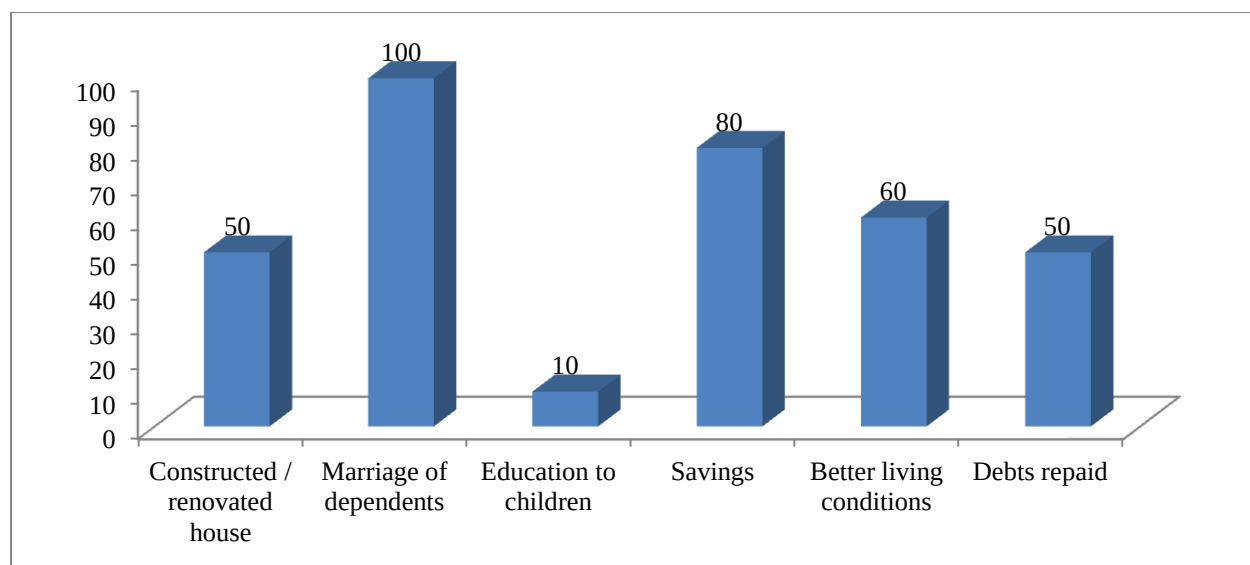


Fig 2: Major achievements through migration.

Present study highlights the lack of awareness regarding education among the fishers. Even though the groups consisted of many children below the age of 14, none of them are regularly attending schools. An

189 infinitesimally small portion of the fishers (10 per cent) are caring about education. The simple and less
190 expensive life style is helping them to earn much and hence they are not much interested in other jobs.

191 4. Conclusion

192 The study throws light over the operation of one of time tested method of sustainable fishing, Indian
193 coracles, operated in the Vembanad estuary. Even in the era of mechanization, these coracles are found to
194 be attractive as a more economical way and have its own relevance as the sustainable way of harvesting
195 systems with least negative impact to fishing environment. Many organizations across the world are
196 promoting the use and history of coracles and their allied crafts. The Coracle Society in United Kingdom
197 is famous among them which came into being in 1990 with aim of promoting the knowledge of coracles
198 and to support fishing using coracles. In 2016, the Bangalore research centre of Central Inland Fisheries
199 Research Institute organized a mass awareness program on safe fishing by using fiber grass coracles in
200 Wayanad District of Kerala, aimed at empowerment of unemployed tribal youth of tribal belt in the
201 district. Seventy two tribal youths were empanelled as members of the fisherman cooperative society,
202 mainly by the joint efforts of scientists of ICAR-CIFRI and the Kerala State Fisheries Department [15,
203 16]. With adoption of the Institute technology in Karapuzha reservoir fish catch has increased from 18
204 kgha to 150 kgha [15]. The Institute provided Bamboo coracles to active fishermen of this Tribal
205 Fisheries Co-operative society. Similar programmes should be conducted among the local fishermen of
206 various districts to promote fishing in coracles.

207 Also, coracle ride is a thrilling experience and is one of the major tourist attractions in South
208 Indian streams and waterfalls. All of the respondents reported the scope of tourism in the coracles of
209 Vemaband. Major tourist destinations of Karnataka viz., Hampi, Hogenakkal, Dandeli, etc. are famous for
210 coracle rides offered. As Kerala backwaters, especially Vembanad estuary has a prominent place in the
211 tourism map of the state, coracle expeditions in the backwaters could be developed as a tourism attraction
212 and as an alternative livelihood for inland fishers of the locality. Since the introduction of new fishing

technology has frequently led to a decline in fish stocks and the destitution of traditional subsistence fishermen, more effective use of existing skills and technology are found economical, profitable and more vital for sustainable development. Hence preservation and promotion of sustainable traditional fishing practices is a key element of social capital of the poor, providing sustainable development to them.

Competing Interests

Authors have declared that no competing interests exist.

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251