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Indigenous Technical Knowledge (ITK) in capture fisheries: A case study in Vypeen island of Ernakulam district

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ABSTRACT

Indigenous knowledge (IK) can be broadly defined as the knowledge that an indigenous community accumulates over generations of living in a particular environment whose scientific validity is not proven. ITKs could very well provide a panacea in building the technology gap required for the sustenance of the fisheries sector. There are numerous ITKs which is available in fisheries sector whose knowledge components still remain localized and yet to be disseminated across different locations. In this connection a research study was done among 60 randomly selected fisher households in Vypeen island of Ernakulam district using a pre structured interview schedule. The study analyzed the different ITKs available in capture fisheries like identification of fishing ground, time of fishing, weather prediction, fish shoals, determination of depth of water, birds as an indicator of shoals and usage of sinkers and floats. There is innate fear of ITKs disappearing in the future on account of capital intensification in fishing and improved technologies in fish aggregating among the traditional fishermen. These treasure houses of knowledge which are based on the practical experience of indigenous people needs to be documented and validated for the sustainable development of the fisheries sector for the future.

Keywords: Indigenous technical knowledge, capture fisheries, fishing ground, fish shoals, weather prediction, technological transformation.

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1. INTRODUCTION

Fisheries sector is considered as one of the productive sectors of Kerala and it contribute about 3 per cent to the economy of the state (DoF, Kerala, 2011). The population of fisher folk in Kerala is estimated at about 10.85 lakhs of which 6.10 lakhs is involved in marine fishingactivity. The total number of fishermen family is around 1.10 lakh with a population density of 2748/fishing village. The fishers engaged in marine fisheries dwells in small houses spread over the coastal areas. The coastal line of the Arabian Sea sprawling on the western part of the state is 590 km in length which spread over nine coastal districts with 222 fishing village and 187 landing centres (Marine Fisheries Census, 2010). The total marine fish production in the state is 6.08lakh tonnes valued at 3803crores at primary level and 5520 crore at retail level (CMFRI, 2011). The general living conditions and the economic status of the fisher folk in the state is considered not up to the living standards of the general populace of the state with a literacy rate of 72.50 per cent. These fishermen possess rich indigenous technical knowledge and expertise in fishing activities which they transfer from generations to generations. Indigenous knowledge (IK) is the local knowledge – knowledge that is unique to a given culture or society and it contrasts with the international knowledge system generated by universities, research institutions and private firms. It is the basis for local-level decision making in agriculture, health care, food preparation, education, natural-resource management, and a host of other activities in rural communities (Warren, 1991). Johnson, (1992) defines traditional environmental knowledge (TEK) as the body of knowledge built up by a group of people through generations of living in close contact with nature. It includes a system of classification, a set of empirical observations about the local environment, and a system of self management that governs the resource use. The quantity and quality of traditional environmental knowledge varies among community members, depending upon gender, age, social status, intellectual capability and profession. With its root firmly in the past traditional environmental knowledge is both cumulative and dynamic, building upon the experience of earlier generations adapting to the new technological and socio economic changes of the present.

Traditional environmental knowledge gained international recognition through such documents as the World Conservation Strategy (OUCN et al. 1980) and Our Common Future (WCED, 1987). Both reports emphasized the need to use directly the environmental expertise of local people in managing natural resources. They stressed that sustainable management of natural resources could only be achieved by developing a science based on the priorities of localpeople and creating a technological base that blends both traditional and modern approaches to solving problems (Johnson, 1992). Van der Bleikand van Veldhuizen, (1993) comprehensively defined IK as ideas, experiences, practices and information that has been generated locally, or is

Figure 1
Map of Ernakulam District

generated elsewhere but has been transformed by local people and incorporated into the local way of life. Indigenous knowledge incorporates local technologies but also cultural, social and economic aspects. Chadwick et al. (1998) opined that contextually people-environment interaction shaped IK. The environment consists of complex conditions shaped by factors such as the physical and biological environment, economic conditions such as market prices, operating costs, cost of production inputs, and socio-cultural conditions such as wishes and demands of formal and informal institutions, and cultural norms. In response to these conditions the stakeholder undertakes actions. In the case of fisher folk these actions relates to decisions such as where to fish and when, equipment purchases, and marketing strategies.

With the advent of technological transformation there exists a paradigm shift in the fisheries sector. There has been technological progress in terms of fishing operation, depth of fishing engine power; fish hold capacity, days of fishing, usage of fish aggregating devices etc. The sector transformed highly during the period as indicated in Table 1. Nevertheless there existsa reduction in the share of the non-motorised fishing craft on account of reducing catches in the sector. This has been due to the capital intensive nature of fishing operation and huge operational cost.It is important to device alternate measures of fishing operations and important to harness the indigenous technical knowledge available in the fishing sector to bridge for negating the costs and ensuring the sustainability of the fisheries sector. Earlier when fishing activities were not modernised, fishermen used to fish based on their traditional knowledge about sea and fish pattern. With the introduction of modern devices like GPS, fish finder, echo sounder etc, even the experienced fishermen prefer to use these devices, even though they possess different ITKs regarding fishing operations. As a result young fishermen do not get a chance to know about these ITKs. This may result in the disappearance of these ITKs with this generation. It's high time that we need to collect these ITKs and document them properly for the benefit of next generation. Otherwise these treasures will disappear with the passage of time. There are numerous ITKs in fisheries sector whose technical knowledge has not disseminated spatially among the fishers by and large. The present study was carried out with the objective of documenting the various indigenous knowledge relating to marine capture fisheries among fishermen in Vypeen Island of Ernakulam district (Figure 1) and to analyse its perception across different fisher households.

2. METHODOLOGY

The research study was carried out in Vypeen island of Ernakulam district. Vypeen, one of the Goshree islands, spread in an area of more than 25 km .Till the advent of the Portuguese in the 16thcentury; the island was inhabited by a small indigenous fishing community. Under the influence of the Portuguese, Vypeen developed as one of the island with the highest density of population. Sixty fisher households were randomly selected and interviewed using a pre structured interview schedule. The study analyzed the different ITKs available in capture fisheries like identification of fishing ground, time of fishing, weather prediction, movement of currents, determining fish shoals, analysing depth of sea and usage of sinkers and floats.

3. RESULTS AND DISCUSSIONS

The perception/response of fishermen in Vypeen islands to the different indigenous technical knowledge is depicted in the tables 2-11.

3.1. Socio Economic profile of sample respondents

The socio economicprofile of sample respondents details the particularson age, experience and the type of fishing that they are engaged in. The total sample selected for the study is 60 fishermen from Vypeen Island. Out of the total sample, 43.33 per cent are engaged in mechanised fishing and 25 per cent in motorised fishing. The traditional fishermen constitute 31.67 per cent of sample respondents (Table 2). Modern equipment's are widely used in mechanised and motorised fishing. Naturally in this type of fishing, fishermen make use of the scientific devices rather than depending on their indigenous technical knowledge. The lowcapital intensive nature of traditional fishing forces the fishermen to adapt to indigenous knowledge for their fishing operation. The age wise distributions of fishers indicate that about 11.67 per cent of the sample respondents belong to the category of age group less than 30. It is interesting to note that about 88.33 per cent of the sample respondentswere above the age of 30 (Table 3). It was found that fishermen were actively engaged in fishing even after the age of 55.The better employment opportunities available in the area motivate youngsters to other lucrative jobs. The age wise distribution of the respondents shows that number of young fishermen is less which is in conformity with the study conducted by (Shyam, 2011).

The results on the experience in fishing, respondents indicated that about 13.33 per cent of the samples had less than ten years of experience in fishing. The respondents with 10-20 years of experience constitute 16.67 per cent of the sample. Another important fact is that 36.67 percent of the fishermen had 20to30 years of experience. It is interesting to note that 33.33 percent of the sample had more than 30years of experience (Table 4). Most of the fishermen enter into the fishing activity at a young age of 15. This enables them to inculcate adequate experience in the field. The study indicates that there is a positive correlation between the age and experience of the fishermen. The experienced fishermen who are still active in fishing activity possess various ITKs. They can easily identify fishing ground based on their indigenous knowledge.

3.2. Indigenous technical knowledge regarding fishing operations

The study reveals that fishermen possess lots of indigenous technical knowledge regarding different fishing operations. Fishermen acquire this knowledge from their fore-fathers and their long fishing experience. Indigenous technical knowledge in fishing like identification of fishing ground, time of fishing, birds as indicator of shoals, fish shoals, usage of sinkers and floats, weather prediction, determination of depth of water, fish aggregating device and determination of speed and direction of water were analysed in this section. Indigenous technical knowledge among fishermen related to identification of fishing ground is that fishes can be easily identified by the colour of surface water. Different colours on the surface of water indicate different fishes. According to 70 percent of fishermen, black colour on the surface water indicates presence of sardine (*Sardinellalongiceps*) in the near vicinity. This blackish colour is almost like the shadow of clouds. Green colour on the surface of the water is an indication of the presence of Mackerel

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Table 1
Fishing craft and gear inventory in Kerala

S/N	Craft and gear	2005	2010
1.	Mechanised	5504(18.86)	4722 (21.68)
2.	Motorised	14151(48.50)	11175 (51.31)
3.	Non motorised	9522 (32.64)	5884 (27.00)
4.	Total	29177 (100.00)	21781 (100.00)

Table 2
Type of fishing

S/N	Type	No. of Fishers
1.	Mechanised	26 (43.33)
2.	Motorised	15 (25.00)
3.	Non motorised	19 (31.67)
4.	Total	60 (100.00)

Table 3
Age wise distribution of fishers

S/N	Age	No. of Fishers
1.	< 30	7 (11.67)
2.	30-55	26(43.33)
3.	> 55	27 (45.00)

Table 4
Experience of fishers

S/N	Experience	No.of. Fishers
1.	< 10	8 (13.33)
2.	10-20	10 (16.67)
3.	20-30	22 (36.67)
4.	> 30	20 (33.33)

Table 5
Identification of fishing ground

S/N	Colour	Type of Fish	Fisher's response
1.	Black	Sardine	42 (70.00)
2.	Green	Mackerel	38 (63.33)
3.	White	Black Pomfret	21 (35.00)

Table 6
Time of fishing

S/N	Time	Vernacular name	Fisher's response
1.	5am – 8am	Velluppu	45 (75.00)
2.	5pm – 7pm	Karippal	39 (65.00)

Table 7
Birds as indicator of shoals

S/N	Presences Birds	Fisher's response
1.	Presences of birds like Cormorant in the sea indicate fish in the area	60 (100.00)
2.	Appearance of Black seagulls cautions rough sea.	41 (68.33)
3.	Appearance of White seagull favours normal sea.	43 (71.67)

Table 8
Water movement as indicators of Fish Shoals

S/N	Fish species	Indicator	Fisher's response
1.	Sardine	Creates air bubble in the water	36 (60.00)
2.	Tuna & Seer fish	Rapid movement and hop in the water	24 (40.00)

Table 9
Usage of Sinkers and floats

S/N	Sinkers & floats	Fisher's response
1.	Piece of wood is used as floats.	30 (50.00)
2.	Iron chain is used as sinkers.	34 (56.67)

Table 10
Weather prediction

S/N	Cloud indicator	Results	Fisher's response
1.	Occurrence of white clouds	Wind	41 (68.33)
2.	Occurrence of black clouds	Rain	43 (71.67)

(*Rastrelligerkanagurta*) in the neighbourhood which can be identified by 63.33per cent of the sample respondents. The presence of Black Pomfret (*Parastromateusniger)* can be identified by observing white colour on the surface of water similar to the brightness of a tube lightas suggested 35 percent of the respondents (Table 5).

There were differences in the fish catch depending on different time. About75 percent of sample respondents are of the view that fish catch is more in morning during the time between 5am to 8am.This time period is known as `Velluppu'. The evening time which was found more suitable for fishing is between 5 pm to 7 pm. This time is known as 'Karippal' which is known to 65 per cent of the sample respondents.Fish catch is more during these specific times compared to normal times (Table 6). Birds can be indicators of the presence of fish in the sea.100 percent of the samples have an idea that the presence of birds like Cormorant(*Phalacrocoraxfuscicollis*) in the sea indicates fish in the near vicinity. It was also found that catch of the previous day which was dumped into the sea attracts the birds. This is also an indication of presence of fish in the nearby areas. About 68.33 per cent of the respondents know that appearance of black seagulls cautions rough sea. Out of the total respondents 71.67 per cent are of the view that appearance of white seagull is an indication of normal sea (Table 7). Fish shoals can be identified based on the movement of water. There will be differences in the movement of water, depending on the type of fish. Out of the total sample respondents 60 per cent observed that sardine creates air bubbles in the water.By observing these air bubbles in the water they can easily identify the presence of sardine in the area. Tuna (*Thunnusalbacares*) and Seer fish (*Scomberomoruscommerson*) move rapidly and jump over the water. About 40 per cent the sample respondents possess this knowledge (Table 8). The movement of large fishes like Tuna and Seer fish is very noisy. Fishermen can identify these large fishes even from long distance.

Out of the total sample 50 per cent of sample respondents were aware of the usage of different wood as floats. These woods vary from place to place which includes 'Pongu', 'Aryaveppu'(*Azadirachtaindica*) etc. Iron chain was used as sinkers by 57 percent of the sample respondents which is not popular for now (Table 9). According to the fishermen weather predictions can be done based on the colour of the clouds.About 68 per cent of the sample respondentsknow that white cloud leads to wind and 72 percent knows that black clouds results in rain (Table 10). They were aware that sometimes a cylindrical shape from the clouds may appear which leads to cyclone. The study reveals that fishers are aware of the medicinal value of fish. The study shows that 70 per cent of the sample respondentsknow the usage of dried sea horse powder as a medicine for breathlessness. It is a common knowledge among the fishers that sardine oil is good for general health. About 100 per cent of the sample respondents are aware that sardine oil is good for cholesterol. Shark oil and liver is useful for healing of wounds, dryness of lips and cracks on heels which is known to 90 per cent of the sample respondents. About 75 per cent of the respondents know that baby shark is good for maternity care (Table 11).

3.3. Determination of depth of water

The entire samplerespondents have same indigenous knowledge regarding the determination of depth. They use 'Katti' to measure the depth of water. A'Katti' (weight) is tied to thread and dropped into the water.Then measure the length of that thread with their arms and determine the depth. The depth is measured in a unit of 'Bagham' means twice the arm length. They can refer to a particular fishing area in the unit 'Bagham'. The response shows that this is a common knowledge among these fishers.

3.4. Light as fish aggregating device

Fishermen use various fish aggregating devices to attract the fish. These fish aggregating devices vary from place to place. About 24 percent of the sample respondents use

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Table 11
Medicinal value of fish

S/N	Fish as medicine	Fisher's response
1.	Dried seahorse powder is useful for breathlessness	42 (70%)
2.	Sardine oil is good for general health and cholesterol	60 (100%)
3.	Shark oil and liver is useful for healing of wounds,	54 (90%)
4.	Dryness of lips and cracks on heels.	-
5.	Baby shark is good for maternity care	45 (75%)

lights to attract fish during night. When the lights are switched on, this can attract the fish towards the fishing nets which ensures a good catch.

3.5. Determination of speed and direction of water

Determination of speed and direction of water can be done on the basis of the movement of craft and gears. By observing the movement of craft and gear, fishermen can calculate speed and direction of water. About 83 per cent of the respondents can determine the speed and direction of water in this manner.

4. CONCLUSION

The study indicated that there exist numerous ITKs in fisheries sector practiced over more than a decade and possess unique qualities for usage in terms of easiness, cost effectiveness and durability. The study reveals that ITKs are more practised among the traditional fishermen compared to fishers involved in the mechanized sector. There is innate fear of ITKs disappearing in the future on account of capital intensification in fishing and improved technologies in fish aggregating among the traditional fishermen. These treasure houses of knowledge which are based on the practical experience of indigenous people needs to be documented and validated for the sustainable development of the fisheries sector for the future.

SUMMARY OF RESEARCH

The study analyzed the different ITKs available in capture fisheries. There is innate fear of ITKs disappearing in the future on account of capital intensification in fishing and improved technologies in fish aggregating among the traditional fishermen.

FUTURE ISSUES

The Indigenous Technical Knowledge's are treasure houses of knowledge which are based on the practical experience of indigenous people needs to be documented and validated for the sustainable development of the fisheries sector for the future.

DISCLOSURE STATEMENT

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