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# A Compilation of Indigenous Technical Knowledge in Marine Fisheries Sector of Karnataka

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## ABSTRACT

The research article makes an earnest effort to compile the major Indigenous Technical Knowledge (ITKs) prevailing in Karnataka. The major objectives were to document the different FTKIs of the coastal villages of Karnataka and to anlayse the changes in practice as well as to study the perception of the scientists and the fisherfolk on the role of FTKIs in resource management. ITKs categorised under eight groups such as 'Craft and Gear Making/Maintenance', 'Shoal Identification', 'Harvesting Methods', 'Predicting Natural Hazards', 'Preservation Techniques', 'Processing', 'Medicinal Uses' and 'Beliefs & Value systems' have been collected through personal interview of 400 stakeholders including fisherfolk, farmers, policy makers, development agencies, govt. departments and NGOs with a structured interview schedule, focus group interactions and PLA techniques undertaken in potential maritime pockets of Karnataka state such as Mangalore, Ullal, Thalapadi, Bhadkal, Baithkol, Tadri, Belekeri, Dandebag, Karwar, Sunkeri, etc. free flow of information on ITKs was encouraged and documented everything recorded as such. In the second phase each practice was examined systematically for the scientific rationale by the project associates and the changes in the practice of FTKIs were quantified through interactive sessions and appropriate PLA tools. The scientific rationale behind the selected items as perceived by the scientists and the fisherfolk was also found out at appropriate stages through content analysis. This identification and documentation process of the fisherfolk on ITKs will accelerate the technology transfer as well as the technology refinement in such a way to suit to the needs of the target group as it acknowledges their inherited knowledge and value system and thereby the inclusion of selected FTKIs in the contemporary management measures will augment the resource management strategies.

**Key words:** Indigenous Technical Knowledge (ITK), Marine Fisheries, Compilation, Documentation, Community Based Natural Resource Management (CBNRM), Fisherfolk's Traditional Knowledge (FTK)

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## 1. INTRODUCTION

**Indigenous Knowledge (IK):**
It is the participant's knowledge of their temporal and social space. Indigenous knowledge as such refers not only to knowledge of indigenous peoples, but to that of any other defined community.

**Local knowledge:**
Refers to knowledge systems embedded in the cultural traditions of regional, indigenous or local communities.

Indigenous knowledge is unique to each culture and is a treasure of knowledge which forms the cultural base of a society and thereby influences any change, whether in the technology regimes, art, science or other field. Indigenous Technical Knowledge (ITK) is formulated by generations over so many years of observations, trials and documentations. Indigenous knowledge (IK) is, broadly speaking, the knowledge used by local people to make a living in a particular environment. Terms used in the field of CBNRM (Community Based Natural Resource Management) to designate this concept include traditional environmental or ecological knowledge, rural knowledge, local knowledge and farmer's or fisherfolk's knowledge. Indigenous knowledge can be defined as "A body of knowledge built up by a group of people through generations of living in close contact with nature" (Johnson, 1992).

ITK is the local knowledge i.e, the knowledge that is unique to a given culture or society which contrasts with the international knowledge system generated by universities, fisheries, animal husbandry 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). Indigenous people are the original inhabitants of a particular geographic location, who have a culture and belief system distinct from the international system of knowledge (e.g. the Tribal, Native, First, or Aboriginal people of an area). Some feel that such a definition is too narrow, in that it excludes peoples who may have lived in an area for a long period of time but are not the original inhabitants. This has led to widespread use of the term "local knowledge", a broader concept which refers to the knowledge possessed by any group living off the land (or sea) in a particular area for a long period of time. Interest in indigenous knowledge systems has been fuelled by the recent worldwide ecological crisis and the realization that its causes lie partly in the overexploitation of natural resources based on inappropriate attitudes and technologies. Scientists now recognize that indigenous people have managed the environments in which they have lived for generations, often without significantly damaging local ecologies. Many feel that indigenous knowledge can thus provide a powerful basis from which alternative ways of managing resources can be developed. While ITK research

## Content

The article is based on the study undertaken as a part of the project on Indigenous knowledge systems and community based resource management in marine fisheries undertaken in Karnataka coastal belts by Dr.Vipinkumar,V.P, Senior Scientist, CMFRI, Kochi, Kerala, with the assistance of the co-authors of the research article.

originally emphasized indigenous technical knowledge of the environment, it is now accepted that the concept of ITK goes beyond this narrow interpretation. ITK is now considered to be cultural knowledge in its broadest sense, including all of the social, political, economic and spiritual aspects of a local way of life.

Many authors (Hviding and Graham, 1994, Veitayaki, 1994) have articulated the significance of acknowledging and incorporating the traditional knowledge of a society into the modern technology management options of marine sector. The old system alone cannot address the issues of the contemporary users and it will be fatuous of present world not to use the accumulated knowledge of the ancestors. Future will have to resort to a system of management that caters both for old and new (Veitayaki, 1994). There is a general consciousness among the contemporary marine resource users that the experiences of traditional communities are essential to the planning and implementation of appropriate resource management systems (Jennings and Polunin, 1996). As with scientific knowledge, however, ITK has its limitations, and these must be recognized. ITK is sometimes accepted uncritically because of naive notions that whatever indigenous people do is naturally in harmony with the environment. There is historical and contemporary evidence that indigenous peoples have also committed environmental "sins" through over-fishing, over-hunting or over-cultivation of the land. In the emerging global knowledge economy a country's ability to build and mobilize knowledge capital, is equally essential for sustainable development as the availability of physical and financial capital. The basic component of any country's knowledge system is its indigenous technical knowledge. It encompasses the skills, experiences and insights of people, applied to maintain or improve their livelihood. ITK is developed and adapted continuously to gradually changing environments and passed from generation to generation and closely interwoven with people's cultural values. ITK is also the social capital of the poor, their main asset to invest in the struggle for survival, to produce food, to provide for shelter or to achieve control of their own lives (Lekshmi et al, 2013). The present study envisages on an attempt with this perspective to document the different FTKIs of the coastal villages of Karnataka as well as to study the perception of the scientists and the fisherfolk on the role of FTKIs in resource management.

**Indigenous Knowledge System (IKS):** It delineates a cognitive structure in which theories and perceptions of nature and culture are conceptualized. Thus it includes definitions, classifications and concepts of the physical, natural, social, economic and ideational environments. The dynamics of the IKS takes place on two different levels, the cognitive and the empirical.

**Indigenous Technical Knowledge (ITK):** The term may be defined as a tacit type of knowledge that has evolved within the local (grass roots) community and has been passed on from one generation to another and encompasses not only local or indigenous knowledge, but also scientific and other knowledge gained from outsiders.

**Traditional knowledge**: It has been defined as "a cumulative body of knowledge, know-how, practices and representations maintained and developed by peoples with extended histories of interaction with the natural environment. These sophisticated sets of understandings, interpretations and meanings are part and parcel of a cultural complex that encompasses language, naming and classification systems, resource use practices, ritual, spirituality and worldview.

## 2. SCOPE OF THE STUDY

Fishers' society, though is rich in ITKs, it has not so far received adequate attention of the technocrats. The adoption of and innovation in a fishers' society is highly swayed by the extent of compatibility of the new technology with the traditional knowledge system. In many countries, fisheries management options are nowadays conditioned such that while formulating the strategies itself, the knowledge base of fisherfolk is incorporated into that so that the implementation, rather than enforcement of the same will be done easily. Among the fisherfolk, there are a lot of community oriented do's and don'ts regarding the pre-harvest, harvest, post-harvest practices in fisheries which have a direct bearing over the resource utilization. Due to the same reason, those set of believes are of utmost importance in the contemporary measures of resource management. Karnataka with a coastline of 300 km encompasses the three coastal districts of Dakshina Kannada, Udupi and Uttara Kannada. The coastal districts have a rich repertoire of Indigenous traditional knowledge woven in to the coastal fabric of the fishermen community. These range from the knowledge used in preservation of traditional crafts such as use of dolphin fat which is heated to extract its oil which is later used for coating the boats for ensuring longevity of the craft, to the art of traditionally strengthening the fibres of cotton nets (now not in vogue) by dipping in hot boiling solutions of plant bark extracts, to underground pit method of dry fish making and preservation along the coast to innumerous methods of predicting the weather parameters with the help of their time tested wisdom, mainly used in capture fisheries. In the present context, where researchers are in search of alternate approaches of achieving optimum production without hampering the sustainability of resources, the Fisherfolk's Traditional Knowledge (FTK) would be of much significance. The research efforts directed towards disclosing he scientific rationale behind the most customary ITKs may give way to better management options. Marine fisheries management options are to be taken on a collective decision basis for ensuring co-operation of the community, for which documentation and inclusion of the matchless treasure of ITKs into the modern management options has become a necessity. Therefore the major scope of the present study is in this perspective from compilation of a bunch of ITKs of Karnataka ensuring the villagers' practical wisdom with scientific validity.

### 2.1. Methodology

The study was conducted in the selected coastal villages of Karnataka in two phases. In the first phase, a detailed survey of the selected villages was made fist to document traditional knowledge items in the various knowledge domains like pre-harvest, harvest, post-harvest, processing, preservation, resource conservation and consumption. ITKs categorized under eight groups such as 'Craft and Gear Making/Maintenance' , 'Shoal Identification', 'Harvesting Methods', 'Predicting Natural Hazards', 'Preservation Techniques', 'Processing', 'Medicinal Uses' and 'Beliefs & Value systems' have been collected through personal interview of 400 stakeholders including fisherfolk, farmers, policy makers, development agencies, govt. departments and NGOs with a structured interview schedule, focus group interactions and PLA techniques undertaken in potential maritime pockets of Karnataka state such as Mangalore, Ullal, Thalapadi, Bhadkal, Baithkol, Tadri, Belekeri, Dandebag, Karwar, Sunkeri, etc. While gathering data on traditional wisdom of fisherfolk, in the first phase, irrespective of the scientific validity and logic the free flow of information on ITKs was encouraged and documented everything recorded as such. In the second phase, each practice was examined systematically for the scientific rationale by the project associates and the changes in the practice of FTKIs were quantified through interactive sessions and appropriate PLA tools. The scientific rationale behind the selected items as perceived by the scientists and the fisherfolk was also found out at appropriate stages through content analysis. Whether the practice was still in vogue was also assessed stressing on the location of the state where it was conspicuous.

## 3. RESULTS

The major results of the data gathering on FTKIs were categorized under eight sections such as 'Craft and Gear Making/Maintenance', 'Shoal Identification', 'Harvesting Methods', 'Predicting Natural Hazards', 'Preservation Techniques', 'Processing', 'Medicinal Uses' and 'Beliefs & Value systems' are presented in the separate categories with photographs. The inferences of the sidelined objective of the study accomplished as the second phase on content analysis part and expert consultations on assessment of scientific rationale of traditional wisdom gathered has been presented as the ninth section.

### 3.1. ITKs on Craft and Gear Making / Maintenance

The major ITKs of scientific rationale identified in the craft and gear making and maintenance were 'Sardine oil smearing on craft wood for improving the durability', 'Smearing cashew kernel oil on craft wood for durability'. Similarly the durability of cotton nets was believed to be



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**Photograph 1**
Smearing cashew kernel oil on craft wood for durability in Karwar

**Photograph 2**
Plant *Calotropis gigantea* used for dyeing and strengthening cotton nets

**Photograph 3**
Bark of Indian Laurel *Terminalia elliptica* used for dyeing and strengthening fibre nets

improved by dipping in *banpu* bark decoction. In the same way, beating nets with *thalampu* plant for ensuring strength was another one identified in craft and gear maintenance. The scientific validity assessment indicated that the boats of about 6.5 ft size length and 4.5 ft width require 3.5 to 4 litres of oil of sardine. The oil coasts about Rs 70/- per litre. Three cosequitive coatings followed by natural drying under sun are required for good results. Cashew smearing: The boats of about 6.5 ft size length and 4.5 ft width require 3.5 to 4 litres of cashew nut oil and the oil costs about Rs 40 -50/- per litre. Here also three cosequitive coatings followed by natural drying under sun are required for good results. Smearing Cashew kernel oil on craft wood for durability in Karwar of Karnataka is shown in photograph 1. For improving durability of nets, dipping nets in *banpu* bark decoction was practiced. The *thalambu* beating is nowadays not practiced due to the non-availability of those items. Instead, fisherfolk use a powder available in the market especially in the net shops. 1 kg of the colour powder (red/ blue) is required for 1 kg of net. The advantage is that the wastage due to mud coating and dirt can be rectified to a great extent. The plant *Calotropis gigantea* is used for dyeing and strengthening cotton nets (Photograph 2). Similarly the bark of Indian Laurel *Terminalia elliptica* is used for dyeing and strengthening fibre nets (Photograph 3). The List of ITKs and particulars are presented in table 1.

## 3.2. ITKs on Shoal Identification

The major ITKs concerned with shoal identification in Karnataka essentially include different coloration on the sea water representing the presence of different types of fishes such as red colouration of sea water indicating the presence of mackerel/prawn, black colouration of sea water indicating the presence of mackerel/sardine, white colouration of sea water indicating the presence of pomphret, high blue colouration of sea water indicating the chance of less catch, dark blue colouration of sea water indicating the chance of heavy catch, presence of rainbow in sea indicating the presence of seer fish and the presence of air bubbles indicating the availability of mackerel fish. The ITKs concerned with shoal identification are presented in table 2.

## 3.3. ITKs on Harvesting Methods

In Karnataka, fisherfolk extensively use traditional wisdom in developing and modernizing different harvesting methods and craft-gear combinations. Among nets, a variety of items as ITKs are still in vogue. Single man operated *veesuvala* for fish catch is a major item for catching fish. Among shore seine also *Rampani* shore seine is an extensively used net observed in Karwar, Baithkol, Tadri etc. Small sized *Rampani* nets are called as *kairampani* and *mini rampani.* The operating mechanism of shore seine *rampani* is in the photograph 4. Another type of net named as *Maranambala* tied around the waist of the person for fishing is to be used with extreme care, which can cause even the death of the person operating. A very interesting ITK among craft is an 'outer rigger canoe' which is the craft balanced by wooden structures tied on one side of the raft, which help the boat float over the water surface for balancing. Photograph 5 shows the outer rigger canoe used by fisherfolk in Dhandebag of Karnataka. The ITKs on harvesting methods are presented table 3.

## 3.4. ITKs on Predicting Natural Hazards

The major ITKs predicting natural hazards are of considerable significance in coastal Karnataka. The occurrence of *dakshin gali* (monsoon wind) indicates the arrival of *monsoon* and the presence of worms in shoal indicates the chance of storm shortly. The presence of black cloud and rough sea indicate the chance of heavy rain with violent storm throughout the coastal belts Karnataka. The presence of bubbles on sea surface indicates the chance of storm. Similarly the presence of sea snake appearing as a ball, group of rays, presence of dolphins moving along with waves etc. represent the fury of violent sea which can be expected within a short span of time. 'Stranding of whales' is generally observed when there is a general reversal of the current patterns. Whales are called "*samudra raja"* or king of



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**Table 1**
ITKs on Craft and Gear Making / Maintenance

| Name of ITK | Brief Description | Still in vogue or not | Location |
|---|---|---|---|
| 1.Smearing sardine oil on craft wood | Sardine oil smearing on craft wood for improving the durability | Yes | Throughout Karnataka |
| 2.Cashew kernel oil smearing on craft wood | Smearing Cashew kernel oil on craft wood for durability | Yes | Throughout Karnataka |
| 3.Dipping cotton nets in *banpu* bark decoction | Durability of cotton nets – dipping in *banpu* bark decoction | Yes | Northern Karnataka |
| 4.Beating nets with *thalampu* plant | Beating fibre nets with *thalampu* plant for strength | Yes | Northern Karnataka |
| 5. *Calotropis plant* for dyeing and strengthening cotton nets | Plant *Calotropis gigantea* used for dyeing and strengthening cotton nets | Yes | Throughout Karnataka |
| 6.Bark of *Terminalia* for dyeing and strengthening fibre nets | Bark of Indian Laurel *Terminalia elliptica* used for dyeing and strengthening fibre nets | Yes | Throughout Karnataka |

**Table 2**
ITKs on Shoal Identification

| Name of ITK | Brief Description | Still in vogue or not | Location |
|---|---|---|---|
| 1. Red water : Mackerel / prawn | Red colour of sea water indicates the presence of mackerel / prawn | Yes | Throughout Karnataka |
| 2. Black water : Mackerel and Sardine | Black colour of sea water indicates the presence of mackerel / sardine | Yes | Throughout Karnataka |
| 3. White water : Pomphret | White colour of sea water indicates the presence of pomphret | Yes | Throughout Karnataka |
| 4. High Blue water : Less catch | High Blue colour of sea water indicates the chance of less catch | Yes | Throughout Karnataka |
| 5. Dark Blue water : Heavy catch | Dark Blue colour of sea water indicates the chance of heavy catch | Yes | Throughout Karnataka |
| 6. Presence of Rainbow : Seer fish | Presence of rainbow in sea indicates the presence of seer fish | Yes | Throughout Karnataka |
| 7. Presence of air bubbles : mackerel fish | Presence of air bubbles indicates the availability of mackerel fish. | Yes | Throughout Karnataka |

**Table 3**
ITKs on Harvesting Methods

| Name of ITK | Brief Description | Still in vogue or not | Location |
|---|---|---|---|
| 1. *Veesuvala* | Single man operated *veesuvala* for catching fish | Yes | Throughout Karnataka |
| 2. *Rampani* | *Rampani* shore seine | Yes | Southern Karnataka |
| 3. *Kairampani* | Small sized *Rampani* | Yes | Southern Karnataka |
| 4. *Minirampani* | Still smaller sized *rampani* | Yes | Southern Karnataka |
| 5. *Maranambala* | *Maranambala* (Net) tied around the waist of the person for fishing to be used with extreme care, which can cause even the death of the person operating. | Yes | Southern Karnataka |
| 6. Outer rigger canoe | Outer rigger canoe is the craft balanced by wooden structures tied on one side of the raft, which floats over the water surface for balancing. | Yes | Southern Karnataka |

**Table 4**
ITKs on Predicting Natural Hazards

| Name of ITK | Brief Description | Still in vogue or not | Location |
|---|---|---|---|
| 1. *Dakshin gali :* Monsoon | The occurrence of *dakshin gali* indicates the arrival of Monsoon | Yes | Southern Karnataka |
| 2. Worms in shoal : storm | The presence of worms in shoal indicates the chance of storm | Yes | Throughout Karnataka |
| 3. Black cloud and rough sea : Heavy rain | Presence of black cloud and rough sea indicates the chance of heavy rain with violent storm | Yes | Throughout Karnataka |
| 4. Bubbles: storm | The presence of bubbles on sea surface indicates the chance of storm | Yes | Throughout Karnataka |
| 5. Sea snake appearing as a ball, group of rays & presence of dolphins moving along with waves represent fury of sea. | Presence of sea snake appearing as a ball & group of rays presence of dolphins moving along with waves Represents fury of violent sea which can be expected within short span of time. | Yes | Throughout Karnataka |
| 6. Stranding of whales : A bad omen | This is generally observed when there is a general reversal of the current patterns. Stranding of whales is often associated with poor prospects of fishing, looked upon as a bad omen, and an indication of bad weather conditions. | Yes | Throughout Karnataka |

the oceans. Stranding of whales is often associated with poor prospects of fishing, looked upon as a bad omen, and an indication of bad weather conditions. ITKs on predicting natural hazards are presented in table 4.

## 3.5. ITKs on Preservation Techniques

The most conspicuous ITKs on preservation techniques collected in Karnataka state include these. Fresh fish while mixed with wet sand will preserve the fish. Similarly fresh fish while mixed with wet sand and salt will preserve the fish with more durability. Salted fish kept on cashew leaves, salted fish kept on palm leaves and salted fish kept in clay tanks or in mud pots proved by experience that those



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**Photograph 4**
Harvesting fish with *Minirampani* in Karwar of Karnataka

**Photograph 5**
Outer rigger canoe in Dhandebag of Karnataka

**Photograph 6**
Salt drying of fish in Baithkol of Karnataka

practices preserve the fish excellently. Pouring lemon juice over fish is a common indigenous practice which will preserve the fish for a sufficiently longer span of time. Simple sun drying of silver belly fish and simple sun drying of cynoglossus with salt and without salt, simple drying of mackerel with salt, drying in cement tanks after mixing with salt, bamboo rack drying technique of fish etc. are all commonly practiced preservation techniques in the arena of ITK wisdom. ITKs on preservation techniques are presented in table 5. Salt drying of fish in Baithkol of Karnataka and mixing of fish with wet sand for preservation in Majali of Karnataka are shown in photographs 6 and 7 respectively.

## 3.6. ITKs on Processing Aspects

The indigenous wisdom prevalent in processing sector in Karnataka was essentially noticed in fish oil extraction. The oil extraction process in cement tanks is a major item practiced throughout Karnataka. Similarly pressing and extraction of oil in pressing devices also were noticed in northern parts of Karnataka as an ITK. These ITKs on Processing Aspects are presented in table 6.

## 3.7. ITKs on Medicinal uses

Medicinal properties developed as ITKs in fisheries sector have been noticed to a commendable extent in coastal Karnataka based on the data gathered. Ribbon fish (*Trichurus*) for lactating women was found to be an exemplary practice. Eating silver belly fish is believed to be good for recovering from dysentery. Shark oil pellet is useful for the relief against stomach disorders and is practiced in northern Karnataka essentially. Tablet manufacture from prawn heads are being used against ailments in northern part of Karnataka. Seahorse dried in shade, powdered, heated in earthern pot and mixed with honey which will be made as a paste and consumption of the paste in empty stomach in the morning prevents whooping cough and asthma which is practiced as an excellent ITK throughout Karnataka. Similarly, the seahorse dried in shade, burnt in fire and mixed with coconut oil applied on cut wounds will act as an excellent disinfectant and is practiced throughout Karnataka. The conspicuous ITKs on medicinal uses are presented in table 7.

## 3.8. ITKs on Beliefs and value systems

The indigenous wisdom of fisherfolk with regard to beliefs and value systems in Karnataka coasts also had a considerable significance in marine fisheries sector. The religious beliefs and super powers, evil powers, *manthravadam* and *pooja* are normal activities for achieving certain aims practiced in coastal villages also. Beating *vallam* (boat) with *thalambu* plant to avoid evil powers is a practice throughout Karnataka. *Samudra Pooja* is being undertaken for ensuring God's grace for a good catch which also is practiced throughout Karnataka coasts. This is essentially to propitiate the sea goddess. *Manthravadam* and associated *pooja* for good fish catch is rarely practiced in Karnataka. The opposite side projecting *Durmanthravadam* and *pooja* are called *Koodothram* which also are rarely practiced by marine fisherfolk for not getting fish catch for enemies. The table 8 shows the ITKs on beliefs and value systems.

## 3.9. Content Analysis of the ITKs gathered

Another sidelined objective of the study was to know the perception of the scientists, fisheries development personnel and the fisherfolk on the role of FTKIs in resource management. This was essentially undertaken in the second phase of the research and was assessed with a pre-tested structured interview schedules covering the domains of ITK consisting of pre-harvest, harvest, post-harvest, processing, preservation, resource conservation, consumption etc. , location of the ITK, change in the fishermen's practice, fishermen's perception on practical utility of high, medium and low dimensions. The perception of the scientists and



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**Table 5**
ITKs on Preservation Techniques

| Name of ITK | Brief Description | Still in vogue or not | Location |
|---|---|---|---|
| 1. Mixing Fish with wet sand | Fresh fish while mixed with wet sand will preserve the fish | Yes | Throughout Karnataka |
| 2. Mixing Fish with wet sand and salt | Fresh fish while mixed with wet sand and salt will preserve the fish with more durability | Yes | Throughout Karnataka |
| 3. Salted fishes kept on cashew leaves | Salted fish kept on cashew leaves preserves it | Yes | Southern Karnataka |
| 4. Salted fishes kept on palm leaves | Salted fish kept on palm leaves preserves it | Yes | Southern Karnataka |
| 5. Salted fishes kept in clay tanks | Salted fish kept in clay tanks preserves it | Yes | Southern Karnataka |
| 6. Salted fishes kept in mud pots | Salted fish kept in mud pots preserves it | Yes | Southern Karnataka |
| 7. Lemon Juice over fish | Pouring lemon juice over fish will preserve it | Yes | Southern Karnataka |
| 8. Drying of silver belly fish | Simple sun drying of silver belly fish | Yes | Throughout Karnataka |
| 9. Drying of cynoglossus with salt and without salt | Simple sun drying of cynoglossus with salt and without salt | Yes | Throughout Karnataka |
| 10. Salt drying of mackerel | Simple drying of mackerel with salt | Yes | Throughout Karnataka |
| 11. Fish drying in cement tanks | Drying in cement tanks after mixing with salt | Yes | Northern Karnataka |
| 12. Rack drying | Bamboo Rack drying technique of fish | Yes | Northern Karnataka |

**Table 6**
ITKs on Processing Aspects

| Name of ITK | Brief Description | Still in vogue or not | Location |
|---|---|---|---|
| 1. Fish oil extraction in cement tanks | Fish oil extraction in cement tanks | Yes | Northern Karnataka |
| 2. Pressing & oil extraction of fishes | Pressing & oil extraction of fishes | Yes | Northern Karnataka |

**Table 7**
ITKs on Medicinal uses

| Name of ITK | Brief Description | Still in vogue or not | Location |
|---|---|---|---|
| 1. Ribbon fish for lactating mothers | Ribbon fish ( *Trichurus* )for lactating women | Yes | Throughout Karnataka |
| 2. Silver belly for dysentery | Eating silver belly fish is good for recovering from dysentery | Yes | Throughout Karnataka |
| 3. Shark oil pellet for stomach disorders | Shark oil pellet is useful for relief against stomach disorders | Yes | Northern Karnataka |
| 4. Tablet manufacture from prawn heads | Tablet manufacture from prawn heads against ailments | Yes | Northern Karnataka |
| 5. Dried Seahorse, powdered & mixed in honey for asthma | Sea horse dried in shade, powdered, heated in earthern pot and mixed with honey and consumption of the paste in empty stomach in the morning prevents whooping cough and asthma | Yes | Throughout Karnataka |
| 6. Dried Seahorse, burnt in fire & mixed with coconut oil to protect infection | Seahorse dried in shade, burnt in fire & mixed with coconut oil applied on cut wounds will protect infection | Yes | Throughout Karnataka |

**Table 8**
ITKs on Beliefs and Value systems

| Name of ITK | Brief Description | Still in vogue or not | Location |
|---|---|---|---|
| 1. Beating *vallam* with *thalambu* plant | Beating *vallam* with *thalambu* plant to avoid evil powers | Yes | Northern Karnataka |
| 2. *Samudra Pooja* for good catch | *Samudra Pooja* used to be undertaken to propitiate sea goddess for good catch | Yes | Throughout Karnataka |
| 3. *Manthravadam & Pooja* | *Manthravadam & Pooja* for good fish catch | Rarely | Throughout Karnataka |
| 4. *Koodothram* for not getting catch | *Durmanthravadam & Pooja* for not getting fish catch for enemies | Rarely | Throughout Karnataka |

development personnel also were assessed for the same perspective. For this, each practice was examined systematically for the scientific rationale by the project associates and the changes in the practice of FTKIs were quantified through interactive sessions and appropriate PLA tools. Thereby the scientific rationale behind the selected items as perceived by the scientists and the fisherfolk was also found out at appropriate stages through content analysis. Only such practices with scientific rationale were filtered and the rest were discarded while presenting the final outcome. This identification and documentation process of the ITKs will hopefully accelerate the technology transfer as well as the technology refinement in such a way to suit to the needs of the target group as it acknowledges their inherited knowledge and value system and thereby the augmentation of the resource management strategies will be ensured by the inclusion of selected FTKIs in the contemporary management measures.

## 4. DISCUSSION

ITK is the information base for a society, which facilitates communication and decision making. Indigenous information systems are dynamic and are continually influenced by internal creativity and experimentation as well as by contact with external systems. Generally speaking, such knowledge evolves in the local environment, so that it is specifically adapted to the requirements of local people and conditions. It is also creative and experimental, constantly incorporating outside influences and inside innovations to meet new conditions. It is usually a mistake to think of indigenous



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**Photograph 7**

Mixing Fish with wet sand for preservation in Majali of Karnataka

knowledge as "old-fashioned"," backwards", "static" or "unchanging". In this particular study on the indigenous knowledge systems and community based resource management in marine fisheries in Karnataka coastal belts, the major aims to document the different FTKIs of the coastal villages of Karnataka and to analyse the changes in practice were envisaged. The perception of the scientists as well as the fisherfolk on the role of FTKIs in resource management attempted and the ITKs classified under eight categories were documented. The locations of Karnataka state as well as whether the practice is still in vogue or not also was studied based on the data gathered through personal interview of 400 stakeholders including fisherfolk, farmers, policy makers, development agencies, govt. departments and NGOs with a pre-tested well structured interview schedule, focus group interactions and PLA techniques undertaken in potential maritime pockets. This identification and documentation process of the fisherfolk on ITKs will accelerate the technology transfer as well as the technology refinement in such a way to suit to the needs of the target group as it acknowledges their inherited knowledge and value system and thereby the inclusion of selected FTKIs in the contemporary management measures will augment the resource management strategies.

**Community Based Resource Management (CBRM)**: This is a bottom-up approach that involves local resources users and community members in active management and responsibility for coastal resources. The bottom-up approach assumes that local users, if given responsibility for their resources will manage their resources in sustainable ways and enforce community-derived rules.

These insights and adaptive skills of fisherfolk are often derived from many years of experience and may be called cultural traditions which have co-evolved with the local environments. This information often have been communicated and learned through family members over generations. Such knowledge systems may pertain to various cultural norms, social roles or physical conditions such as the climate or lunar cycles. Obviously, decisions to use these ideas are not based on empirical measurements or cost-benefit analyses as in conventional modern science. In some cases, the knowledge is based on unique epistemologies, philosophies, intuitions, and principles, which differ from modern scientific tenets. Incorporating indigenous knowledge into climate change policies can lead to the development of effective mitigation and adaptation strategies that are cost-effective, participatory, and sustainable (Robinson and Herbert 2001; Hunn, 1993).

Fisher's traditional and indigenous know-how is often discarded while charting out development plans for them. Their attitude towards their ancestor's wisdom is also unknown. With its roots firmly in the past, traditional ecological need is both cumulative and dynamic, building upon the experience of earlier generations and adapting to the new technological and socioeconomic changes of the present (Stevenson, 1996). Another major query to be born in mind while documenting the traditional wisdom of marine fisherfolk is that "Is fisherman a scientist too?" The rational FTWIs documentation which will help in deriving location specific and cost effective technological options and ensures local people's participation in the resource conservation and management programmes. Also there is ample scope for commercializing this treasure of knowledge in Fisheries as in Agriculture. Similarly by documenting the traditional knowledge items and incorporating in the marine policy decision in marine fisheries sector, the community participation can be improved and the smooth implementation of policy decision will be made feasible. Bringing about a social action for sensitization on generating a judicious blend of the indigenous knowledge system and scientific rationale including policies and other interventions to narrow the gap between fisherfolk and technocrats can be made feasible so that a methodology can be worked out on scientists, farmers and fisherfolk work together hand to hand as in Participatory Technology Development in with special emphasis on marine fisheries sector.

Simultaneously when the massive exploitation of marine resources continues, the ecosystem weakens, posing the threat of ruin more on the indigenous communities. The indigenous knowledge contains ideas of limited use of resources, if not of conservation directly. As the production targets are on the hike every year, the ITKs hardly fit as a substitute for modern methods even though conservation is high in the agenda (Ashaletha and Immanuel, 2006). Though new technology becomes highly imperative for those in the fishing occupation, they are not fully abandoning the traditional techniques owing to the emotional binding. At the same time, there is a growing concern among the fishers on issues like the vanishing of certain species, which were very common earlier, reducing catch, and degrading coasts. The different regulations introduced in these communities are not acceptable to the community. Hence, there is amble scope for introducing participatory resource conservation means incorporating people's know-how. However, it is an ideological bridge to the future and in practice it seems not to be that straightforward, especially when fisheries makes up a minute of national income and fisheries management would need to transcend the arduous but incomplete present technocratic exercise.

## 5. CONCLUSION

Speaking the context of marine fisheries sector of a developing nation like India, revolutionary changes are emerging in the form of improved equipments like GPS, mobile phones and highly advanced practices on rapidly changing craft and gear combinations in different locations for increasing the production. Simultaneously the traditional know-how of fisherfolk, which is rich in terms of its diversity and magnitude, is facing a threat of extinction. Many of the traditional knowledge items are observed to be re-emerging. But the reasons behind these transitions are not explored so far. In other sectors like Agriculture, the indigenous knowledge items (FTKI) gain special significance in the context of emerging IPR regimes under WTO. The documentation of the FTKIs will serve as a motive for undertaking research to derive location specific and low cost technological options and there lies the enormous scope for commercialising this treasure of knowledge. At the same time, the scientific community has the responsibility of protecting the rights of the people to whom the knowledge originally belongs. Ultimately the incorporation of the traditional know-how into neoteric management strategies assures community participation in resource management attempts. The present study made a pertinent effort to compile the major Indigenous Technical Knowledge (ITKs) prevailing in Karnataka, anlaysed the changes in practice and studied the perception of the scientists and the fisherfolk on the role of FTKIs in resource management. The scientific rationale behind the selected items as perceived by the scientists, development personnel and the fisherfolk was also found out at appropriate stages through content analysis. This identification and documentation process of the fisherfolk on ITKs will hopefully accelerate the technology transfer as well as the technology refinement in such a way to suit to the needs of the target groups as it narrows the gap between fisherfolk and technocrats. The practical research results directed towards disclosing the



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scientific rationale behind the most customary ITKs may give way to better management options. Marine fisheries management options are to be taken on a collective decision basis for ensuring co-operation of the community, for which documentation and inclusion of the matchless treasure of ITKs into modern management options has become an extreme necessity right now, and this study as a tip of the iceberg made an earnest effort in this direction.

## SUMMARY OF RESEARCH

A study was undertaken on collecting and documenting indigenous knowledge systems and community based resource management in marine fisheries in Karnataka coastal belts with the major objectives to document the different FTKIs of the coastal villages of Karnataka and to analyse the changes in practice. The perception of the scientists as well as the fisherfolk on the role of FTKIs in resource management also was studied and the ITKs classified under eight categories such as 'Craft and Gear Making/Maintenance', 'Shoal Identification', 'Harvesting Methods', 'Predicting Natural Hazards', 'Preservation Techniques', 'Processing', 'Medicinal Uses' and 'Beliefs and Value systems' have been collected through personal interview of 400 stakeholders including fisherfolk, farmers, policy makers, development agencies, govt. departments and NGOs with a structured interview schedule, focus group interactions and PLA techniques undertaken in potential maritime pockets of Karnataka state such as Mangalore, Ullal, Thalapadi, Bhadkal, Baithkol, Tadri, Belekeri, Dandebag, Karwar, Sunkeri, etc. In the first phase, a free flow of information on ITKs was ensured irrespective of the logic and practicality and documented everything recorded as such. In the second phase each practice was examined systematically for the scientific rationale by the project associates and the changes in the practice of FTKIs were quantified through interactive sessions and appropriate PLA tools. The scientific rationale behind the selected items as perceived by the scientists and the fisherfolk was also found out at appropriate stages through content analysis. This identification and documentation process of the fisherfolk on ITKs will accelerate the technology transfer as well as the technology refinement in such a way to suit to the needs of the target group as it acknowledges their inherited knowledge and value system and thereby the inclusion of selected FTKIs in the contemporary management measures will augment the resource management strategies.

## FUTURE ISSUES

The documentation of the rational FTWIs which will help in deriving location specific and low cost technological options and ensures people's participation in the resource conservation programmes. Also there is ample scope for commercializing this treasure of knowledge as in Agriculture. Similarly by documenting the traditional knowledge items and incorporating in the marine policy decision in marine fisheries sector, so as to ensure community participation, the smooth implementation of policy decision will be made feasible. The future researchers can think about bringing social action for sensitization on a judicious blend of the indigenous knowledge system and scientific rationale including policies and other interventions to narrow the gap between fisherfolk and technocrats with an exhaustive research with larger sample and wider area involving the farmers of crop enterprises like cash crops, perennials and homestead farming systems etc so that a methodology can be worked out on scientists, farmers and fisherfolk work together hand to hand as in Participatory Technology Development in with special emphasis on marine fisheries sector.

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