Traditional Knowledge in Fishing Practices: Maduganga System, Sri Lanka

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Abstract

Maduganga inherits the characteristics of typical river systems lining the South West coast of Sri Lanka, but for its ecological significance it was declared a Ramsar Wetland and was protected as a Wildlife Sanctuary. Traditional knowledge of the inhabitants about the biotic and abiotic components of the system as a whole may have accumulated over the centuries as per the historic sources revealing inhabitance of the research area from thirteenth century CE.

Being a mangrove fringed estuary, Maduganga is an excellent breeding ground for fish. Local community engaged in marine fisheries use fishing gear and vessels engineered in accordance with the ecosystem. In fishing practices locals make use of accessible mangrove (Ceriop tagal, Avicennia and Rhizophora species etc.) and other terrestrial plant species (Derris uliginosa, Alstonia mocrophylla etc.) as resources.

The traditional knowledge of the local community was challenged, their practices altered, and beliefs questioned with the colonial invasion, industrialisation, globalisation, tourism and the application of scientific knowledge, paving way to unsustainable practices in this sensitive ecosystem. Hence the importance of preserving traditional knowledge of inhabitants is felt deeper at present.

Introduction

It is believed that the local community living in an ecosystem is the guardian of its sensitive ecological unit and the knowledge systems they developed over centuries of residence in such environment is of immense use in conserving the ecosystem (De'Rozario 1999: 8). Maduganga is a sensitive wetland ecosystem inhabited since at least thirteenth century CE according to historic resources. From generation to generation inhabitants of the area have comprehended this environmental system as a nursery of life and that the degradation or modification of it triggers dire repercussions. The traditional subsistent methods including fishing practices they adopted, thus, cause minimal harm to the environment. But

with the western colonial rule, industrialisation, urbanisation and globalisation unsustainable activities of the same community are escalating. Hence in the present research it was attempted to recognise the traditional fishing practices which made use of the components of the system sustainably and the threats faced by traditional knowledge in biodiversity conservation.

Physical Environment

Maduganga, situated between longitude 80^{o} 01' 02" - 80^{o} 70' 15" and latitude 06^{o} 14' - 06^{0} 19' in the Galle District of Southern Province of Sri Lanka is consisted of 15 islands. Even though referred to as a river, it resembles more a lagoon or estuary in structure (CEA/ EUROCONSULT 1997: 3). Amarasinghe and Liyanage (1996) refer to the system as estuary (Amarasinghe and Liyanage 1996: 3). Randombe, Rathgama, Bolgoda and Koggala are also among such rivers turned lakes and lagoons lining the south-west coast of Sri Lanka. But the ecological significance of Maduganga is higher than that of other systems. Since it provides shelter for 20 endemic and 30 nationally threatened vertebrate fauna (Bambaradeniya et al, 2002: 11), 8 endemic and 13 nationally threatened invertebrate fauna (Bambaradeniya et al, 2002: 13) in addition to 19 endemic and 8 nationally threatened plant species (Bambaradeniya et al, 2002: 8) including the pristine mangrove forest, Maduganga was declared a Ramsar Wetland in 2003 (www.ramsar.org). IUCN Assessment of Biodiversity reports 10 major vegetation types in Maduganga from which mangroves, mangrove scrubs and mangrove mixed swamps are dominant extending 144 ha (Bambaradeniya et al, 2002: 9).

Mangrove swamps which trap saline waters in pockets with foliage as detritus are excellent breeding ground for aquatic life. In the mangroves of Maduganga four shrimp species (CEA/ EUROCONSULT, 1997: 16) crabs and lobsters thrive (Bambaradeniya et al, 2002: 13). IUCN Assessment of Biodiversity recorded 70 fish species including two endemic and two threatened species, from Maduganga in 2002 (Bambaradeniya et al, 2002: 11). Fresh water forms, brackish water forms, fresh-brackish water forms (catadromous) and marine brackish migratory species (anadromous) are among them. This rich aquatic faunal diversity of the wetland resulting in the growth of traditional knowledge systems of local community was chosen as the focus of the present study.

Previous Research

Individuals as well as institutions have assessed the natural resources of Maduganga and recorded the traditional and current resource utilisation patterns. Mala D. Amarasinghe explored the socio economics of communities living in selected mangrove areas of west and south west coast studying fishing as a method of subsistence (Amarasinghe, 1988). Even the research on similar environments widens our knowledge on fishing practices in Maduganga. H.A.A. Kumara and others study human interaction with mangroves of Negombo (Kumara et al, 2003: 11-19).

A number of researches by various institutions preluded conservation measures. The Central Environmental Authority (CEA) in their Wetland Project recognised Maduganga as a wetland and published the 'Wetland Site Report and Conservation Management Plan' in 1997. According to the Coast Conservation Act 2km of Maduganga from the river mouth comes under the Coast Conservation Department (CCD). The project report of Maduganga as a Special Management Area or SMA site (Goonethilake et al, 2005) documents the resource utilisation including fisheries and draws a resource management plan. In 2006, 2300 hectares of Maduganga was gazetted a Wildlife Park. In 2001 IUCN assessed the 'Status of Biodiversity in the Maduganga Mangrove Estuary (Bambaradeniya et al, 2001). They have recognised the ecological zoning of Maduganga and major threats to its biodiversity. These previous research aiming on assessing and conserving the ecological value of Maduganga system sheds light on the present study whose main objective is to recognise, preserve and make use of the traditional knowledge for the sustainability of this ecosystem.

Research Methodology

The present study is a component of the wider research "Man - Environment Interaction in Maduganga System; Past and Present". An ethnoecological approach was used to culturally understand the relationships among organisms (Johnson et al, 2011: 280) to study traditional ecological knowledge rooted in the ecosystem. Some researchers focus on habitat type and others landscape, in the sub-discipline of landscape ethnoecology (Johnson et al, 2011: 283). Eugene Hunn has suggested that local people understand the ecotope they dwell in to be adaptive to the site for successful living (Johnson et al, 2011: 287), which is true of the community of Maduganga.

It is said that traditional knowledge is holistic. When studying the fishing practices of local people, the researcher has to study the biotic and abiotic components of the system, the local knowledge of these components used in fishing, various fishing practices, as well as beliefs regarding fishing which form the traditional knowledge system of fishery in Maduganga. In gathering data related to traditional fisheries both literary surveys and field surveys were done. The history of the research area and previous research on Maduganga were studied in the literary survey while field visits, interviews and participatory observation was carried out in the field survey to retrieve data on fisheries, and its socio economic and environmental contexts.

Importance of Studying the Traditional Knowledge of Fishing Practices in Maduganga

In ethnobiology 'traditional knowledge' is also called as ethnobiological knowledge, learned long ago and passed on with faith for at least two or three generations (Anderson 2011: 2).Traditional knowledge is holistic, it does not only constitute of science, but also arts, crafts, concepts, beliefs and subsistence of all kinds bound to the context the community lives in and it blurs the distinction between tangible objects and intangible knowledge. Hence researchers suggest these traditional knowledge systems exist as flexible and adaptive knowledge-practice-belief complexes (Folke 2004: http://www.ecologyandsociety.org/vol9/iss3/art7).

'Traditional Ecological Knowledge' is often referred to as TEK. As mentioned before, TEK is place-based thus focusing on ecosystem, habitat type, or landscape. It is the age old way of management or the sustainable use of nature. Hence ecological conservation is not merely protecting fauna, flora and their habitats but also preserving the traditional methods and concepts of natural resource management (Anderson 2011: 9). Therefore TEK of Maduganga community is useful in conserving the sensitive ecosystem. Traditional fishery is only a fraction of their knowledge system. But it provides insights into the whole knowledge complex and draws lessons. The present research discovers the local community's sustainable use patterns of the environment, their interaction across the river system and methods of passing traditional knowledge from generation to generation. Ethnobiologists stress the value of traditional means of knowledge

transition when the classroom system fails to impress children (Anderson 2011: 9).

Fishing as a Subsistent Method

Fish is important in human dietary patterns since it is rich with proteins. Fish is probably the most accessible source of protein for man throughout evolution. In Maduganga where fresh water, brackish water and marine fish are found, locals fish for daily consumption and recreation while commercial fishing is narrowing. Inhabitants believe that the fish density and diversity of the river is dropping with time. People who engage in fishing are continually decreasing and the traditional fishing methods are changing (Puññasara: Personal Communication). It is said only 100 - 150 fishermen engage in inland fisheries. Inhabitants call the estuarine fisheries as the 'job in the river' (*Gange Rassawa*) and the marine fisheries as 'the job in the sea' (*Muhudu Rassawa*) depicting the stronghold of fisheries in their cognition.

Zonation in Fishing

Due to the geomorphology, hydrology, vegetation and biodiversity variations a zonation of fishing activities can be observed in Maduganga which demonstrate the local communities' knowledge of the landscape and how they adapted fishing to exploit TEK of river terrain. Fresh water streams flow to the river at upper reaches. Sitting on the banks, men fish in these streams using fishing rods as the waterways are shallow and narrow. Downstream they are seen fishing in *oru* or motor boats with fishing rods and nets. In the middle reaches *jakotu* or shrimp traps are visible. People fish in these areas stationing their *oru* near the *jakotu*. Mostly they are seen with fishing rods. When the river gets narrower at lower reaches number of kraals turns lesser. It was observed that the fishing activities are scarce in the slim lower reaches compared to the mid and upper reaches. Near the river mouth fishing harbour is situated. Seafarer fishermen start their daily journey to the sea from here.

Marine fishers also utilise geomorphology in their fishing practices. A reef exists at the coast of Welithara, at the river mouth. It extends from the river mouth and westward parallel to the beach (CEA/ EUROCONSULT 1997: 28). In the reef where ornamental fish varieties are abundant (CEA/ EUROCONSULT 1997: 28) people engage in catching them. The *Vallam* vessels fish in the rocks using

hooks. Larger motor boats fish in deep sea using nets. *Vallam* are also equipped with motors for faster navigation. As they are small and narrow *vallam* can sail near rocks safely. For the bulky motor boats it is convenient to sail in the deep sea avoiding rocks.

The relative shallowness of the river and lack of a shore are also used to advantage in fishing. In the past the inhabitants had used the traditional traps of *Karaka* and *Kemana* to catch fish in shallow waters. *Karaka* is a funnel like basket which is made of sticks woven together at the top narrower than the bottom. Both the top and the bottom are open and nearly three feet high. When the fisherman standing in the shallow waters sees a fish he places *Karaka* surrounding the fish trapping it and thurst his hand from the top opening, to catch fish. The *Kemana* is also a funnel like trap two three feet long. Unlike the *karaka* which is placed horizontally *kemana* is placed vertically in shallow waters. The narrow end of the tunnel shaped is tied closed. When fish enters it from the open end fisherman close the entrance with the attached door made with sticks. Karaka is described by Robert Knox in the seventeenth century (Knox 1981: 142). Even in the wider mid reaches men cast nets or fish with rods while half submerged in the water. Setting gill nets and beating water with batons to frighten away fish towards the net is a common practice in the river (Jayasiri: Personal Communication).

Shrimp Kraals

Tens and twenties of *jakotu* are a remarkable feature in Maduganga which is a traditional method of exploiting shrimps, an exclusive estuarine resource. There is an accumulated TEK complex consisting of legends, beliefs, practices, cognition of ecosystem and sensitivity to its change, all related to shrimp kraals. *Jakotu* functioning in accordance with the life circle of the prawn shows the local knowledge of aquatic life of the ecosystem. Eggs of prawn are hatched in the sea. Nauplius who comes out of the egg lives there and turns to protozoea. At the next stage mysis, the prawn enters mangrove lagoons or estuaries because of nutrition and protection available in mangroves. The prawn spends post larva stage there and at juvenile stage it returns to the sea (Pinto 1986: 48). The design of the *jakotu* is to trap the larger returning juvenile.

The structure of *jakotuwa* depicts that the local community had a precise knowledge on the behavior of shrimp. *Jakotu* act as fences in stopping shrimps

swimming seaward. By hitting the kraal, shrimp swim along these fences and enter the kraal from the narrow opening (at the seaward face it does not have an opening as the prawn migrating from the sea is at the smaller mysis stage). Shrimp is unable of finding the small entrance to turn back and hence they swim forward along the fence and pass the two rooms in the kraal and end up in the third. Fisherfolk call the three rooms of the kraal, *pitakotuwa, madakotuwa* and *irakotuwa* (Wickramaratna et al, 2007: 69). In the farmost corner of the third room *irakotuwa,* there is a kerosene lamp to attract shrimps. The owner of the *jakotuwa* lights the lamp with the fall of dusk. Unable to locate the entrance, shrimp which had got attracted to the light get trapped in the *irakotuwa* until the fisherman come to collect the catch early morning with the hand net (*Athanguwa*). They collect shrimp to baskets and keep them hung to the kraal, submerged in water. Water fills the basket and shrimp would not die until the seafarer fishermen arrive to buy them for fish bait. Some of the kraal owners erect huts on the posts in the river and stay the night guarding the catch from the otter and other animals forcing in and from thieves. They close the third or the last room of the kraal with a wooden lid and keep it locked at night (Shantha: Personal Communication).

Small estuarine shrimp - *Metapenaeus dobsoni,* large white shrimp - *Penaeus indicus*, tiger prawn - *Penaeus monodon* and *Machrobrachium rosenbergii* exist in Maduganga (CEA/ EUROCONSULT 1997: 16). Locals' nomenclature of shrimp species showcases their observation of nature. The smallest named *Malissa* (flower like) *Mal* flower like indicating the smallness, *Kiri issa* (milky coloured) named for its whiteness and *Kalissa* (black coloured) *Kulu* turned *Kal* to denote the darkness of the prawn. From these the Kalissa or the tiger prawn is the rarest in the estuary. More commercially important species are Kiri issa or large white shrimp and *Machrobrachium rosenbergii*. But the majority of the harvest of the *jakotu* comprises the smallest species Malissa. Kraal owners do not let these tiny shrimp go unused, but sell them for fish bait to marine fishermen for hook and line fishing.

The legends of the community cite that the shrimp culture was practiced in the Maduganga from centuries (Jayasiri: Personal Communication). It is believed that this method was introduced to the locality by the Japanese who invaded the south-west coast of Sri Lanka in the thirteenth century CE. (Wickramaratna et al, 2007: 70) They further narrate that decades ago there were hundreds of *jakotu* in the river (Jayasiri: Personal Communication). They have stories about kraals in

the history famous for large harvests, such as *Atholiya jakotuwa*, *Velkotuwa* and *Kapollakotawa* (Wickramaratna et al, 2007: 70). Locals bound to their environment are sensitive to the changes in the river system, which cause fluctuation of fish and shrimp catch. With the Salt Water Exclusion Scheme in 1965 (Arumugam 1969: 71) the saline conditions of the river was controlled resulting in a decline in the shrimp harvest. But with time salt water exclusion structures were abandoned (CEA/EUROCONSULT 1997: 11 - 14) and again the shrimp culture developed. Owners of *jakotu* admit that the harvest increased after the tsunami in 2004 (Shantha: Personal Communication) due to the increase of the salinity with the inclusion of sea water.

Local community has its unique way to pass traditional knowledge to younger generations. During the season when shrimp are abundant in the river banks children catch shrimp using a rod with a loop, named *Kudda.* Here they carefully put the loop around the protruding eyes of the shrimp and pull entangling the shrimp in the loop. This fishing practice is senseless at first sight because of the trouble taken to catch shrimp one by one. But the practice could have been adapted to motivate and train younger generation to fish with patience and it must have been a good exercise to study the behavior of shrimp. When these youngsters grow up to take up fishing and shrimp kraals, they are already familiar with the aquatic life of the ecosystem.

Crab Catching

With the TEK, generations of fisher folk have adapted traditional techniques to catch Mud Crab - *Scylla serrata* and Grapsid Crabs - *Chiromantes spp.* found in Maduganga. It is again a knowledge complex sprung out of and shaped by man's interaction with ecosystem. The crab trap is called *Kakulu Athanguwa* (crab hand net). It is a nylon net bound to a bicycle rim to which a code with a float is attached. A fish, commonly *Anguluwa* (Long - whiskered catfish: *Mytus gulio*) or *Aada* (Eel: *Anguilla bicolour*) used as bait, is bound to this net and dropped on the river floor at night. Fishermen are aware that crabs stay in burrows at day and come out in the night. In the early morning before sunrise the trap is dragged out of water with the crab feeding on the fish. Only the experienced fishermen can catch the crab without letting it escape because there is no mechanism to entangle the crab on the trap (Shantha: Personal Communication). The fishermen's knowledge of fauna is depicted in the skillful way they handle the crab. They

grasp the crab from their last pair of legs. The last pair of legs of edible Portunidae crabs is modified in the shape of oars for swimming (Pinto 1986: 26). Fishermen say that when they catch crab from this pair of legs the crab becomes inactive (Shantha: Personal Communication). Hence they bind these two legs and sell the crabs when they are still alive.

Marine Fisheries

It is said that 43 per cent of the people living in the estuarine area practise marine fisheries (CEA/ EUROCONSULT 1997: 27), most of them being the residents of Brahmanawaththa and Weliwathugoda. Resource utilisation across the river is evident in marine fisheries as small estuarine shrimp - *Metapenaeus dobsoni* or *Malissa* is used by seafarers as bait to catch fish. From the two kinds of marine fishers we stated before fishers who sail in Vallam use shrimp as bait. They visit *jakotu* early morning in motor boats to get shrimp. As they want shrimp alive, they tie the shrimp baskets outside the boat to keep it submerged in the water. In rocky waters of the sea they put few shrimps to a cone like container and put it to the water with the hook. In the water shrimp scatter out of the cone and the fish that swims in to feed on shrimp get hooked. They mostly catch *Paraw* or Trevally *(Carnax sexfasciatus, C. sansun)* from this method (Shantha: Personal Communication). Fishers pay back kraal owners with a portion of the catch. Cooperation between the two communities shows that the knowledge systems they have formed is not limited to their own habitat or to their livelihood, it is so rich that they share the resources and TEK across the river very efficiently and sustainably.

Fish Bait

Species selection for fish bait demonstrates the locals' traditional knowledge on species interaction and predatory relationships in the ecosystem. In Maduganga estuary species most exploited as fish bait is the shrimp *Metapenaeus dobsoni* or *Malissa* due to their availability and convenience of capture. Apart from shrimp and fish, polychaetes and molluscs are also used as bait. The large polychaete *Marphysa boradellei* or *Kalanda panuwa* in Sinhala lives in Maduganga. They are utilised as bait as well as fish food since they are rich in proteins (Pinto 1986: 45). Flesh of the abundant mollusc *Telescopium telescopium* (Pinto 1986: 45) and

Terebralia palustris (De Silva and De Silva 2006: 52) is also a fish bait used by the fishermen living near mangroves.

Ethno-botanical practices in fisheries

Local fishermen's TEK also consists of their knowledge of plant life in the ecosystem. They use both mangroves and terrestrial plants in fishing practices. But with the protection of mangroves after declaring Maduganga as a sanctuary the use of mangroves decreased. People experimented alternatives for mangroves.

Use of mangroves

In fisheries mangrove twigs are used for the 'Brush - pile' or *Mas athu* method in which mangrove twigs are put in different places of the river. These piles of twigs make shelter for fish and they are attracted to feed on algae, aufwuchs, protozoans, rotifers, worms and crustaceans which gather and grow in piles (De Silva and De Silva 2006: 51). After few weeks (it depends on the fish species the fisherman is interested in) fishermen encircle the brush pile with nets and remove the branches to catch the gathered fish with hand nets. Fleshy Avicennia twigs are preferred for setting brush - piles. This fish trap is common in Negombo estuary. They mostly use twigs of *Rhizophora mucronata, R. apiculata* and *Lumnitzera racemosa* for the piles (Amarasinghe 1988: 5) and it is said that 80 per cent of the lagoon's fishery depends on brush - piles (Pinto 1986: 42).

In another traditional fishing method fish are poisoned to stupefy for easy capture. In mangroves latex of *Excoecaria aagallocha* was used as fish poison. As it is a toxic it would cause blindness and blistered skin if contacted by man (De Silva and De Silva 2006: 52). It depicts the locals' knowledge of the characteristics of plants surrounding them.

Shrimp kraal owners use two 5 feet branches of *Rath Kadol (Ceriops tagal)* to get the corner of the shrimp kraal in triangular shape because of the woods' flexibility and the way of branching. This branch used is called *Haedapolla* (shaped branched) (Sumanadasa: Personal Communication). It is another example for the depth of their TEK adapted to their environs. Realising the importance of protecting the mangrove fringe they use bamboo species, *Domba (Calophyllum inophyllum), Hawari Nuga (Alstonia macrophylla)* and *Rukkaththana (Alstonia scholaris)* (Sumanadasa: Personal Communication) in kraal construction. They

believe, even though mangrove branches are durable in water they are weaker above the water level (Puñña sara: Personal Communication).

Other uses of mangroves in fisheries include tanning the fish nets with tanning derived from mangrove trees. According to Amarasinghe, tanning is extracted mainly from the barks of *Rhizophora mucronata,* lesser from *R. apiculata* and *Ceriops tagal* to tan net and sails to make them durable (Amarasinghe 1988: 6). A few decades ago people used to beat the cut wood to peel the barks, dry, pack and sell them to fishing villages. Also in Maduganga the mangrove barks were used to tan the nets and sails years ago. But with the evolution of fishing practices sails are no more in use and the nets are made of nylon which does not require tanning.

Use of terrestrial plants

Local fishermen use many species of terrestrial plants in fishing practices. The *jakotu* is covered with mats woven with stripes of *Bata* or bamboo (*Davidsea attenuata*) culms. This bamboo species is not abundant in the Maduganga environment. Usually fishermen are supplied with lorry loads of bamboo from Bulathsinghala of Kalutara District (Shantha: Personal Communication). Cut into 10 feet strips they are woven by the wives of fishermen with plastic code. As the mats deteriorate quickly due to its physical characteristics and being submerged in water, annually or once in two years they are replaced with new ones. At present they have learnt to cover the third room of the kraal with more durable striped PVC tubes. The third room is rendered this exception because it should be stronger as all the trapped shrimp gathers to it. But the traditional use of organic matter is sustainable than the synthetic PVC.

Fishing Gear

In making the various fishing equipment, a variety of flora in the region is widely used showcasing their knowledge of valuable plants. Fishing rods are usually made of the tip of bamboo culm or rachis of the *Kithul* palm (*Caryota urens*) and a thangus code with a hook bound to it. *Kudda* used by children to catch shrimp gathering near a river bank is a loop made of a fiber taken from a sheath of the banana leaf (*Kesel kenda*), tied to scraped midrib of a coconut leaflet (*Pol iratuwa*). Traditional fish traps, *karaka* was made with bamboo twigs bound together with a rim made from the climber *Kalavel (Derris uliginosa)* and *kemana*

was made with ribs of coconut leaflets bound with coir. A small number of people engage in weaving baskets (*Pasa*) used in shrimp kraals, when requested by the kraal owners. In the past these were woven with *Kalavel (Derris uliginosa)* (Shantha: Personal Communication). But now they use cane. The latest development is weaving with thangus string which is more durable.

Canoe Making

Canoe making is another way in which the local community has excelled the art of making use of plant life. A few decades ago carving wooden boats was a local industry. The traditional vessel *Oru* is a dug - out - trigger canoe. These were used for fishing and transport. The largest of *Oru* were those found in ferries, coastal lagoons, estuaries and coasts, 30 feet *Hadi oru* or *Bala oru* (Vitharana 1992: 18). The smallest of them are only 5 feet in length. Today we find only one wooden *oru* in the study area. It reflects the type of canoes used in the area from ancient times. This dugout canoe of Maduganga is nearly 10 feet long and possesses one outrigger. They use two canoes bound together as a platform to build floating cabanas for tourist hotels. This double canoe is traditionally known as *Angula* (Vitharana 1992: 18).

Since a few decades, organic local productions have been turning in to inorganic industries. Likewise wooden boat carving changed in to molding fiber canoes and boats. Motor boats as well as canoes travelling in Maduganga are made of fiber. Among the seafarer vessels we find boats and *vallam. Vallam* is a form of *Toni* or *Dhoni* vessel (Vitharana 1992: 18). The 20 feet *vallam* we see today in the research area is whole built with fiber. A fiber outrigger is attached to the vessel using wooden poles. Masts appear on board as supports to fishing. Masts of some of the *vallam* are bound with plastic chairs to provide seats for fishermen to keep watching until fish get hooked. These are powered by motor engines. They also carry plastic or wooden oars to sail safely through the narrow mouth of the estuary.

Usually the wooden oars of *oru* and *vallam* are made of the *Kithul* palm (*Caryota urens*) trunk (Shantha: Personal Communication). When the tree trunk is planked the rounded planks of the extremes are used to carve out oars. Common bamboo (*Bambusa vulgaris*) culms are taken as masts. Before the fiber industry came to the region the wood preferred for boat making were mango (*Amba*) - *Mangifera indica*, *Domba - Calophyllum inophyllum*, wild bread fruit (*Val del or*

Gam del) - *Artocarpus nobilis* (Puññasara: Personal Communication) and bread fruit (*Rata del*) - *Artocarpus altilis* (Sumanadasa: Personal Communication). These timber are chosen to dig canoes as they are durable even when consistently exposed to water (Puññasara: Personal Communication).

The Portuguese used jack wood for boat making. But the jack tree was far too valuable for the local community to be used for timber. They believed that the boat made of jack wood led to bad ends because of the curse of destroying the precious tree (Pieris 1983: 226). The selection of woods for canoe making depicts the traditional knowledge and valuation of the environment, fashioned by the experience of generations. In addition it demonstrates another facet of plant utilisation in their daily lives.

Conclusion

The traditional sustainable way of living in the research area which was in cooperation with nature has been challenged by the people's unsustainable interventions in the ecosystem. Traditional knowledge bound with the community's life is challenged, their practices altered, and beliefs questioned with the colonial invasion, industrialisation, globalisation, tourism and the application of scientific knowledge. Under the colonial rule cinnamon cultivation spread widely in the area and mangroves were felled and land was reclaimed for cinnamon cultivation. Even today cinnamon plantations cover stretches along the river banks. Heavy use of fertiliser and pesticides in these plantations causes nutrient accumulation, altering the aquatic life of the system. Traditional fisher folk complain that not only the agro chemicals but also the escalating number of motor boats operating in the river with the rise of tourism has caused a decline in their harvest. Motor boats disturb the reproduction and growth of fish, shrimp as well as mangroves in the ecosystem with high turbulence of water and discharge of oil. Sewage disposal by emerging hotels and factories adversely affects biodiversity.

The use of industrialised fishing gear in commercial fisheries challenges traditional fishing practices. They destroy the early stages of aquatic life in bulks which traditional fisheries attempt to preserve so that their fish catch will not be affected in the long run. Even the mechanism of the shrimp kraals depicts how they save and harvest shrimp by closing the seaward face of the fence preventing prawn in small mysis stage migrating from the sea getting trapped in the kraal.

Instead they let them swim upward the estuary grow there to become juveniles and catch them on their way back to sea. Hence the traditional fishing is a 'conserve and use' practice by means of the traditional knowledge of the ecosystem, which can be called 'sustainable'. The future of TEK of Maduganga has to be conserving and at the same time adaptable to the continuous changes faced by the community and the environment of the system.

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