

MANAGEMENT OF SUSTENANCE ACTIVITIES IN ISLAND ENVIRONMENT

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Each ethnic group or human population employs technique in order to appropriate resources from the environment. Each technique is a combination of material artifacts and the knowledge required to make and use them. Usually the ethnic group or population will employ a range of such techniques which together constitute a mode of subsistence—a subsistence strategy. The present paper highlights only the indigenous knowledge of the island inhabitants in the process of management of environment and natural resources through which they eke out their livelihood pattern for survival. The data in the present treatise will initially focus on Sundarban- the largest delta of the river Ganges and also a unique bio-climatic zone in a tropical geographical niche of the coastal bay of Bengal; and this will again be substantiated by secondary published materials on Jarwa and Nicobarese of Andaman and Nicobar Islands.

The present treatise is limited to the study of Traditional Knowledge of some tribal people of our country in the process of management of environment and natural resources through which they eke out their subsistence for survival. Traditional knowledge usually covers traditional and tradition based cultural expressions in the forms of stories, music, dance, artworks and crafts including signs and symbols and other recurring expressions of traditional concepts. It is knowledge handed down from one generation to another through oral tradition and that suggests a sense of common or communal ownership. It is the systematic body of knowledge acquired by local people of a particular geographical niche which they acquire over experience, informal experiment and intimate understanding of local conditions and provides a productive context for activities designed to help the communities. This knowledge is the product of centuries of trial and error, natural selection and keen observation that can form a knowledge base on which researchers and planning executors can plan their research strategy and experimental procedures.

The present paper highlights some points of indigenous knowledge of the island inhabitants in the process of management of environment and natural resources through which they eke out their livelihood pattern for survival. The data in the present treatise will initially focus on Sundarban- the largest delta of the river Ganges and also a unique bio-climatic zone in a tropical geographical niche of the coastal Bay of Bengal; and this will again be substantiated by secondary published materials on Jarwa and Nicobarese of Andaman and Nicobar Island.

Sundarban Situation

Sundarban the largest delta of the river Ganges (Bhagirathi), is the unique bio climate zone in a tropical geographical niche of the coastal Bay of Bengal. The

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Southernmost part of W.B is important - a landmark of great ancient cultural heritage of mythological and historical events. It is a place which fascinates with wonderful spellbound scenic beauty and natural resource of wide bio-diversity of mangrove forest. It is of curiosity for scientist as well as anthropologist too. Sundarban is the densely forested wetland of the river Ganges, Brahmaputra, and the Meghan.

Sundarban - the largest natural mangrove dunge, is a region of global significance because of its unique coastal zone ecology in the world. The mangrove forests also offer protection against storms, tidal surges and erosion to not only local communities but also to the city of Kolkata, about 130 kilometer away (Danda;). Sundarbans is consisted of about 102 low-lying inlands of which 54 are reclaimed and are of habitable condition while 48 are under reserved forests. The area is the homeland of many endangered wildlife species. The keystone species that has brought fame to the Sundarbans is the Bengal tiger. The total area of Sundarban is 9630 sq. km. Sundarban is located between 21°32' and 22° 40' north latitudes and between 88° 05' and 89° east latitudes bound by Dampier Hodges timer.

The field work was carried out at Mathurapur- II block in Dakshin Konkandighi of Konkandighi G.P. and Pachpukur. These areas are far away from forest while other studied villages namely Mughkhali, Uttar Mukanberie of (Basanti) and Ranipur, Rangebelia and Dayapur of Gosaba – are at the fringe areas to forest.

Sundarban People

The majority of these populations trace their origin either from East Midnapur district or some parts of Bangladesh depending on their location in the Sundarbans. There are also a large number of tribal population in this region whose ancestors were brought by the then British administrators here to clear the forest and to make the place habitable. The scheduled castes and scheduled tribe population of Sundarban region play a vital role in composition of population. These scheduled tribes of this area are mostly the descendants of those who were once brought over to this area, for clearing the forest and making the land cultivable, from their original homeland of Chotangpur plateau of present day Jharkhand state and adjoining Orissa state (Das and at all, 1981). There are altogether 6 major scheduled tribes at Sundarban region who are numerically dominant tribe group in the region; they are Bhumij (88.8%), Munda (82.3%), Oraon (63.3%), Santal (65.7%), Kora (91.9%), and Mahali (89.5%) etc. (These data are based on 1971 census). They have nearly lost their original/traditional culture behavior and present day Sundarban becomes the traditional homeland to them. It is also reported that their forefathers left their ancestral village in Chotangpur under adverse economic pressure. During present field investigation it is observed that some of them trace their clan name from their ancestral place name like Tamariya and Silli etc. though they do not posses any idea regarding Tamar and Silli area of present day Ranchi district of Jharkhand.

Role of Traditional Wisdom in Sustainable Activity

Forest Management

When they have work in cultivable land generally they avoid going to the forest. In case of less cultivation work or no profitable work they get then they go to the forest for collection. It is also mentioned that there are some seasons when collection specially the honey collection is a very profitable work. So in spite of having the life risk, full of uncertainty and insecurity they go to the forest for collection. Whenever they go there-they go either for collection of honey, or fuel wood or sometimes big wooden logs for house making and hetal leaves to use as broom, chappals and shoes for honey collection and also for salt preparation.

During honey collection from forest it is reported that honey collection is a seasonal operation starting from the month of *chaitra* (March-April) and continues at least for three months. With the end of the season of neem flower it is the time when the beehives are full with honey, as all the flowering trees are full with bloom. The *mouleys* locate the beehives, tracing the velocity of the northerly wind. Mauley is a group of people specialized for honey collection. They collect *hental* (*Phoenix paludosa Roxb*) leaves to use as broom, *chappals* and shoes during collection. For collection of honey, they set fire to the mixture of the dried and fresh *hental* leaves and with the smoke of the burnt leaves the bees are driven away. After setting fire they hold it in favour of wind. As soon as the smoke reaches to the honeycomb, irritates the bees and finally the bees leave the beehive and they collect honey.

They claim that they are accustomed with the jungle animals. They know the smell of a tiger. They say, monkeys are best friends in forest. Those alert others by creating noise. They can identify the impression of tiger's feet, any animal excreta and half-eaten food.

For house making many times they arrange to get wooden logs from their neighborhood. If not available they go to jungle to collect the wood. They cut it leaving at least 2' height from the base. They have a belief and also their practical experience says that in those cases the trees may not die and there are chances of their re-growth. Similarly whenever they dig out any tuber from the earth, they do not take out the whole portion out of it. Always they leave some or a little portion of it in the earth. Gradually it again grows for future use. In this way conversation of tubers and plants both in the forest and in their locality is done.

They are tabooed to cut some trees as Neem, Jagdumur, Bel, Gab, Bot, Asattha, Geha, Tulsi etc. as those have certain religious importance. Again they are not allowed to cut any tree and even a little shrub in their religious and sacred places which are known as *than* in this locality and is equivalent with the *sarna* at the Chotanagpur plateau. All these religious beliefs and restrictions ultimately help in the conversation of forest.

Land Management

Similar to the situation of Chotanagpur plateau, to the Oraons and the Mundas of the Sundarban area, cultivation is one of the most important occupations to maintain their livelihood. As they live in the delta region, the land is primarily of low laying type and it is totally different from that of Chhotanagpur plateau in the hilly terrain is a hill-clad area with hard rocky surface. The cultivable lands there are less irrigated dry upland locally called as *tanr*. They primarily depend on the rain water for cultivation. Due to this reason the process of cultivation and the products are of different forms, from those of the Sundarban area.

After their settlement at the Sundarban area, to adjust with ecological condition of the particular area, the presently studied groups have to share the traditional knowledge of the local people.

The plough used in the Sundarban area for cultivation is different from the plough used in the Chotanagpur plateau. In the Chotanagpur plateau they use an iron shaft in the plough to till the hard rocky soil. In the Sundarban area, the soil is very soft, easy for tilling so instead of an iron shaft a wooden shaft is enough. Presently in the Sundarban area in some places they are using tractor instead of plough which indicates mechanization of agriculture.

The process of cultivation of crops and cereals and their varieties - everything is done suited to the Sundarban environment. It is told that though they have plenty of water in their surroundings, even then they have to depend on the rain water absorbed in the soil is utilized in cultivation specially for gardening in their area. As they live very close to the sea, the water of the rivers is saturated with salt and this brackish water is not suitable for cultivation. If the brackish water flows through a cultivable land, the land becomes less productive. In such cases a cultivator stops cultivation in that land and waits for next monsoon when the salt is washed out of the field and again drained towards the river. It is called *dhoyani*. To protect the cultivable land from the brackish water, they prepare some barrier by the mud. Sometimes in such a cultivable land instead of cultivation they do prawn cultivation. After sometimes when the field becomes dry again, they wait till the *dhoyani* in the monsoon and then they use it for agricultural purposes.

According to them they do not like to use the canal water for cultivation as it is filthy. It is told by them that in such cases plants grow healthy (as those get plenty of food from the filthy water) but after sometimes these are attacked by various types of insects, some of which grow in the same filthy water. So if they use the canal water for cultivation, they take several measures to protect the plant from insect attack.

They have noticed that the insects are attracted to the plants which are green and very fresh looking. So when the plants are grown up, they stop irrigation in those lands for a few days. By this time the field becomes dry and the green colour of those plants are faded so the insects are less attracted. In this way they protect their plants.

Their traditional knowledge says that foggy weather is not good for cultivation fog or mist hampers in the growth of the cultivable product. Similarly it is applicable for the mango flower and also for the small mango. But if there is shower after the fog then the sticky fog is washed out from those, and then there will be no harm.

As their lands in most of the cases are very low they feel difficulty to produce crop. So sometimes they take out the mud deposited in the canal by digging. They accumulate that mud on the nabal or low laying land to prepare it into slightly a high land.

To drain out the excess water staged in a land, they keep a hole at a corner of the contour bounding (locally known as *pokar/gheri/bheri*). The excess water passes downwards to the land just beneath high land through the hole.

Beside utilization of land, at the Sundarban area, the Oraons and the Mundas of the same area have acquired the knowledge how to increase the fertility of the land. When they see that the quantity of the harvest is less, paddy stalk is smaller in size, there is a quantity of paddy stalk without any grain. (Locally called as *Chite dhan*). They get assured that the productivity is lessened. Then they generally abandon the field for sometimes for its recovery from its loss of fertility. But usually they change the variety of the paddy grain. In case of single crop land, the land is left in cultivated for at least six to seven months within which period the land again receives from its loss of productivity. In this way they do conservation of land.

Water management

Sundarban – The largest deltaic region of the world is consisted of several small and large Islands which are surrounded by several rivers and rivulets such as Bidyadhari, Matla, Moni, etc. which have ultimately flown down to the Bay of Bengal. So the people of the Sundarban area live in the surrounding of water and automatically water has got a special importance in their life and culture. In Chotanagpur plateau geographical condition is very different from that of the Sundarban area as it is written earlier. They have scarcity of water.

As in the Sundarban area, the geographical condition is completely different, the Oraons and the Mundas after they have settled in plains in the deltaic region where instead of scarcity of water they got it in plenty. So the process of management of water in that place is totally different. To cope up with the local ecological niche, they have to share the traditional wisdom of the local people.

It is told that when a cultivable land is flooded by brackish water which is not suitable for cultivation, the land becomes less productive. Sometimes a ditch is formed in that land ditch where they do prawn cultivation.

During our field investigation it is found that the fisher folk of Sundarban use various kinds of net for their catch which depends on (a) nature of catches, (b) depth of water, (c) colour of water and (d) bubbles created by a shoal of fish in the

water, size of fish etc. It is reported by a group of fisher folk living in this region that as per size of fish available in various depth of water the fishing net /s and man power with their expertise are determined.

They use fishing nets for various types of catches as given below:

Application of Indigenous Knowledge for Fishing

<i>Name of the fishing net</i>	<i>Name of catches</i>	<i>Nature of water etc.</i>
1. Benti Jal	Chapra (Prawn), Chuno Machch (Small fish)	Found in low water near sand-bank
2. Char pata jal	Bhetki, Phansa	Coastline of mangrove and s and bank
3. Khal Pata	Chapra (prawn), Chuno machch, Bетки, Datney, Kan machch, Payra toil	Where estuary of river becomes dry and low deep of water in estuaries and canals.
4. Kumo jal	Kan, Payratoli, Bhetki, Koibhol	Different tree twigs are used in covering the area for catching fish
5. Kalsi Jal	Bhetki, Jawa Payra Datney	Nets are tied with big tree on both sides of creeks or rivulets.
6. Monofil Jal	Khayra, Parsey, Prawn (big size viz. Bagda, Galda etc.)	With the help of bamboo fishing nets are spread over the creeks and canals.
7. Galsa Jal	Sheley, Jawa, Bhetki, Bhola Bhetki (big size)	Nets are spread in the water with the help of <i>gorapi</i> (made of iron and used as anchor) where current in the river exist.
8. Bhesal jal	Chapra Prawn, Parsey, Phansa.	Use search light in the boat, then by seeing light shoal of fish are attracted, then nets are spread from inside water.
9. Khepla Jal	Prawn, Parsey, Phansa and various small fishes (chuno machch)	Nets are thrown from ground knee deep water.
10. Don Barsi Jal	Thorny fishes like Mochan, Medh, Kan, Sheley, Murali etc.	For deep water. Use usually bait in fishing hook, where prawn, <i>loteh</i> or <i>nereh</i> , <i>sita pati</i> etc. fishes are used as bait.

During both full moon and new moon days, intensity of tide and ebb is very high. The tides on these two days are called as *Kotal*. The *Kotal* of the full moon day is regarded as a female or *madi Kotal* and that of the new moon day is called as *madda* or male *Kotal*. The force or intensity of the male *Kotal* is more than a female *Kotal*. There is a myth behind it. It is told that the female *Kotal* wants to run away from the male *Kotal* and the male *Kotal* runs behind her to catch hold of her. The effects of the *Kotal*s are continued till next three to five days. After that gradually it is minimized. The tide with lesser force is called as *marani* tide and *marani* ebb.

In the Sundarban area prawn cultivation is one of the most important occupations. It is very commonly seen that there are a huge number of people

specially the small boys, girls and the women who are engaged in meendhara or catching of shrimps or finger ling which ultimately grows to prawn. Along with collection of finger lings they also collect fishes and crabs.

In the studied villages generally women and little children collect small fishes, crabs, snails. The small fishes and crabs come towards the bank locally known as *khari* with the tidal water. The crabs take shelter in the hole at the bank. During ebb they dig out those crabs and shrimps from the holes. Sometimes they hang a small fish very close to the hole. When a crab sees the fish, it gets attracted and comes out of the hole and is captured by them. There are various types of crab such as chiti, tele, hero and nona. Among these chiti grows more in summer in the saline water. The tele variety grows more in the monsoon both in ponds and saline water. The nona and hero variety are available in river throughout the year.

In case of fish cultivation, they prefer to cultivate fish in clean water. According to them, the fishes grow in the filthy water, like in the canals, grow quicker and are healthier than the fishes grow in the fresh water as those get plenty of food in the filthy water. Even then they prefer to cultivate fishes in fresh water. They have experienced that the fishes of canal get rotten very quickly and are not tasty, where the fresh water fishes are very tasty and not get rotten quickly. One can easily identify a canal fish as its belly portion is softer than the soft water fish which has a hard belly hard. The canal fishes look black in colour.

Fishes, as they have informed that like to stay in a very calm and quiet place and in turbid or muddy water full with current.

They say that they prefer to do meendhara than cultivation of other fishes and the people are also known as meendhara. At first the women and small boys and girls go to the river to catch shrimps with minjal (a type of net with a very fine weaving). During the web they drag the net towards the bank and the fingerlings which come with the wave of tide are captured in that net are separated from the net. When the tide is very high, they stop mindhara as it is difficult to stand in the water with net.

Generally there are three types of fingerlings namely chhati or galda bagda and mocha. Galda can grow both in sweet and saline water whereas bagda grows in saline water.

They use lime to filter the water of a bheri or gheri. In the sweet water pond, they leave banana leaves and the secretion of those leaves purify the water. If in a pond they observe that the growth of fishes is not satisfactory and or fishes are not looking fresh but looking sick or the water got spoiled, at first take out all the fishes from that water. Then add mahua khaili in it. All the small creatures born in the water will die. Then they Add lime and alum for final filtration and the water is stirred. After completion of filtration process, they start fish cultivation again in that water.

Andaman and Nicobar Island Situation

It is to be said that the situations of both Sunderban and Andaman Island are very similar. There are similarities between the lifestyle of the tribal people of both the Islands. In spite of the similarities dissimilarities are also to be noted. In Sundarbans the inhabiting tribal people on whom the study is done are the migrant people, migrated primarily from the Chhotanagpur plateau of the Jharkhand state and from its adjoining districts of the Orissa state in search of job of clearing of forest and for reclamation of land and ultimately they were settled there. They have taken occupations primarily based on forest and water and these became their very important sources of livelihood beside their occupation of cultivation (which is changed and adapted with the Sundarban Island ecological niche). While the tribal inhabitants on whom the study is done are the original inhabitants of the Andaman Island. Herein Andaman also the tribal people from the Chhotanagpur plateau were brought for reclamation of land and they have also settled there similar to the Sundarban Island and after the allotted work is finished for which they migrated to the place, they have taken cultivation and other menial works other than water related and forest based occupations. The original tribal populations of the Andaman Island are totally attached with water and forest and these two are the sources of their economic life and their social aspects are shaped as per the local eco system. Due to this similarity in occupational life between the groups in two different Islands, the original tribal inhabitants of Andaman Island are taken for the present study of management of sustenance activities in Island environment leaving the Chhotanagpur tribes migrated in Andaman Island.

This Andaman Island is the abode of the following tribal groups like Jarwa, Onge, Great Andamanese and Sentinelese who are considered as Negrito, while Nicobarese and Shompen are considered as Mongoloid. Here in the following lines authors will try to highlight the application of indigenous knowledge for fishing (which is one of the means of subsistence) in deep sea by the Nicobarese.

It is reported by Sinha Roy (2011) that the Nicobarese of the Katchal Island use their indigenous knowledge for maintaining livelihood in island situation. They have their own calendar of transportation and fishing activities which is guided by seasonal variation, weather condition, direction of wind and nature of sea i.e. tide, current of water and length of wave etc. He reported that:

A.	May		
	June	Sumhav	(i) west wind (ii) Heavy rain (iii) very bad weather for fishing and journey
	July		
B.	August	Itui	(i) south wind (ii) heavy rain (iii) not good for journey (iv) Fishing activities mainly in day time
	September		
	October		

C.	November	Foul	(i)	east ward wind
	December		(ii)	sometimes rainy; not suitable for fishing and journey
D.	February	<i>Kuikaba</i>	(i)	northwest wind
	March		(ii)	very good weather for fishing and journey

“The Nicobarese divide a 30 days calendar into two phases. The first is the 16 days duration towards full moon or *Karuk* and the next 14 days towards new moon or *gugal*. Again *karuk* is further divided into *chaniatha kahe* of 10 days duration and *kamleta karuk* for next 6 days. The first 6 days according to Nicobarese is not safe for mid water fishing and journey because of high tide and high current of sea water. They take part in line and hook fishing and perform journey within the village only during the phase; while the next four days (i.e. *hudkamalesoh*) is best suited for fishing and journey because of low current in sea water and it also remains calm.

Similarly, the last six days of *karuk* (in the phase of *kamaletakaruk*) is the period when the pull of moon is strongest, the water level rises, fishing and journey is avoided” (Sinha Roy, 2011).

The next part of our presentation deals with the traditional knowledge of the Jarwa:

The Jarwa are one of the four Negrito tribes living in the western side of the South and Middle Andaman Islands. Their movement within the habitat is confined to a Reserved Forest having approximately an area of 765 sq km. The hunting, fishing and gathering activities are carried out with the help of bow and arrow, small fishing nets, digging stick and knife. Like other hunters and gatherers, they are also semi-nomadic people.

There are three territorial groups among the Jarwa who inhabit *Boiab* (Tirur area), *Thidong* (Middle Strait area), and *Tanmad* (Kadamtala area) territories of South and Middle Andaman Islands. Resource acquisition in a particular territory by a particular group of the Jarwa is the basis for grouping the Jarwa into three territorial groups and demarcating their respective territories.

Movement of different groups of the Jarwa is territory specific in relation to hunting and gathering activities, but this rule is not applicable when they move for social purposes, for example inter-territorial marriage alliances exist among them. It can be said that the concept of territoriality at subsistence level is very strong in the Jarwa and it flows from the topophilia (sense of attachment). It is quite natural in a society that is primarily hunter and gatherer.

The Jarwa Reserve

The Government of India declared the Jarwa Territory as a ‘Reserved Area’ in the year 1956. In the subsequent notification, there was some change in the total area of the ‘Jarwa Reserve’ (Mukhopadhyay, 2002). Prior to the Gazette Notification

of 2004, it measured about 765 sq km. After the 2004 notification, it has been expanded to approximately 950 sq km.

Resource Base

The resource base of the Jarwa is inclusive of both the terrestrial and aquatic resources. At cognitive level the Jarwa classify the space into five categories. These are *pilleh* (coastal area), *tagidh* (marshy area), *chanhannap* (plain forest land), *tinon* (hilly dense forest) and *wa* (streams, inlets).

Terrestrial resources are exploited from the *Chanhanap* and *Tinon* areas, while *Pilleh* and *Tagidh* areas are used for the exploitation of aquatic resources. The fresh water need is met from *wa* (streams). However, the availability of many of these resources is season specific. So far the Jarwa has been observed to use about 139 species of plants as resource of which 54 are used as edible resources and remaining as non-edible resources. The collection of aquatic resources is mostly for food purpose. Aquatic resources mostly consist of different varieties of fish, crabs, shells, molluscs, turtle and turtle eggs. The resources gathered by the Jarwa can be put under two broad categories namely edible resources, water and non-edible resources. The edible resources can further be sub-grouped into two categories namely (i) plant resources, and (ii) animal resources.

Edible Plant Resources

There are numerous plant species available in the 'Jarwa Reserve', which are yet to be fully documented. The edible plant resources of the Jarwa can be put under three broad groups. These are (a) tubers, (b) fruits, pulp and tender leaves, and (c) seeds.

Edible Animal Resources

The edible animal food items are collected from both terrestrial and aquatic ecosystems of the Island. The animal resources from terrestrial ecosystem consist of wild pigs (*ovu*), monitor lizards (*orrugu*), grub larvae, honey and a few species of birds, while the resources of the aquatic ecosystem comprise of turtle (*ukkele*), turtle eggs, fish (*naappo*), molluscs, crustaceans etc. So far the Jarwa have been found to use 82 edible animal resources.

Although numerous edible items are collected through hunting, fishing and gathering, the Jarwa have a dietary preference for meat of wild pig, monitor lizard, turtle, fish and molluscs.

It is interesting to note that the Jarwa do not hunt the deer that are in abundance in the Jarwa territory. The apparent reason could be that it was an alien species introduced during second settlement and hence did not figure in the list of prey animals of the Jarwa. Thus, the Jarwa desisted from hunting the deer.

Aquatic resources mostly consist of different varieties of fish, crabs, shells, molluscs, turtle and turtle eggs. In the aquatic resources, fishes and molluscs are important food items for the Jarwa, and both are found in abundance in the coastal region of their habitat, hence easy to catch. Of particular importance are bivalve shells and fishes found in the creek and shallow water near the shoreline. Male members do the fishing by bow and arrow while female members do it with hand nets. However, the females do most of the fishing.

Non-Edible Resources

In addition to edible resources, there are many non-edible resources used by the Jarwa to meet their other requirements. It mostly consists of plant and non-plant resources. The non-edible usage of plant resources are mainly for shelter, medicines, ornamentation, repellent for honeybee and implements. It has been so far found that the Jarwa make use of 85 plant species for non-edible purposes. The actual number could be much more than the observed figures. In addition to the plant resources, there are a few things which are also important for the Jarwa. Important among those are ochre, iron and metal utensils. While the ochre is used to paint the body, the iron is used to make various implants. In addition, metal utensils are also used by them for storing and cooking purpose. It is interesting to note that except the iron and other metal utensils, all other resources are naturally available in the Jarwa area. The iron and metal utensils are supplied presently by the AAJVS. All these resources have been discussed below in detail.

Seasonality of Food Resources

The harvesting of terrestrial and aquatic resources is mostly for food purpose. However, the availability and in some cases density of many of these resources is season specific, it means availability of these resources vary from one season to another. The collection of resources by the Jarwa is, therefore, subject to abundance of specific resource in a particular season. Availability of few of the edible resources is inter-seasonal also. There are three broad resource seasons as given below (Kumar and Biswas,2002):

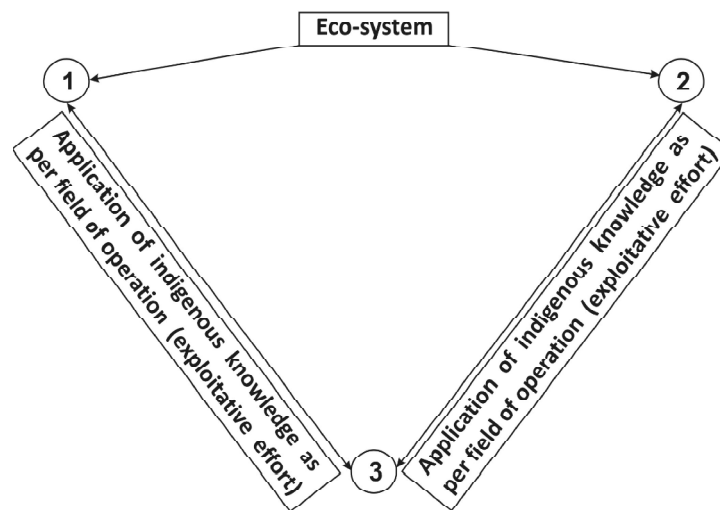
1. *Mid-March to mid-May (dry summer season)*: It is the season of collection of wild jackfruit. The fruits of wild jackfruits are collected in large quantity during dry summer season. The pulp of ripen fruit is eaten instantly. The unripe fruit is cooked in the fire and there after its seeds are taken out. Some of the seeds are eaten immediately, while the rest are stored. The stored seeds last until August. Coincidentally, this period happens to be the lean season of pig hunting due to some reasons discussed elsewhere. There is occasional collection of honey also in this season.
2. *Mid-May to November (rainy season)*: The rainy seasons include both the south-west and the north-east monsoons. During this season, the thrust is

on pig hunting and collection of the seeds of *Cycus rumphii* and *Nipa fruticans*. During this period roots and tubers, the food of the feral pigs, are available in abundance. As a result, the pigs grow heavier during this period. The collection of the seeds of *Cycus rumphii* continues until end of November.

3. *December to mid-March (cool winter season)*: This is the main season of collection of honey and turtle eggs, followed by pig hunting. The turtle starts coming ashore for laying the eggs from November onwards. Thus, the turtle hunting together with collection of eggs begins from November and continues until end of February, though egg collection diminishes gradually. There are a few species of turtles that lay eggs in other seasons also. The honey collection begins when the rain stops, i.e., from December and last until May.

In case of wild pig, the seasonality does not hold true except that pigs are hunted less during March to May. In addition, no seasonality is observed in case of the fish, molluscs and crabs as these are available throughout the year. Thus fishing goes on round the year and the supply of the aquatic edible resources is in plenty.

Exploitation of Natural Resources for Sustenance



Survival Strategy for Sustenance

1. Exploitation of Resources for Sustenance.
2. Availability of product.
3. Ethnic group in a particular eco system.

Same is the case with availability of edible tubers (*Dioscorea sp.*) also. Plants of a single species can be found at all stages of growth at the same time. At least two species of tubers (*woh*) sometimes have mature and immature tubers on the same plant at a particular time.

Conclusion

From the aforesaid discussion it reveals that an ecological system is determined in terms of mutually interacting and adapting populations of organisms and the condition of varied ecosystems is a direct result of human activity. Moreover, the ecological characteristics on the human beings at Sundarban and Andaman-Nicobar islands are comparable to those of other groups and in this sense culture is part of the distinctive means by which a human population maintains itself in the particular eco-system (Ellen, 1982).

It is concluded that survival strategy is the main tool for a community for developing its adaptive strategy in managing his niche for sustainable activities and this knowledge bank to them is time tested and acquired over generation with long experiences.

References

- Ellen, Roy (1982). Environment, Subsistence and System: The ecology of small-scale Social Formations, Cambridge: Cambridge University Press.
- Kumar, Umesh and Samir Biswas (2002). "The Jarwa and their Habitat : A Man-Nature Relationship", in *Jarwa Contact: Our with them theirs with Us*, ed. K. Mukhopadhyay *et al.*, Kolkata:Anthropological Survey of India. pp. 58-71.
- Kumar Umesh (2008). Unpublished Ph.D.dissertation on A & N Island (degree awarded from NEHU, Shillong).
- Mukhopadhyay, K. (2002). "A Brief History of Relationship between the Jarwas and Others", in *Jarwa Contact: Our with them theirs with Us*, ed. K. Mukhopadhyay *et al.*, Kolkata: Anthropological Survey of India. pp. 25-42.
- Ruyle, E. E. (1973). Slavery, Surplus and Stratification on the North-West Coast: the ethno-energetic of an incipient Stratification System, *Current Anthropology*, Vol. 14 (5), pp. 603-31.
- Sarkar, Amitabha and Samira Dasgupta (2011). "Indigenous Knowledge for Sustenance: an introspection of Tribal India, in *Indigenous Knowledge in Traditional Folk Panorama: Genesis, Development and Application*, ed. R.M.Sarkar, New Delhi: Serial Publications. pp. 266-297.
- Sinha Roy, K. N. (2011). "Wood Craft and Traditional Wisdom among the Nicobarese of Katchal Island", in *Indigenous Knowledge in Traditional Folk Panorama: Genesis, Development and Application*, ed. R.M.Sarkar, New Delhi: Serial Publications. pp. 376-391.