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**A LIVELIHOOD ANALYSIS THROUGH SUSTAINABLE LIVELIHOOD
APPROACH IN COASTAL SUNDERBAN, SOUTH 24 PARGANA, WEST BENGAL**

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Abstract

A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base. This paper deals with the sustainable livelihoods condition of Indian part of coastal Sunderbans by analysing the different assets, vulnerability context and coping capacity and strategy adopted by the people of this area. All the livelihoods groups are more or less vulnerable in this fragile islands ecosystem. People dependent on agriculture are vulnerable due to saline water and frequent cyclones, fishing communities are also affected by cyclones, tidal waters and different policies of government. The study area comprises of coastal part of Sunderbans which is under thirteen blocks of South 24 Parganas. The Blocks which have good infrastructure, education and health centres have less vulnerable livelihoods. Apart from the various trends, this paper examines the impact of seasonality and shocks upon the nature-based livelihoods and the importance and the influence of various policies, institutions and processes in addressing the people's need to cope with their vulnerability context in a meaningful manner. It summarizes the various factors having an impact upon the livelihoods of the people and develops them into simple indicators relevant in assessing the changing patterns of poverty. Indicators like landless households, distribution of BPL population, availability of medical and educational facilities etc have been developed to analyse the Sustainable livelihoods framework.

Key Words: Sustainable Livelihoods, coping strategy, diversification

INTRODUCTION

West Bengal has a short coastline - only about 64 km, spread along the southern edge of its two maritime districts, 24 Parganas and Midnapore. This represents approximately one per cent of India's coastline. Indian part of Sunderbans is located in this zone with a diverse flora and fauna with different socioeconomic population groups. The livelihoods of coastal Sunderbans are most vulnerable in terms of physical vulnerability and social backwardness and remoteness. Sustainable livelihoods approach analysis the socio economic condition of the area and its direct and indirect impact on livelihoods groups. Sunderbans is one of the most fragile ecosystem in the world. Fragility of the environment leads to poor condition of livelihoods. As pressure on land is increasing and most of the lands are under forest cover waters in different forms appear as a major source and opportunities for livelihood generation and promotion. After agriculture people engaged to fisheries as their main source of livelihoods because fish is the most favourable food item of Bengali people and inland as well as coastal fisheries have been carried out from the ancient time. Other livelihoods groups consists of office workers, handicrafts and small industries, tourism and non timber forest product collectors etc. The blocks which have highest level of livelihood assets have lowest number of population engaged in agriculture like patharpratima, Kakwdip and Canning I.

OBJECTIVE

The main objectives of the paper are

- i. To explore and analyse the different livelihood groups in Sunderbans with the help of Sustainable Livelihood Frame work developed by DFID (1999).
- ii. To identify the livelihood assets, structure and process prevail in Sunderbans.
- iii. To locate the most vulnerable regions in terms of livelihoods and causes behind it .
- iv. To develop suggestion and policy to remove the problems and poverty of the coastal fishing communities.

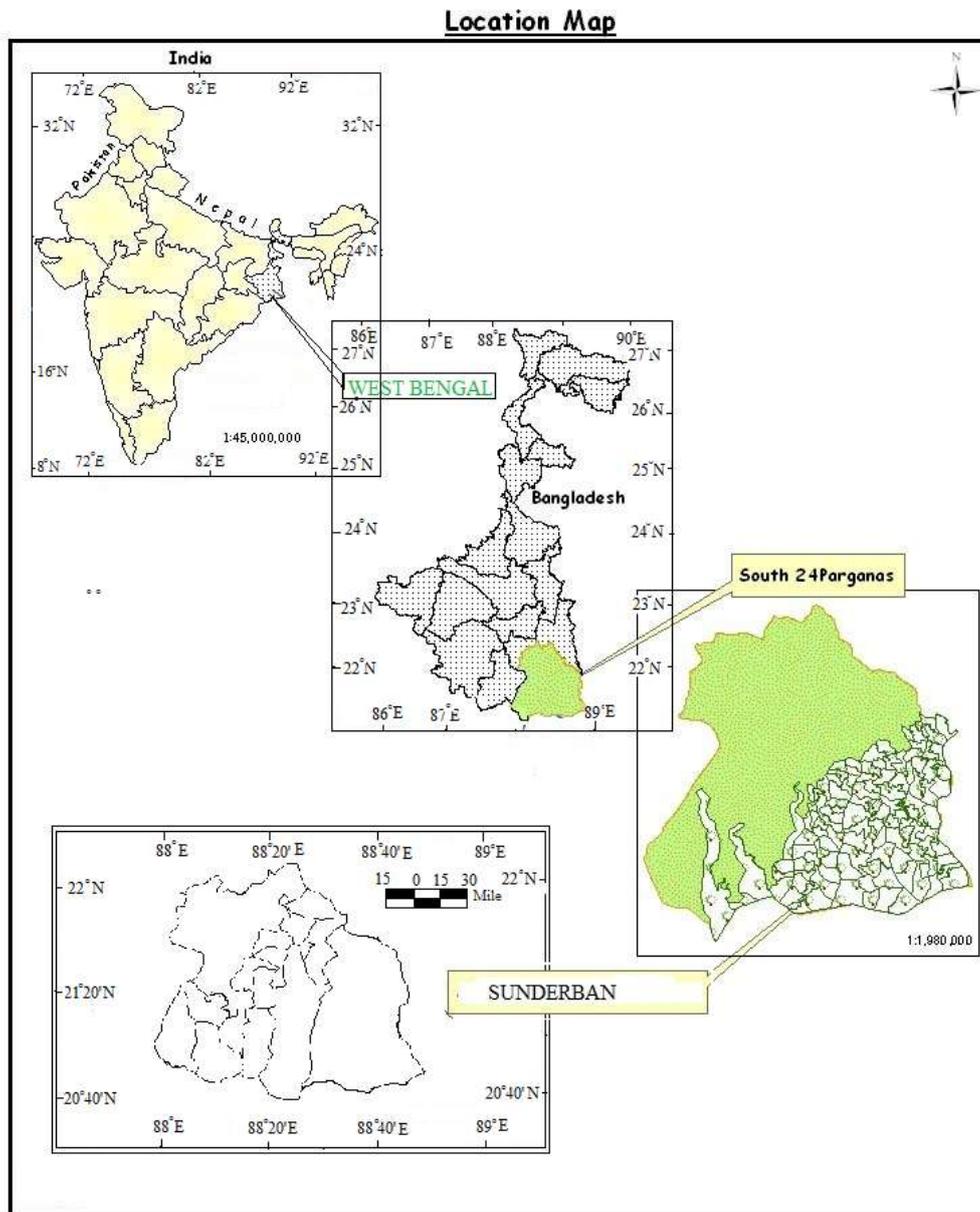
DATABASE METHODOLOGY

This paper is mainly based on secondary data collected from different government and quasi governmental sources. Sustainable livelihood approach have been applied to analyse different capitals (human capitals-education, knowledge, health, Social Capital-Govt assistance, Financial Capital-saving, Physical Capital-access to income earning sources like boat ,machinery, Natural Capitals -access to land, water ,tree, common property etc.), vulnerability situation and coping strategy as well as level of living. Data has been collected from statistical hand book 2009-10 of south 24 Pargana, Annual Report 2004-2005 of department of fisheries, Aquaculture, aquatic resources and fishing harbours, Human development report south 24 parganas 2009.

Indian part of Sunderbans consists of 13 blocks of south 24 parganas and 6 blocks of north 24 parganas. This paper deals with coastal livelihoods especially on coastal fisheries and marine fisheries which is done only in the part of Sunderbans located in south 24 parganas consisting of 13 blocks. So this study is particularly based on the study of only south 24 pargana's sunderban part. Data have been analysed and map have been formed with the help of GIS archview.

STUDY AREA

The Indian Sundarbans Delta (ISD) is part of the delta of the Ganga-Brahmaputra-Meghna (GBM) basin in Asia. The ISD spread between 21°40'04"N and 22°09'21"N latitude, and 88°01'56"E and 89°06'01"E longitude, is the smaller and western part of the complete Sundarbans delta.

Figure :1 Location Map of Sunderbans

Indian Sunderbans comprises 37 percent of the World largest mangrove of which 44 per cent area is under Reserve forest and 26 per cent is under Project tiger. Total Island in Sunderbans is 102 of which 54 are inhabited. Mangroves are one of the most productive ecosystems, which can efficiently fertilize the sea, potentially protect the coastal zone and vitally serve as a breeding, feeding and nursery ground for fin/shell fish species. The Indian Sunderbans Delta is bounded by the Ichamati-Raimangal River in the east, by the Hugli River in the west, by the Bay of Bengal in the south, and the Dampier Hodges line drawn in 1829-1830 in the north. A little over half of this area has human settlements on 54 deltaic islands the remaining portion is under mangrove vegetation.

The Sundarban is an important and unique natural resource endowment, characterized by an extensive mangrove forest breeding and nursery ground contiguous with a wide marine shelf receiving significant freshwater discharge. It has a potential for generating substantial benefit in the form of income and economic growth for people using its resources, particularly in the fisheries sector where the Sundarban has a high comparative advantage for brackish water fish production and coastal marine fisheries

SUSTAINABLE LIVELIHOODS APPROACH

The Concept of Sustainable livelihood approach becomes increasingly important in many contexts like rural development, poverty reduction, sustainable development, environmental management issues. It takes People as the core for analysis. The word 'livelihood' can be used in many different way. The following definition captures the broad notion of livelihoods understood here: 'A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base'.(Chambers and Conway 1992).¹

Sustainable livelihoods framework defined by DFID has been adopted here to analyse the livelihoods of the coastal Sunderban's peoples. The sustainable livelihoods framework presents the main factors that affect people's livelihoods, and typical relationships between these. It can be used in both planning new development activities and assessing the contribution to livelihood sustainability made by existing activities.²

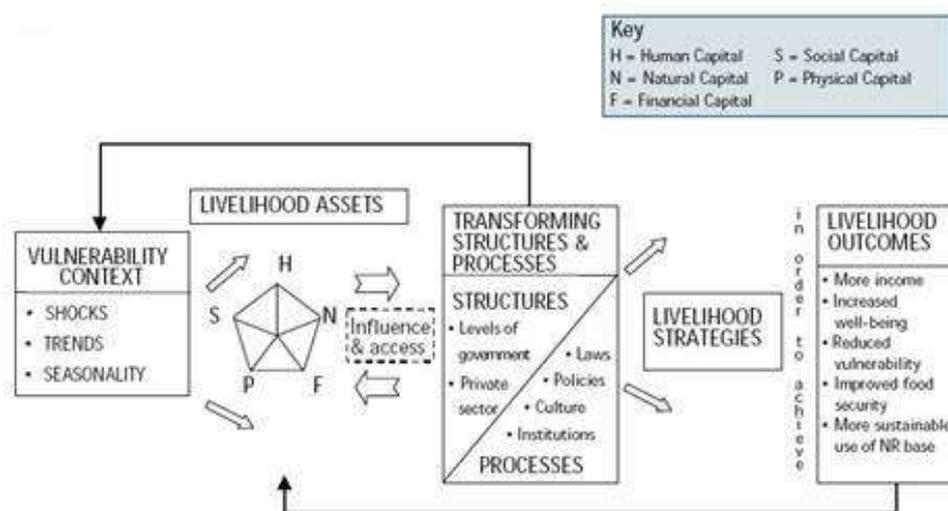
The socio-economic profile of Sundarban's inhabitants and the bottlenecks to their development are very similar across the two districts. Presently Sundarbans has a forest cover of 10,200 sq. km. shared between India and Bangladesh. India's share of this forest area is around 4,200 sq. km. Indian Sundarban also includes around 5,400 sq. km. area outside the forest cover that includes inhabited lands along the north and north-western boundary of the forest. The mangrove dominated delta is a complex ecosystem comprising one of the three largest single tracts of mangrove forests of the world. It has significant ecological implication for marine life and livelihood of coastal communities for a large part of south-east Asia.

The mangrove vegetation itself assists in the formation of new landmass and the intertidal Vegetation plays an important role in swamp morphology. The area experienced migration of poor people from the adjoining district of Midnapur in the west, which is a coastal district with a history of repeated cyclone disasters. Finally, a significant section of local population

consisted of migrants from neighbouring districts of Bangladesh in the east. The Blocks of Basanti, Gosaba, Kultali, Patharpratima and Sagar of south 24 Pargana, together accounting for around 40% of total area in the district, call for a special understanding of the people, their livelihood and threat perceptions. They are almost entirely detached from the mainland and live under much different conditions unmatched in the rest of India.

In this context The Sustainable Livelihood approach have been applied to analyse the livelihood patterns of Sunderbans which provides a framework for understanding the diverse and complex livelihoods strategies developed by individuals or households.

Figure: 2 Sustainable Livelihood Framework



The framework has several components such as Vulnerability context (shocks, seasonality and trends), Livelihood Assets (Human, Social, Physical, Natural and Financial Capitals), Livelihoods Strategy, Structure and Process and lastly the livelihoods outcomes comprising of more income, reduced vulnerability, increased well being, Improved food security and more sustainable use of natural resource base.

VULNERABILITY CONTEXT

Sunderbans is the most ecological fragile zone in West Bengal. Owing to its unique geographical location the entire 'Sundarban Biosphere Reserve' and especially the 13 thickly populated riverine blocks of the District are under constant threat of powerful nor' westers, bay cyclones, tidal surges and constant change of courses by the numerous distributaries in the active part of the delta. Sunderbans is mostly affected by cyclones, riverine and marine erosion, salinity etc.

Table 1: Cyclones in the past Five Years

Events 2005-2009	Date	Speed (km)	Nature of Storm
	2 October, 2005	<40	Cyclonic Storm
Mala	24 April, 2006	>120	Super Cyclonic Storm
Not given	13 May, 2007	<60	Severe Cyclonic Storm
Sidr	15 November, 2007	>120	Super Cyclonic Storm
	28 June, 2007	>120	Super Cyclonic Storm
Rashmi	26 October 2008	>40	Cyclonic Storm
Nargis	27 April, 2008	<120	Very Severe Cyclonic Storm
Bijli	16 April, 2009	<60	Severe Cyclonic Storm
Aila	24 May, 2009	<60	Severe Cyclonic Storm

Source: *S Hazra, et al 2010, 'Temporal Change Detection (2001-2008) Study of Sundarban', School of Oceanographic Studies, Jadavpur University, Kolkata.*

There is an urgent need to understand the complex relations between temperature (air and water), rainfall, sea level rise, erosion and cyclones with changing climate. At the moment, Sundarban's heightened vulnerability to climatic changes is clearly demonstrated from the few studies that have been carried out. However, the exact nature of the impacts remains unclear (*S K Jadhav et al 2009*). The Sundarbans is a low lying area and the interaction between sea level rise, salinity, erosion and land loss lead to a complicated set of outcomes that jeopardise the stability of the area and livelihoods of the people. The east coast of India has already been proved to be more vulnerable to sea level rise in comparison to that of the west coast. (*S R Shetye, et al 1990*).

LIVELIHOOD ASSETS

Livelihood assets comprises of different types of capitals that people have and on which they depends upon for their livelihoods. People require a range of assets to achieve positive livelihood outcomes; no single category of assets on its own is sufficient to yield all the many and varied livelihood outcomes that people seek. Assets have been categorised in five categories i.e. Human capitals (Knowledge, Skill, Education, Health), Social Capital (social relations, groups, Source of information), Physical capital (affordable transport, secure shelter and buildings; adequate water supply and sanitation, clean, affordable energy, and access to information), Natural Capital (land, water, tree etc), Financial capitals (different form of

savings). All the assets are interdependent to each other. The most important is the human assets. If human assets enriched then all the other assets can be obtained by utilising it. For example If people suffer from illness then his financial assets will be deteriorate and most of the time will be spend in treatment and other activities so he will be unable to earn his livelihoods as per his need. Education is one of the most important human assets. By educating oneself one overcomes many problems. To analyse the livelihood of Sunderban we have taken health care facility, educational facilities, BPL and landless population of Sunderbans.

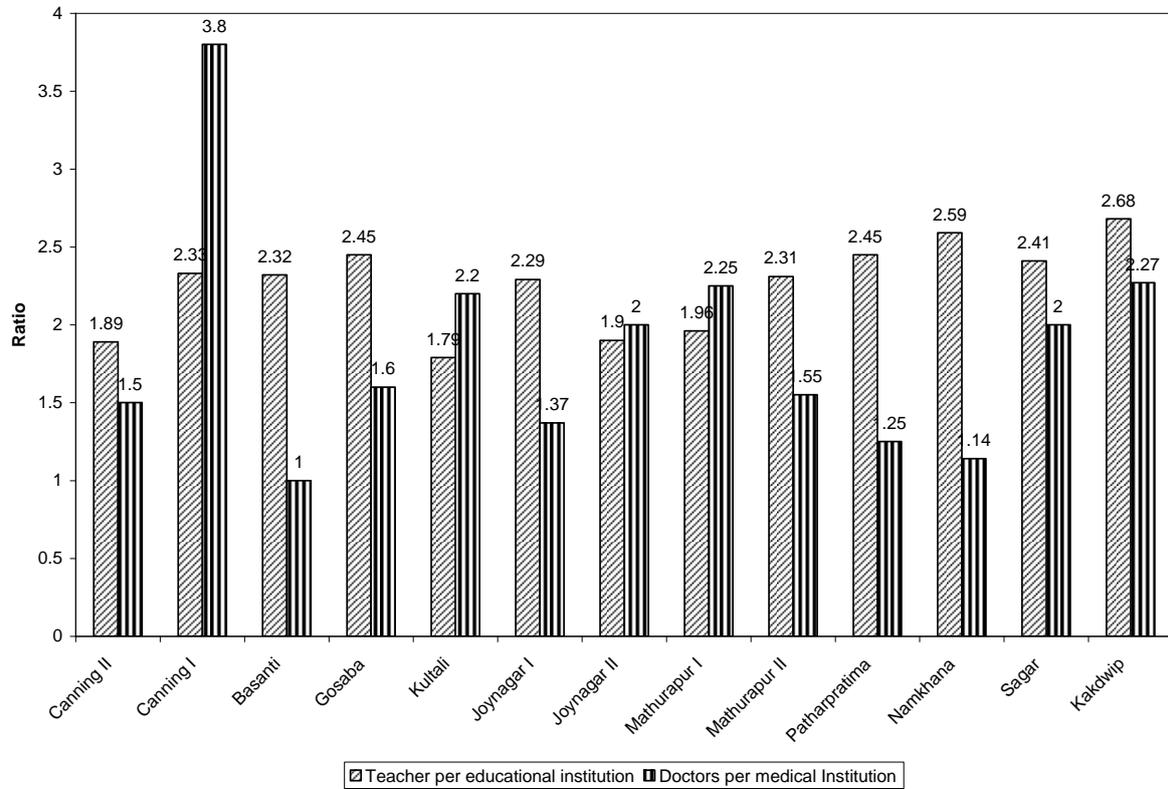
HEALTH CARE FACILITIES

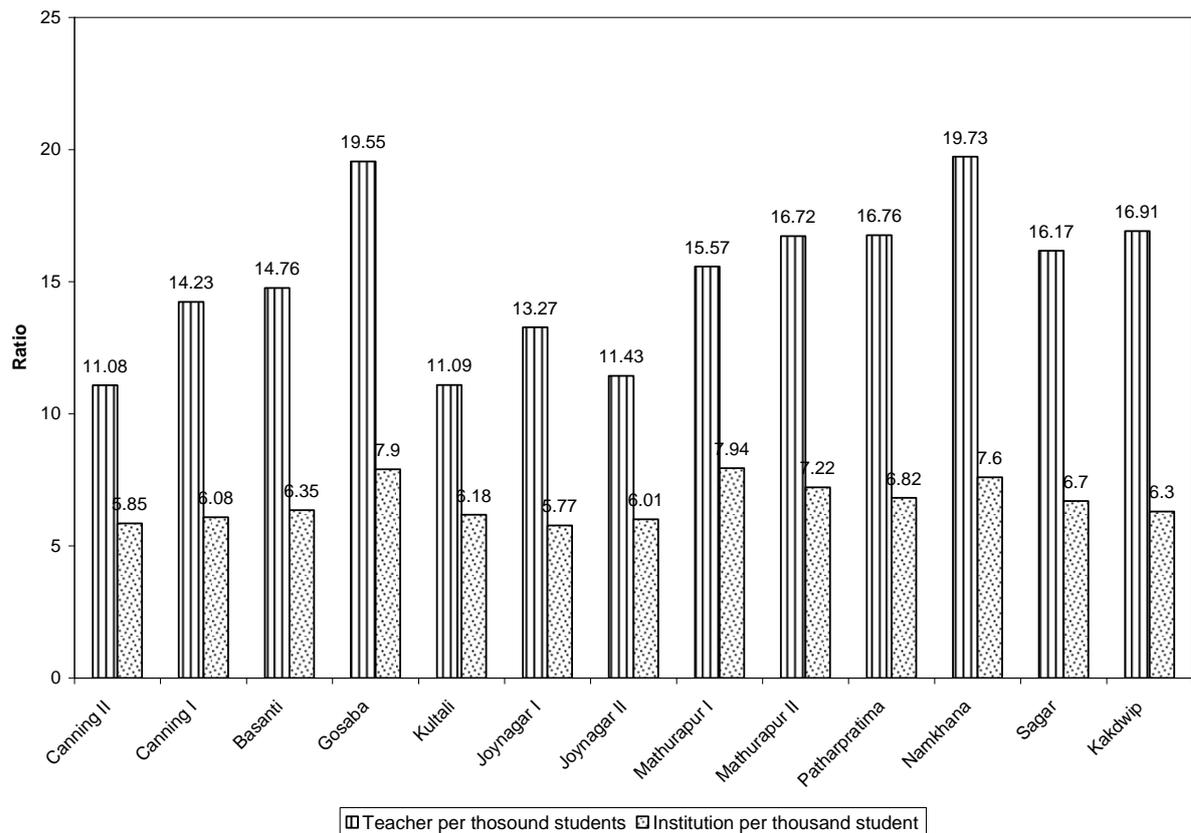
Health is the wealth. By measuring the health care facilities we can analyse health status of the population. Sunderbans is one of the backward areas of west Bengal. Precarious health condition prevail in this area .There are only two general hospitals i.e. one is in Canning I and the other is in Kakdwip. People from remote island came here for treatment as a result of which highest number of patient are treated here. Doctor to patient ratio is lowest in Canning II blocks where there are one doctors per sixteen thousand population .When Number of hospitals including govt hospitals ,health centres sub centres, private nursing home is considered It is clear that , Eight blocks including Canning I, Canning II, Basanti, Gosaba, joynagar II, Mathurpur I and Sagar have lowest(2-5) number of health care facilities (fig 3).Joynagar I and Namkhana has moderate (6-9) and Patharpratima and Kakwdip have highest(10-13) number of health care facilities available.

EDUCATIONAL FACILITIES

Education is one of the most important indicators of Human Capital. To analyse the educational facilities here Teacher Student Ratio(TSR) ,Teacher Institution Ratio(TIR) and

Fig 3 :Health care and Educational facilities available in Sunderbans



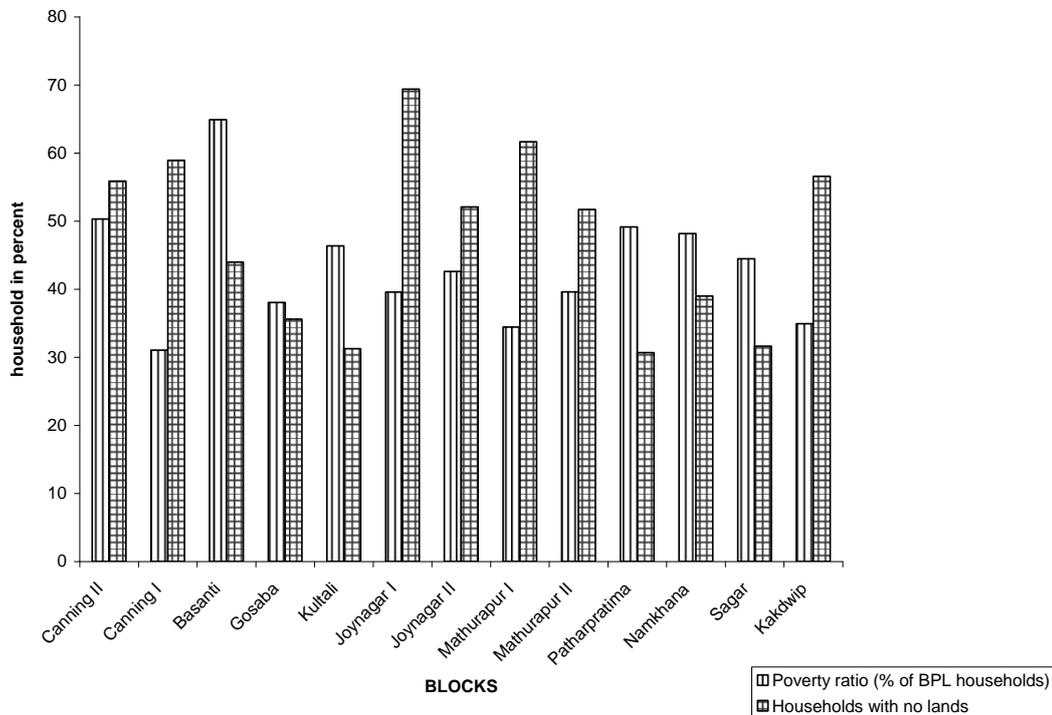


Institution Student Ratio has been taken by considering all the educational sectors in one. On an average there are 170 students per school and 58 students per teacher at primary level. Canning II, Kultali, Jaynagar I and Jaynagar II have the lowest TSR, Canning I, Basanti, Mathurapur I and Sagar have moderate TSR and Gosaba, Mathurpur II, Namkhana and Kakdwip have highest TSR. Good condition of Institution per thousand population prevail in Mathurapur I and Mathurapur II block. The lowest ratio is found in Canning II. If Teacher per Institution is Considered, it is worse in Sunderban. On an average there is 2.25 teacher per institutions lowest being in Canning II (1.89) and highest is in Kakdwip (2.68).

LANDLESS AND BPL HOUSEHOLDS

Nearly half of the population (45 percent) in Sunderban live bellow poverty line. BPL population is one of the most important indicator to know the financial assets of the people and it can indicate the coping capability of the population. The total BPL population have been divided into three groups high (53.61-64.89), Moderate (42.33-53.61) and Low (31.05-42.33).

Figure 4 : Distribution of Landless and BPL Households in Sunderbans



More than three-fifths of the population of Basanti (64.89%) live below the poverty line. Moderate categories include Canning II (50.32%), Kultali (46.36%), Joynagar II (42.6%), Patharpratima (49.13%), Sagar (44.46%), and Namkhana (48.17%). Low BPL population, i.e., less than 42% have been found in Canning I (31.05%), Gosaba (38.03%), Joynagar I (39.57%), Mathurapur I (34.43%), Mathurapur II (39.59%), and Kakdwip (34.91%).

If we look into Figure 4, it is easy to find out the concentration of households with no lands in the blocks. Landless households have been categorized into five divisions, i.e., Very high (61.64-69.38%), High (53.9-61.64%), Moderate (46.16-53.9%), Low (38.42-46.16%), and Very low (30.66-38.42%). Mathurapur I (61.65%) and Joynagar I (69.38%) blocks have very high concentrations of landless populations. Canning I (58.92%), Canning II (55.86%), and Kakdwip (56.58%) fall into the group of high landless household concentrations. Joynagar II (52.09%) and Mathurapur II (51.7%) have moderate landless households. Namkhana (39%) and Basanti (43.97%) have been categorized into low, and Gosaba (35.59%), Kultali (31.25%), Sagar (31.61%), and Patharpratima (30.66%) have very low landless households.

STRUCTURE AND PROCESS

Structure and process depicts the law and legislation in the study area. It control and effect the livelihoods pattern of the population largely. The most important form of self-help group introduced by the government that directly emphasizes creation of self-employment for the poor households is “Swarnajayanti Gram Swarozgar Yojana”, or SGSY which is implemented by District Rural Development Agencies (DRDAs) with the active involvement of Panchayets, Banks, the line departments and the NGOs. Under the SGSY, assistance is given to the poor families living below the poverty line in rural areas for taking up self employment. The persons taking up self-employment are called swarozgaris. They may take up the activity either individually or in groups, called Self-Help Groups. Of the self-help groups formed in the district, about 57 per cent have been operative in the blocks of the Sundarbans. Such group formation is found to be comparatively lower in the blocks closer to urban centres.

NREGA, 2005 is an Act to provide for the enhancement of livelihood security of the households in rural areas of the country by providing at least one hundred days of guaranteed wage employment in every financial year to every household whose adult members volunteer to do unskilled manual work and for matters connected therewith or incidental thereto. Unlike any other government scheme, it gives a *legal guarantee of wage employment*. (Human Development Report, 2009, south 24 parganas). Patharpratima (1217) block have highest number of Self Help Groups followed by Gosaba (681) and Joynagar II (628). SHGs in Sunderban are divided sector wise such as Primary sectors consist of projects related to irrigation, livestock, fisheries etc. Secondary sector comprises village industries, handicrafts, handlooms and other activities, Tertiary sector have the activities related to tailoring, shops, bullock-carts and others.

Table: 1 Number of SHGs, Job Card Issued and Employment Provided, till January 2008

Block	No. of SHGs	NREGA Job card issued	Employment provided to individual	Per cent of individual employment to the total job card issued
Canning I	348	18341	7443	40.58
Canning II	259	12520	6514	52.02
Basanti	432	29382	11485	39.08
Gosaba	681	37737	17581	46.58
Joynagar I	430	25592	8143	31.81
Joynagar II	628	24126	8169	33.85
Mathurapur I	419	23114	14899	64.45
Mathurapur II	419	33711	20970	62.20
Kultali	374	28387	16350	57.59
Patharpratima	1217	50083	40330	80.52
Kakdwip	614	27169	17286	63.62
Namkhana	592	26381	12730	48.25
Sagar	405	25817	16271	63.024
Total	6818	362360	198171	54.68

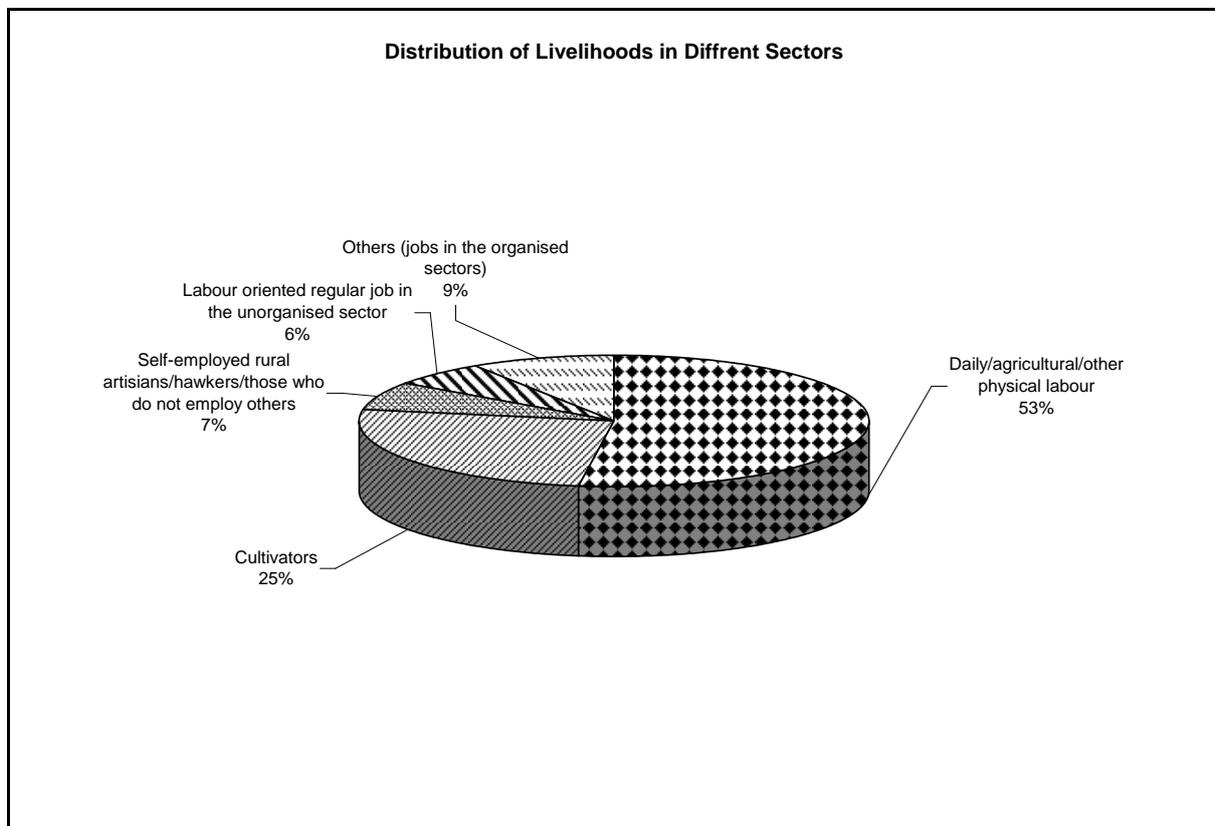
Source: DRDC, South 24 Parganas Zilla Parishad

LIVELIHOODS OUTCOMES

Livelihoods outcome is the desired level of living which people want. By analysing the different livelihoods patterns Livelihoods outcome can be identified. At first different livelihoods groups have been defined according to household survey of West Bengal 2005. In the Rural Household Survey the dominant income sources of the households have been used to classify rural households according to five different livelihood strategies. In Sunderbans (53 per cent) households derive the larger part of their incomes from wage work as daily labourer in the agricultural or non-agricultural sector which is seasonal and volatile in nature (*daily / agricultural / other physical labourer*). There are some landed households whose livelihood depends primarily on farming though they may use majority of their produce for

home consumption (*cultivators 25 per cent*). There are others who are neither cultivators nor daily labourers but are self-employed in the rural non-farm sector like artisans or hawkers. They may include family members in the work but as such do not employ others (*self-employed rural artisan / hawkers who do not employ others 7 per cent*). There are still others who derive their main income through their employment as labour in the unorganized non-agricultural sector which is fairly regular in nature (*labour oriented job in the unorganized sector -6 per cent*). Finally, some households have members in the family who are either employed in the formal organized sector or are established as a medical practitioner or advocate or in own business or production agency (*others 9 per cent*).

Fig 5: Major Livelihoods Groups in Sunderbans

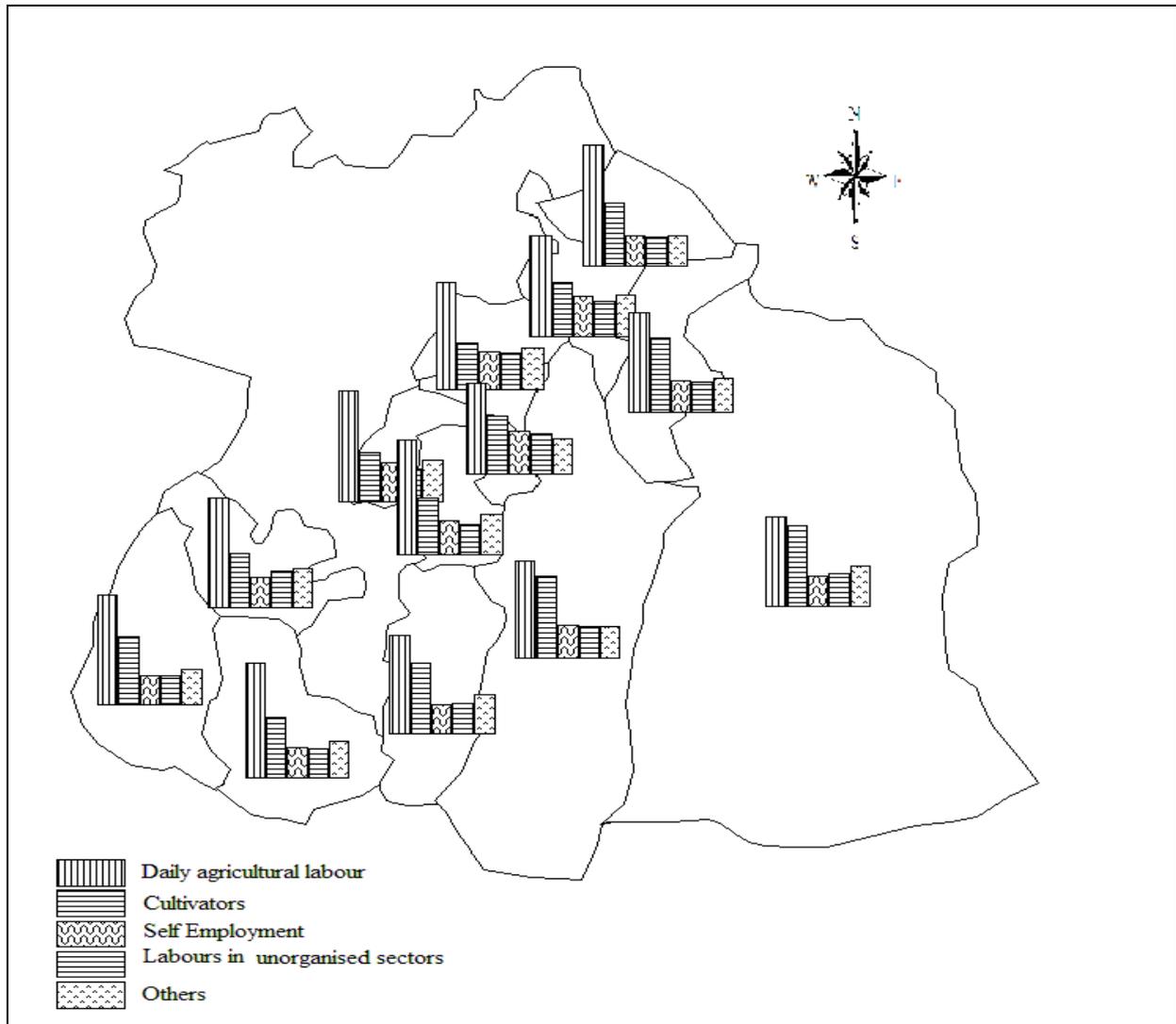


MAJOR LIVELIHOODS GROUPS IN SUNDERBANS

Traditionally Sunderban is known as backward and ecologically fragile area. But recently the scenario has been changed. People have diversified their livelihoods to cope with the vulnerability situation. In Sunderbans mostly Livelihood have been dependent on nature i.e. either to the river or sea for fisheries related activity or to the Sunderban Reserve forest for collecting honey and forest timber. Fig 6 depicts the block wise distribution of livelihoods

groups in different sectors .Here is some brief analysis of livelihoods patterns in 13 blocks of South 24 Parganas which fall under coastal Sunderbans.

Fig :6 Distribution of Livelihoods Groups in Sunderbans



1. AGRICULTURE

The agricultural activities practiced in the Sunderbans are complex, diverse as well as risk prone (Saha, 1999). Paddy monoculture dominates the entire landscape along with small pockets of seasonal vegetables (e.g., watermelon) and oilseeds. Growing of salt tolerant varieties of rice is the only option left in most of the areas. The low lying saline lands, absence of micro- irrigation facilities and lesser success of HYV paddy contribute to the ever decreasing rate of agricultural returns (Biswas et al., 2006). The wide spread destructions of embankments and consequent inflow of saline water into the agricultural fields during Aila

(cyclone) made the lands more unproductive by accumulating salt on the top soil. Hence, traditional agriculture is not conducive here and alternate farming systems have to be introduced in accordance with the required. Together with daily labour, agricultural labour and other physical labour and cultivators 78 per cent of the population in Sunderbans are engaged in agriculture. Above one third of the population of three block Kultali(36.67), Gosaba (36.19) and Basanti (32.69) have engaged in cultivation. Joynagar I (10.24) and Mathurapur I (16.77) have the lowest percentage of population engaged in cultivation.(fig 6)

2. FISHING ACTIVITIES

The whole of Sunderbans is characterized by a variety of fishing and aquacultural activities comprising coastal fisheries, brackish water aquaculture, estuarine and riverine fisheries, riverside prawn seed collection, shrimp farming and several freshwater aquaculture variants (Muhibbullah et al., 2005). The 24 Parganas South District has a marine fisher folk population of 2,69,565, with an active fisher population of 70,750, located in 237 villages (CMFRI 2005). Fishing is not a seasonal occupation for communities in the area. While most fishing is undertaken by men, crab fishing and prawn seed collection are practised by both men and women in the inter-tidal waters. Fishers in the Sundarbans are organized largely into two unions—the United Fishermen's Association and the Sundarban *Matsajibi Joutha Sangram Committee*. Tietze (1985: 80) distinguishes five functions in the division of the traditional fishing economy: (i) production, i.e. catching fish; (ii) processing; (iii) marketing; (iv) finance and credit; and (v) manufacture of the means of production, e.g. boatbuilding, engine repair and net making. Obviously, in some cases, these functions are interwoven and performed by the same category of people; in others, they are separate and performed by different groups, depending on the stage of development of particular communities(FAO technical paper490).

Above map depicts the distribution of area under fisheries. All the blocks utilize more than 70 per cent of the area available for fisheries. Basanti (79), Gosaba (76), Joynagar I (77) Joynagar II (76) have the highest percentage area under fisheries, but these areas have the lowest population engaged to fishing activity.(fig 7) Patharpratima (69), Canning I(67) and Canning II(71) have the lowest percentage of area under fishing activities. Whereas Canning II and Patharpratima blocks have the highest (above 40 thousand) number of population engaged in fisheries. This is due to prevalence of coastal fisheries in these areas and fish markets in which a large number of population is engaged. Marine fish production in West

Bengal has been increased from 125 thousand tons in 1990-91 to 183 thousand tons in 2007-08. This trend shows a positive growth in marine fisheries sectors which indicate a large

Fig : 7 Area under Active Pisciculture in Sunderbans

DISTRIBUTION OF FISHING AREA IN SUNDERBANS

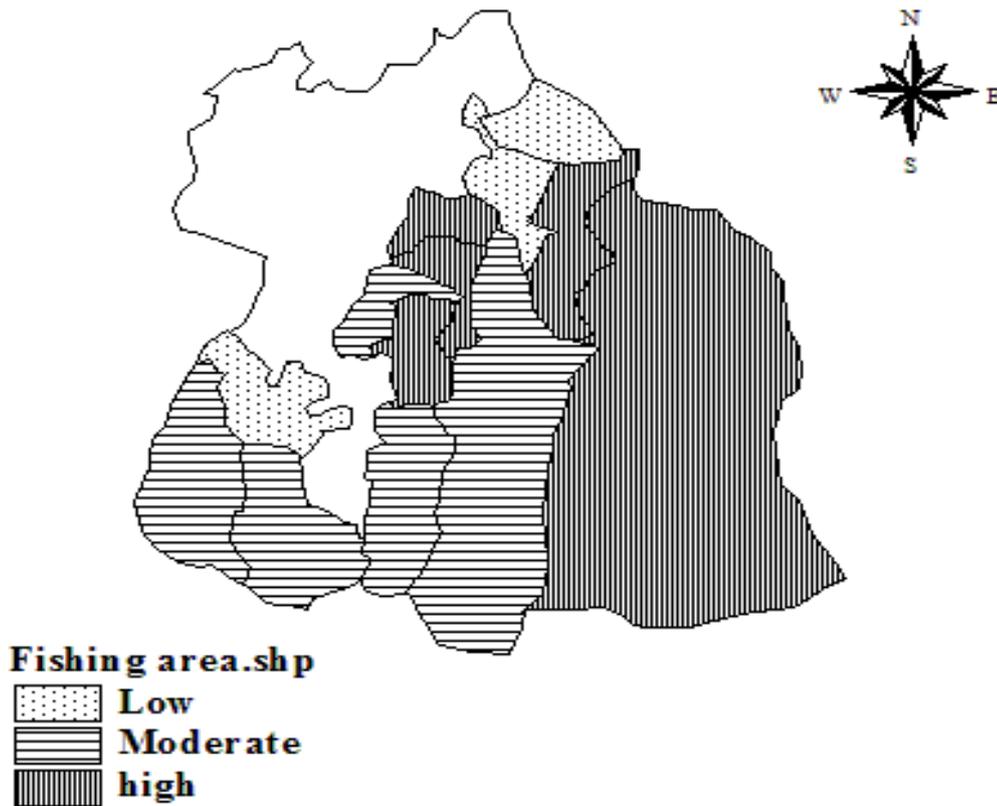
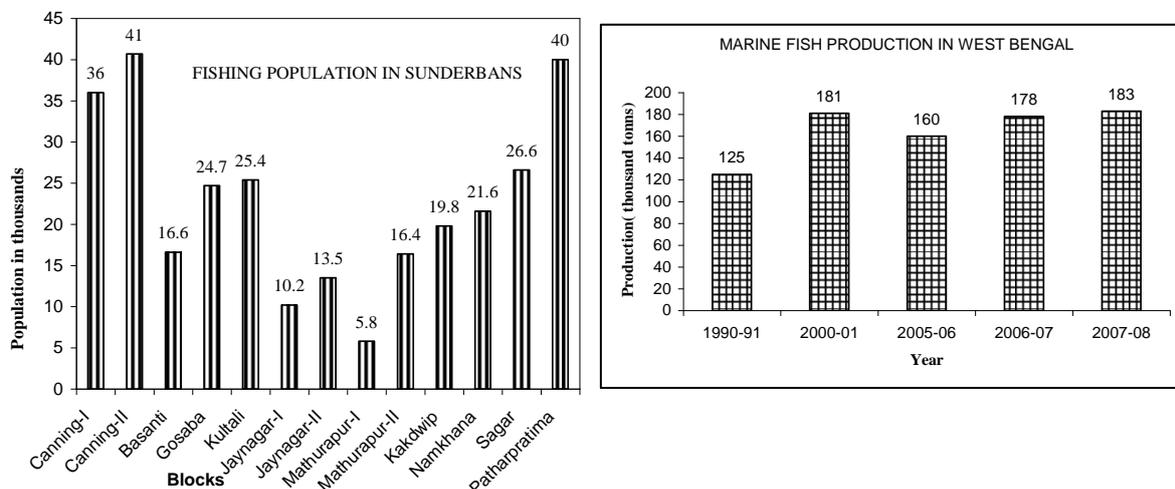


Fig :8 Number of population engaged in fisheries and marine fish production in Sunderbans



number of working population in fisheries sectors. Blocks of Sunderbans have been categorised in three categories High (29.26-41) moderate(17.53—29.26) and Low (5.8-17.53). Highest percentage of population is engaged in fisheries activities in three blocks namely Canning I(36) Canning II(41) and Patharpratima (41) .The villages which have been categorised as moderate are Gosaba (24.7),Kultali (25.4),Kakwdip (19.8),Namkhana (21.6) and Sagar (26.6).In Basanti (16.6)Jaynagar I (10.2), Jaynagar II (13.5), Mathurapur I (5.8) and Mathurapur II (16.4) relatively lower numbers of population lives in terms of other blocks. Following are the major livelihoods groups engaged in coastal fisheries in Sunderban

i. PRODUCERS:

Marine fishing in Sunderbans is almost entirely carried out by men, while women's role is confined largely to post-harvest or other shore-based activities. Women are also involved in creek- or shallow-water-based operations, such as crab and shell fishing, and rarely in cast net operations. People who have their own non-mechanized boats, motorized boats (called *bhutbhuti*),small trawlers, large trawlers ,deep-sea trawlers, wooden catamarans (called *teppas*),wooden boats with engines, and mechanized boats (small trawlers), are known as producers. If we analyse the fishing community it is clear that In Canning II (41) and Patharpratima (40) highest number of fisheries population live i.e. above 40 thousand population in these two blocks have been engaged in fishing activities. In Mathurpur I and Joynagar I Less than forty thousand populations is engaged in this sectors. Fisheries in Sunderbans is not only comprises the catching of fishes but also the population engaged in this activity in various forms.

ii. Fishing crew

Fishing crew consist largely of poor fishers, who depend on a share of the catch for their income. Their socio-economic status is comparable to that of workers without assets in other sectors. Fishers working in traditional – non-motorized – catamarans or dinghies are considered to be the poorest among the different categories of the fishing crew, and those working on mechanized trawlers are considered to be better off, if only because they receive a fixed monthly wage.

iii. Boat owners

A boat owner seldom goes fishing himself, particularly in the mechanized sector, where boats are sometimes owned by people from non-fishing backgrounds, who are more concerned about returns on their investment than about equity and sustainability.

iv. Bedha jal (encircling net) fishers

Encircling nets – called *bedha jal* – used in intertidal areas are common in the. *Bedha jal* was an important fishing system until 30–40 years ago, and many

Villages depended entirely upon it. Recently, it has become a source of livelihood for the old and physically weak fishers, who are unable to undertake sea fishing. About 10–15 fishers contribute a piece of net each; the pieces are then joined together in a circle covering a patch of the intertidal area. As the water recedes during low tide, fish are caught in the nets.

v. Cast net/push net fishers

Cast or push net fishers are often very poor people, who operate in creeks and rivers, casting nets out from the shore. This activity is usually carried out at a subsistence level.

vi. prawn-seed collectors

Mainly women and children are engaged in prawn seed collection activities.

3. NON TIMBER FOREST PRODUCTS

The mangrove biomes of Sundarbans provide some of the essential components of livelihood of the forest-dependant island villagers of the area. These people collect a wide variety of non-timber forest produce (NTFP) including tannin bark (most Sundarban species like *Ceriops decandra*, *Ceriops myrobalans*, *Phoenix paludosa* yield around 30-42 per cent tannin); *Nypa fruticans* (Golpata), natural honey from *Apis dorsata*, cultured (apiary) honey (*Apis indica*) and bees wax; fuelwood and small poles and boles; fish, prawn, crab, shrimps; and lime (manufactured from jorgran, kastura and jhinuk). In some areas of Sundarbans, the contribution of NTFP to total household income is quite high.

i. Honey and Wax collectors

Forests with variety of flowering plants provide centre for honeybees. During flower season of mangroves the swarms of honeybee's colonies in the mangrove forests and fill the hives with honey. Quite expectantly, those honey are good sources of livelihood more than thousands of families. Around 20,000 kg of honey is collected every year from forests of Sundarbans. Mostly people from the Kultali, Joynagar, Basanti, Gosaba and Canning are honey collectors. The number of honey collectors has dwindled from around 1,500 a few years back to around 700 in 2007. From 1985 through 2004, about 75 honey collectors were

killed by tigers in the forests. Now all honey collectors are insured for Rs. 50,000. The forest department has also intensified vigilance during the honey collection period. The range officers and guards are on full alert. No deaths have been reported since 2004.

ii. Golpata collectors

Golpata (*Nypa fruticans*) and Hental (*Phoenix paludosa*) leaves were once widely used for thatching of hut roofs, making ropes and handicrafts in the Sunderbans. With the establishment of National Park and Biosphere Reserve, commercial harvesting of these plants from the wild is totally banned by law. However, these plants along with the Dhani grass variety found around the embankments and riversides as well as Hogla (*Typha elephantina*) found in more inland areas have remarkable potential for small scale handicraft, straw, plate, rope and mat making industries in the rural areas if proper technological and marketing interventions are performed.

iii. Wood collectors

Wood collection, handicrafts, tourism and others: A relatively small number of people of Sunderbans are still engaged in wood collection. Mostly, these people belong to the few indigenous population groups still surviving in the immigrant dominated rural society of the Sunderbans. The collection of wood is oriented more towards fuel wood gathering than on timber harvesting. In reality, large scale timber based logging is done under the direct control of state FD and hence, scope for direct livelihood earning from legal timber harvesting is almost nil for the ordinary people. (Anshu Singh et al)

4. Workers in small Scale industries and Handicraft Activities

The prospect of small scale industries and emerging handicraft activities in Sunderban region is immense. Different region of the area are increasingly forming clusters of handicraft activities that are marketed not only within the state but also exported. Some of the very popular clusters of handicraft activities in the district are those of surgical instruments, batik print, decorative palm leaf products, silver filigree, terracotta, embroidery works, kantha stitch, soft dolls, feather products (like magic flower, dusters, artistic products, cock neck etc.), dak foil, zari work, cane and bamboo products, jute products, different types of brush, sola pith, pottery, shaving brush handle, cane furniture, dry flowers, and turban (Arabian) which is an exportable item. These different types of handicraft activities are employing more and more local people and are increasingly taking the form of household industry in the district. (Human Development report 2009 south 24 parganas).

4. Other Workers: Other workers including self employed rural artisan, hawkers, labour in organised and unorganised sectors constitute one fifth of the total population (22.31). Joynagar I (31.94), Joynagar II (32.23), Canning I (30.31) have the highest number of households i.e. nearly one third engaged in this type of works (fig: 6). Gosaba (22.26), Kakdwip (24.68), Mathurpur II (20.58) and Kakdwip (24.68) have moderate percentage of households engaged in other activities. Canning II (13.63), Sagar (15.59), Basanti (17.81), Namkhana (17.81) and Kultali (15.87) have below 20 per cent of households engaged in other works. (Household level Survey of West Bengal 2005)

CONCLUSION

Poverty and population pressure in precarious ecosystems have historically been a major challenge in Sunderbans. Non-inclusive development has hardly offered these vulnerable people welfare and wellbeing that they are entitled to. Now their lives and livelihoods are further threatened by climatic changes. The challenge for the country is two-fold: protecting an ever increasing number of people living in these ecosystems while mitigating impacts of climate change on these ecosystems. While at the outset these two appear in conflict, they actually are complementary where one will help in achieving the other. It is apparent from the above study that the area which have developed educational and health care facilities, availability of financial support from government and more Self Help Groups are the less vulnerable region like Canning I, Joynagar I and Kakdwip in which more than 20 per cent households are food secure. In this region people have diversified their economic activities..As agriculture is not productive due to saline water and yield is low the region which is mostly dependent on agriculture like Basanti, Gosaba, and Kultali are most vulnerable region in terms of food security also i.e. below 10 per cent of households are food secure (Human development Report,2009) In this situation Sustainable livelihoods approach should be developed to assess the real need of the poor and strengthen them in terms of human, social, physical, natural and financial capital, only then a livelihood could cope with and strive from vulnerability situation and poverty would be removed.

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