

Sustainable Likelihood Security Indicators and Ecotourism Practices: An Assessment for Tourism Development in Indian Sundarban

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Abstract – Sundarban, a separate bio-geographic region, is situated in India and Bangladesh. This largest delta of the world is posed by the climate change of the region as reflected in the continued Global Warming, rising sea level, erosion of island area, and increased frequency of cyclones. In such landscape of blue economy, mangroves can create a bio-shield, stabilizes tidal estuaries, sequester huge amount of carbon-di-oxide and dissuades wind and wave energy. Mitigating climate change through “conserve and sustainable use the oceans, seas and marine resources for sustainable development.” is envisioned as one of the important seventeen sustainable development goals. In this context of sustainable development goals introduced by the United Nations in 2015, the measurement and evaluation of the performance of Social and Solidarity Economic (SSE) Organizations viz. registered NGOs e.g. NEWS, (Nature Environment & Wildlife Society), PEHC (Purbasha Eco Helpline Society), in exploring sustainable economic activities in the framework of blue economy approach is not only important but imperative as well. Here, the scope for ecotourism through participatory observation method, qualitative information of the operation of these non-profit associations is ensured and a sustainable livelihood security index is brought about.

Keywords: Blue economy, Climate Change, Mangrove, Coastal and Marine Tourism, SSE, Sundarbans

1. Introduction:

Development thoughts in the 21st century devoted attention towards shaping of a social and solidarity economy (SSE) in searching for egalitarian forms of community. Combating climate change through “conserve and sustainably use the oceans, seas and marine resources for sustainable development.” is envisioned as important sustainable development goals (SDG 14) in post 2015 development agenda. In meeting the global target in local context, there is an urgent

need of implementing Integrated Coastal Management (ICM) in the framework of blue economy approach by involving concerned local government, private players, and SSE actors with participation of coastal community.

Coastal countries can exploit the opportunities of the Oceans economy (or blue economy, blue growth) in various scales, from local to regional to global. Prioritization of economic activities is conditioned upon the relative importance of each sector of the oceans economy. The greatest challenge to the blue economy of the Sundarbans landscape (world's largest delta) is posed by the climate change of the region as reflected in the continued Global Warming, rising sea level, erosion of island area¹, and increased frequency of cyclones. In such landscape, mangroves can create a bio-shield, stabilizes tidal estuaries, sequester huge amount of carbon-dioxide and dissuades wind and wave energy (Dey&Kar, 2013). It has been seen that unsustainable economic activities of human civilization resulted in natural resource depletion without maintaining natural ecological balance of Sundarbans. In mitigating the impact of climate change in Sundarbans, SSE actors (specially registered NGOs) started its operation after devastation of cyclone Aila in the region on 2009 for ensuring security of subsistence livelihood for the forest dependent population and their involvement in conservation of mangrove forests. Livelihood project implemented by NEWS created sustainable value chain in mangrove ecosystem with participatory approach, involving local communities. Restoration of degraded mangrove area is expected to improve conditions of fishery resources in the Sundarbans. In generating alternative sources of livelihood opportunity, SSE initiatives in marine and coastal tourism can be considered as a support mechanism in promoting blue economy. In the study region of the Gosaba block of Sundarbans, PEHC specialises in fully-escorted cultural and educational travel programs to Sundarban and other overseas destinations for eco-tourists. In the existing literature, blue economic studies are relatively scanty in India (Llewellyn et al., 2016; Programme for Social Action, 2017) and Indian Sundarbans region in particular. In this context, this paper tries to maps the regional specific need of our study region (Gosaba block in Indian Sundarbans) in exploring economic activities within the domain of oceans economy. In addition, this paper

¹An inhabited island, Lohachara, in Indian Sundarbans completely disappeared in 2006 due to severe coastal erosion caused by rising sea levels and around 7000 environmental refugees settled themselves in Sagar Island. During the same period, another uninhabited island, Suparibhanga, also disappeared. 'Other islands that are considered to be at risk of disappearance include Ghoramara, Dublat gram panchayat of Sagarisland, G-plot, Lothian, Dhanchi, Bulcheri, Bhangaduani, Jambudwip and Mousuni' (Mukherjee, 2008). Considering Sundarbans as a single ecosystem, it is estimated that 100000 people could be rendered homeless by 2020 (Hazra et al., 2002).

evaluates the performance of SSE Organizations [registered NGOs, viz. Nature Environment & Wildlife Society (NEWS), Purbasha Eco Helpline Society (PEHC)] in exploring sustainable economic activities in the framework of blue economy approach.

Current Trends in Tourism Practices in Sundarban:

Tourism development in the area is rapidly expanding, both as a reaction to the success achieved by pioneer developments such as the Sundarbans Tiger Camp and as a result of increased demand for visiting the Sundarbans Tiger Reserve and the Sundarbans National Park, the number of tourists increased by roughly 101 percent, from 59,681 in 2003 to 120,495 in 2009. The majority of the visitors to the Tiger Reserve and National Park are domestic, suggesting that the domestic market can provide a solid base for gradual tourism development, allowing for eventual expansion into the international market as the tourism product of the region improves. However, domestic tourists are low-budget travelers and are not always aware of the ecological sensitivity of the area. Based on a survey conducted as part of the analytic work for this NLTA, the primary objective of most surveyed tourists was “leisure/recreation,” with a small fraction of visitors (5.21 percent) coming to the Sundarbans to do volunteer work.

The Sundarbans Tiger Reserve’s transition and core areas include several wildlife sanctuaries. The Sajnekhali Wildlife Sanctuary, covering an area of 362.42 square km, is known as the transition zone (sometimes called the “buffer” zone), an area outside and north of the core area. In addition, there is the Basirhat range, a subsidiary wilderness zone comprising 892.33 square km. The Forest Directorate has designated the transition zone as a multiple use zone to allow tourist visitation and for regulating the harvest of resources to meet the needs of nearby residents. There are two additional wildlife sanctuaries located to the southwest of the Sundarbans Tiger Reserve: Lothian Island Wildlife Sanctuary (38 square km.) and Haliday Island Wildlife Sanctuary (5.95 square km). The gateways to the Tiger Reserve and National Park at Canning, Sonakhali-Basanti, and Gosaba (Gadkhali) are located on the islands of Sandeshkali, Basanti, and Gosaba, and form the northern boundary of the Tiger Reserve. There is a less frequented entry point at Bagna via Dhamakhali (Luna-Kelser and Heyniger 2010). Tourism marketing efforts highlight the rare chance of sighting the Royal Bengal tiger to entice more visitors, but this is misleading because sightings are rare. Sighting a tiger is extremely

difficult due to its elusive character and the density of its mangrove forest habitat. Given its natural heritage, positioning the Sundarbans as a tourism destination must be broadened to incorporate other notable characteristics of the region without centering it primarily on the Bengal tiger as the main attraction. The area should be positioned to emphasize its rich and diverse biological and cultural attributes. Specific opportunities for specialized outdoor activities that can be marketed span a range of outdoor nature-based pursuits, including bird watching, bicycling, and trekking through the villages of the Sundarbans. In addition, the villages of the transition area could generate jobs and income by training and hiring tour guides, showcasing food and other aspects of the local culture, and creating and selling locally made handicraft items.

The current market segments of tourists traveling to the Sundarbans Tiger Reserve and National Park have diverse expectations and requirements. One segment is the predominantly domestic tourist who goes for short holiday breaks and (usually) one-day excursion diversions. These visitors travel in large, multigenerational groups and are extremely budget conscious. Another segment includes foreign visitors who travel in smaller groups, stay longer, and have fewer budget constraints. Key characteristics of the destination's current market positioning include: Low visitor pricing scheme; · Small number of local travel wholesalers and retailers; · Limited distribution channels (for example, limited distribution of product information for customers, points of sale); and · Traditional nonsegmented marketing approaches. Sagar Island has potential for both religious tourism and bird watching, but it currently offers no substantive tourism products. Every year in January, Sagar draws thousands of pilgrimage tourists to celebrate Makar Sankranti by taking the holy dip at the confluence of the Hooghly and the Bay of Bengal. The combination of the large influx of tourists throughout the year (especially during January), coupled with the lack of lodging and sanitary facilities (with consequent effects such as the indiscriminate disposal of solid waste), has the negative effect of degrading the island. Moreover, tourism in the region is still, for the most part, unplanned. Unregulated tourism has led to a clustering of numerous tourist lodges and an increase of mechanized vessels, which has increased water and noise pollution. The burning of large quantities of diesel fuel per vessel is increasing air pollution and contributing to global warming. Energy use at tourist facilities is many times greater than that being used by the local people. The process of transformation that is taking place in the area is beginning to compromise, critically, the physical and environmental

carrying capacity of the ecosystem, biodiversity and air quality of the Tiger Reserve and National Park. As long as tourist facilities are allowed to develop spontaneously without regulation, traditional land use and livelihoods will be impacted, with associated negative sociocultural and environmental impacts. This situation will decrease tourist demand and damage or destroy the resources on which the local residents depend, jeopardizing their livelihoods and causing resentment and anger toward tourism developments. There will also be significant negative effects on the biodiversity and air quality of the Tiger Reserve and National Park. Recognizing and understanding the detrimental impact of mass tourism on the Sundarbans will allow policy makers to adopt a sustainable ecotourism approach in the Sundarbans, an especially sensitive area with unique and precious assets.

2. Review of Literature:

In their article 'Community based mangrove management: A review on status and sustainability', Dutta D., Chattopadhyay R.N. and Guha P. (2012), have marked higher numbers of Community based mangrove management initiatives in South Asia compared to lesser from South America and Africa. Identification of the causes of degradation at a site and use-specific zonal replantations with respect to species associations are identified by them as major criteria of ecological sustainability. Regarding economic sustainability, transformation of potential uses of mangroves known by local communities into actual ones has been found to be necessary. Proper disbursement of accrued benefits among community members irrespective of their socio-cultural status is also a major concern. Restructuring of Community based mangrove management institutions by ensuring participation of subsistence based users in decision-making and resource sharing have been identified as a prime determinant of institutional sustainability.

In their article, Resident's awareness towards sustainable tourism for ecotourism destination in Sundarban forest, Bangladesh, Sarkar S. and Huibin X. (2018) have suggested how nature oriented tourism destination Sundarban can achieve sustainability through public awareness. Well-planned sustainable tourism and residence awareness could provide economic and long term incentives conservation and could bring additional benefit to local communities and regional economies.

In their article, Attitudes of local communities towards conservation of mangrove forests: A case study from the east coast of India, Badola, R., Shivani Barthwal, S. and Hussain, S.A. (2012) have revealed that local communities in the area have positive attitudes towards conservation and that their demographic and socio-economic conditions influenced people's attitudes. Local communities value those functions of mangrove forests that are directly linked to their wellbeing. Despite human-wildlife conflict, the attitudes of the local communities are not altogether negative, and they are willing to participate in mangrove restoration. They have found that the people agreed to adopt alternative resources if access to forest resources were curtailed. Respondents living near the forests, who could not afford alternatives, admit that they would resort to pilfering. In contrast with other ecosystems, the linkages of mangrove ecosystem services with local livelihoods and security are direct and tangible. In their article, Conservation and restoration of mangroves: Global status, perspectives, and prognosis, Románachá, S.S., DeAngelis, D.L., Kohler, H.L., et al. (2018) examine threats to the persistence of mangroves, consequences, and potential solutions for effective conservation. They present case studies from disparate regions of the world, showing that the integration of human livelihood needs in a manner that balances conservation goals can present solutions that could lead to long-term sustainability of mangrove forests throughout the world. Moreno & Becken (2009) said that coastal tourism is vulnerable to climate change impacts. Studies have demonstrated that beach tourism demand is expected to change in response to climate change in coastal environments. To date, the majority of the coastal tourism demand research has been from biometeorological studies focused on beachgoers' preferred temperature and humidity gradients (Bujosa, Torres, & Riera, 2018; de Freitas, Scott, & McBoyle, 2008; Moreno, Amelung, & Santamarta, 2009; Morgan et al., 2000). Yet, physical changes—specifically to beaches (e.g. width) and transportation infrastructure (e.g. bridges, roads, ferries)—may spur tourists to negotiate constraints related to what they expect during typical beach vacations (Atzori, Fyall, & Miller, 2018; Buzinde, Manuel-Navarrete, Yoo, & Morais, 2010; Uyarra et al., 2005). In this paper, we investigate potential localized impacts to the coastal tourism industry on the Outer Banks of North Carolina (NC). We focus on impacts from physical coastal hazards (i.e. transportation disruptions and beach width) as well as managerial and policy responses to coastal hazards (i.e. beach access disruptions from nourishment projects and occupancy taxes to support beach nourishment). In their article, 'Using multiple indicators to evaluate the sustainability of dolphin-

based wildlife tourism in rural India', D'Lima,C., Everingham,Y., Diedrich, A. et.al. have introduced multiple indicators within the human dimensions of wildlife tourism, including tourist visitation numbers, satisfaction, preferences, perceptions, background and specialisation, to ascertain the extent to which the dolphin-watching industry at Chilika Lagoon, in rural India might be considered sustainable. They highlighted drawbacks in the way that wildlife tourism was managed in a rural, developing world context, which drew the sustainability of the dolphin-watching industry in Chilika into question. They further added the development of an early warning system that addressed combined governance or managerial, social, economic and ecological indicators, and an integrated management plan for conservation and wildlife tourism that could contribute to the sustainable management of such industries.

In the article, 'Using a social-ecological systems perspective to understand tourism and landscape interactions in coastal areas', Heslinga,J.H., Groote, P. Vanclay, F. (2017) have argued that the social-ecological systems perspective is a useful approach and could be used to improve the governance of multi-functional socio-ecological systems in coastal areas. They opined that the opportunities for synergies between tourism and landscapes have been overlooked. The authors consider that tourism and nature protection are potentially compatible and that the synergies should be identified. The authors reveal how a social-ecological systems perspective can be used to conceptualize the Wadden as a coupled and dynamic system. This paper is a conceptual analysis that applies this approach to the Dutch Wadden. The data used for the inquiry primarily comes from a literature review.

In their article Seekamp, E., Jurjonas, M. and Bitsura-Meszaros, K. (2019) discussed how the climate change had been affecting tourism demand and subsequently, local economies by disrupting access and altering physical conditions, including those from adaptation and recovery efforts. They concluded a discrete choice experiment to determine how physical and economic changes could affect visitation behaviors to a vulnerable coastal destination, the Outer Banks region of North Carolina, USA. They embedded their experiment within an on-site visitor survey to reveal thresholds of negative changes to coastal attributes that tourists were willing to tolerate, and also examined tourists' willingness to substitute their future trips to the region. Findings included transportation-related changes that had the highest relative importance among the four selected attributes. The likelihood of three types of spatial substitution, spurred by not being able to access the destination, were consistently related to residency but less consistently related to

place meanings, visitation history, and other demographic variables. Study informed climate change planning within coastal zones to minimize negative impacts to tourism demand, such as the need to develop creative revenue streams to maintain resilience in communities that relied on occupancy taxes.

The portion of the transition area near the Sundarbans Reserve Forest can support a limited extent of high-end, environmentally sustainable ecotourism. The most important reasons for visitors traveling to the Sundarbans Tiger Reserve and Sundarbans National Park are the opportunity to see wildlife, particularly the elusive Royal Bengal tiger, and the natural mangrove scenery and landscape. For fragile ecosystems such as the Sundarbans, only limited, low-impact ecotourism, as opposed to mass tourism, is recommended. The spread of unregulated mass tourism²² will degrade the natural resources of the Sundarbans to a point at which it will no longer have any value for local people or visitors. The singular nature of the Sundarbans provides the basis to attract both domestic and international high-end and environmentally sensitive tourists, thereby increasing livelihood opportunities for communities in the transition zone without degrading the forest resources. A survey conducted as part of the analytic work for this NLTA (Non-lending Technical Assistance) shows that there is a demand from high-end international and domestic travelers for nature- and ecotourism-based activities in the Sundarbans. A sample of surveyed travellers, from more than 20 countries in the year 2014, showed that English-speaking foreign tourists constituted the largest percentage (43.8 percent) of the total visitors in which 24 per cent was from the United Kingdom, 9.4 per cent was from the United States of America, 5.2 per cent was from Australia, 4.2 per cent was from Canada and 1 per cent was from New Zealand respectively. The other group of travellers of notable size was from Germany (11.5 percent) in the same year.

3. Data Sources and Methodology:

In defining a set of key indicators of blue economy, Fosse (2017) considered three sustainability pillars: economy, society and environment. In the existing literature, Saleth and

Swaminathan (1993) constructed a comprehensive sustainable livelihood security index (SLSI)² to reflect the economy-ecology-equity interface of sustainable development. Singh and Hiremath (2010) utilized the three dimensional framework in measuring livelihood security at the district level in Gujarat. This composite index applied 'PQLI-HDI methodology in a generic context' (Saleth and Swaminathan, 1993; Singh and Hiremath, 2010). In this paper, we have considered three dimensions of SLSI (i.e. ecological security, economic efficiency and social equity) to provide a holistic picture of the implications of micro level intervention measures on livelihood security of population in the Gosaba block in South 24 Parganas. In constructing SLSI, secondary sources of data (District Statistical Handbook, South 24 Parganas, 2014 and Census, 2011) is employed to compares the state of livelihood security in project intervention block(Gosaba) vis-à-vis other Sundarbans blocks at macro level.

- **Ecology security indicators (ESI):** percentage of forest area to total area³, percentage of cultivable area to total area, percentage of net pisciculture area to total area.
- **Economic efficiency indicators (EEI):** cereal yield, pisciculture labour productivity, work force participation rate⁴, non-farm employment⁵
- **Social equity indicators (SEI):** female literacy rate and percentage of households having any of the assets⁶ (viz. radio/transistors, television, computer/laptop with or without

²In a first ever attempt to operationalize the concept of sustainable livelihood security within the context of sustainable development, the MS Swaminathan Research Foundation developed SLSI for the 15 agro-climatic regions of India (Saleth and Swaminathan, 1993). The analytical and methodological framework for constructing SLSI can be accessed from Singh and Hiremath (2010), p. 443-445.

³ Census data reports classification of land utilisation statistics in the district of South 24 Parganas as on 2000-01 and 2010-11. From the village directory, forest cover area (in hectare) is extracted across blocks of South 24 Parganas.

⁴Work force participation rate is measured by total workers (main and marginal workers) to total population. Following Census definition, a person who has worked six months or more during the last one year in any economically productive activity is termed as 'main worker', while 'marginal worker' worked for 3 months or less but less than six months of the reference period.

⁵It can be measured by the proportion of 'other workers' among main and marginal workers. 'Other workers' are engaged in some economic activity during the last year of reference period but not as a cultivator or agricultural labourer or worker in household industry. Other workers include generally people engaged in various non-farm activities including employment in the organized sectors.

⁶ Asset based approach of measuring poverty is employed in this paper in the absence of latest poverty estimates or per capita income across blocks of South 24 Parganas. Block wise estimates of poverty rates are available from the Rural Household Survey 2005. Following the survey report, 'more than 4 lakhs of households have been identified as below poverty line households, pushing the poverty ratio in the district up to 34.11 per cent. This is way above the state as well as the national poverty ratio' (Government of West Bengal (2009).

internet, landline telephone, mobile telephone, bicycle, scooter/moped/motor cycle, car/jeep/van)

On the other hand, to assess the contribution of SSE in exploring blue economy in the study region (Gosaba block in Sundarbans), we have purposively selected two non-governmental organizations (NEWS and PEHC) working in mitigating climate change by mangrove afforestation, costal wetland protection, and eco-tourism activities. Relevant information on the operation of these non-profit associations is screened in the light of SSE principles (table 1) (following Quiñones, 2013) by canvassing a semi-structured questionnaire. Record of official responses on different attributes in the assessment grid enable us to compare the performance of the SSE initiatives in the study region. Organizational level perceptions are systematically presented by assigning a scorecard in the scale of 0-2 to each of the SSE principles.

Table 1: List of SSE Shared Vision Principles

Shared vision principles	Explanation	Individual indicators	Implications for tourism
Socially responsible governance	governance practices of SSE to enable stakeholders in protecting the environment and meeting SDGs	<ul style="list-style-type: none"> -Participation of marginalised communities, especially women -Profit sharing among the stakeholders -Democratic participation of members in annual meeting 	<ul style="list-style-type: none"> -Skill based local community oriented entrepreneurship and job opportunities -Development with dignity -Low impact tourism
Edifying values/ethical principles	ethical principles that bind stakeholders in placing priority of the people centered development over profits	<ul style="list-style-type: none"> -Caring for each other's or solidarity, sharing, collective dimension, responsibility and accountability, value creation -Strives to meet the need and right of socially disadvantaged in the ownership and 	<ul style="list-style-type: none"> -Enhancing values for disaster management for future tourism activities -Promoting folk culture, local god and goddess etc -Does not loss privacy of

		management	local people
Social development services	services result in capability of the local people to maintain a dignified sustainable way of life	<ul style="list-style-type: none"> -Financing provisions in meeting community needs -Marketing strategies in meeting community needs -Imparting skill/management training for the poor 	<ul style="list-style-type: none"> -Restore harmony, peace and equality -Rural capacity building -scope for other informal and subsidiary sectors to develop e.g. wax and honey collection etc.
Ecological conservation measures	activities of SSE in addressing environmental concerns	<ul style="list-style-type: none"> -Preserving biological diversity in a community participatory manner -Imbibing recycling and reuse strategies 	<ul style="list-style-type: none"> -Stop changes in flora and faunal species composition -Stop disruption of breeding habits -Siltation, sea-level rising, poor quality of drinking water etc. are properly address
Economic sustainability	promoting economic benefits of the poor so as to ensure financial sustainability of the SSE	<ul style="list-style-type: none"> -Promoting entrepreneurial activities for the poor -Distributing financial benefits to the poor and socially disadvantaged 	<ul style="list-style-type: none"> -Does not change the price of land and essential commodities -Reduces economic marginalization

Source: Authors own compilation4. Results and Discussion:

4.1 Mapping of the Study Region:

In the context of ocean economy, sustainable development paradigm is widened to encompass ecological, economic, and social equity concerns in the sustainable livelihood security index. Findings of the state of livelihood security in Gosaba vis-à-vis other island blocks or other Sundarban blocks is presented in table 2.

Ecological Security: in the regional context, ecological security is measured by the block level information on the extent of forest cover, cultivated area and pisciculture area. It is evident that other Sundarban blocks hold a sizable land for cultivation and pisciculture. However, a sizable area (22-33%) of the pisciculture area remained unutilized (appendix table A.1). On the other hand, island blocks are predominantly endowed with the forest cover. Gosaba⁷ block is bounded by the Sundarbans forests in the east (Sajnekhali Wildlife Sanctuary) and south (Sundarban National Park). Extensive area of forest land is observed in all other blocks in the islands (Patharpratima, Kultali, Basanti and Sagar) and Namkhana block in other Sundarban region.

Economic efficiency: on the count of economic efficiency, other island blocks are lagging behind Sundarban blocks. Gosaba excel in the agricultural productivity in comparison to all other regions. However, pisciculture productivity in the Gosaba block is distinctly low. On the employment scenario, Gosaba block exhibit highest participation across blocks in the district in work force participation rate (45 percent), whereas engagement of workers in non-farm employment is only 22 percent (lowest across blocks). Unlike other four island blocks close to the forest, Sagar (a newly developed island) is somewhat different in exploring livelihood options (substitution of forest based earning by tourism related earning).

Social equity: Gosaba block compare favourably with the rest of the region in terms of female literacy. However, Sundarban blocks (in particular Gosaba in island block) are consists of a sizable number of asset deprivation households (nearly 51 percent).

⁷ However, Gosaba block is bounded by the Sundarbans forests in the east (Sajnekhali Wildlife Sanctuary) and south (Sundarban National Park). In Indian Sundarban, much of the interior blocks of Sandeshkhali, Kakdwip, Patharpratima, Basanti, Kultali and Gosaba had been cleared of forest to make room for human settlements during 1873 to 1939. At present, out of 102 islands in the delta region, 54 are populated while the remaining 48 are reserved with forest cover (Government of West Bengal, 2009).

Table 2: Individual Indicator wise Analysis of Sustainable Livelihood Security Index

Name of Block	Ecology security indicators (ESI)			Economic efficiency indicators (EEI)		Social equity indicators (SEI)			
	Percentage of cultivable area to total area	Percentage of net pisciculture area to total area	Percentage of forest area to total area	Cereal yield (in kg./hect.)	Pisciculture labour productivity	Work participation rate (in %)	Non-farm employment (in %)	Female literacy	Households having at least one of asset
Gosaba	78.11	10.81	0.00	2831.80	1.66	0.45	0.22	71.22	48.72
Sagar	58.95	12.15	1.10	2724.10	12.36	0.40	0.28	77.39	75.60
Patharpratima	72.54	13.51	12.18	2368.06	2.63	0.42	0.24	75.40	63.98
Kultali	72.67	14.66	15.39	1822.34	2.61	0.38	0.24	59.14	59.06
Basanti	70.33	6.19	10.65	2345.22	4.67	0.39	0.24	60.62	54.35
Other island block	68.62	11.63	9.83	2314.93	5.57	0.40	0.25	68.14	63.25
Namkhana	84.55	15.19	4.27	2411.64	2.12	0.36	0.38	79.64	63.04
Mathurapur-I	83.17	6.50	0.00	2442.40	23.75	0.33	0.45	66.87	55.90
Mathurapur-II	96.60	12.79	0.00	2403.11	5.52	0.37	0.29	69.98	66.49
Kakdwip	83.04	11.42	0.00	2090.32	3.29	0.36	0.42	71.22	65.54
Jaynagar-I	75.83	10.12	0.00	2181.87	4.89	0.34	0.57	65.87	59.87
Jaynagar-II	84.37	10.38	0.00	2075.81	2.14	0.37	0.35	61.55	52.39
Canning-I	68.58	42.82	0.00	2650.48	3.42	0.36	0.54	62.95	67.77
Canning-II	80.21	34.41	0.00	3073.81	2.95	0.33	0.25	59.61	53.03
Other Sundarban block	82.04	17.95	0.53	2416.18	6.01	0.35	0.41	67.21	60.50

Source: Author' compilation of secondary sources of data (Census, 2011; District Statistical Handbook, South 24 Parganas, 2014)

Table 3 summarizes the block wise score of the three component indices (i.e. ESI, EEI, SEI) and the combined score of the index (SLSI). It can be seen that other island blocks are moving ahead than other Sundarbans blocks in ecological security, economic efficiency and social equity status. Interestingly, Gosaba block marked a distinct achievement in economic efficiency (7th rank) in the district (due to the contribution of agricultural productivity, work force participation rate), but perform miserably poor in the ecological (17th rank) and social security indicators (24th rank). Ultimately, the block placed in the lower stratum of sustainable livelihood security (21st rank among 29 blocks of the district). Overall, the development priorities of the Gosaba block can be identified as follows: mangrove afforestation work,

restoration work in the aqua system, improvement in pisciculture productivity, exploration of non-farm employment (pisciculture, livestock rearing, eco-tourism), upliftment of asset deprivation households.

Table 3: Achievement on Sustainable Livelihood Security in the Regional Context

Name of Block	ESI value	Rank	EEI value	Rank	SEI value	Rank	SLSI	Rank
Gosaba	0.31174 5	17	0.46679 7	7	0.29463 4	24	0.35772 5	21
Sagar	0.26005 6	27	0.50143 2	5	0.77054 6	4	0.51067 8	4
Patharpratima	0.57309 3	2	0.38746 8	17	0.58133 1	11	0.51396 4	3
Kultali	0.65307 9	1	0.24662 7	29	0.12518 2	26	0.34162 9	24
Basanti	0.46796 6	6	0.34486 1	21	0.10425 7	27	0.30569 5	27
Other island block	0.48854 9	9	0.37009 7	18	0.39532 9	17	0.41799 1	14.5
Namkhana	0.47062 5	5	0.31576 6	25	0.67336 6	7	0.48658 4	6
Mathurapur-I	0.29810 6	20	0.52816 2	4	0.27546 2	25	0.36724 3	20
Mathurapur-II	0.41230 5	8	0.32942 5	22	0.47952 3	14	0.40708 5	16
Kakdwip	0.33922 7	11	0.30440 9	26	0.49826 6	13	0.38063 4	19
Jaynagar-I	0.29554 2	21	0.35238 9	19	0.29913 4	23	0.31568 9	25
Jaynagar-II	0.33640 8	12	0.28461 5	28	0.10321 1	28	0.24141 1	29
Canning-I	0.53973 3	3	0.41101 4	13	0.32355 6	21	0.42476 7	14
Canning-II	0.52119 3	4	0.28823 3	27	0.06364 3	29	0.29102 3	28
Other Sundarban block	0.40164 2	10.5	0.35175 2	20.5	0.33952 3	20	0.36430 4	19.62 5

Source: Author' calculation

4.2 Compliance with SSE Shared Vision Principles of the SSE Organizations in the Study Region:

In developing countries, state property resources have become de facto private or open access resources due to the state's failure to enforce property rights because of high transaction costs, corruption of enforcement agencies and/or political reasons (Bardhan, 1993). Historically, a departure from the centralized control strategy in managing Common Property Resources (CPRs) is evident in various settings throughout the Global South, and the sharing of local management has proven quite effective in controlling access to the resource in the perspective of 'growing limitations of the traditional welfare state'. In this context, social and solidarity economy may find a space in managing CPRs through active involvement of forest dependent local population. It has been seen that non-government interventions (one of the institutional form in SSE) in the project area of the Gosaba block dates back to 2010, just after large scale destruction caused by cyclone Aila.

A brief description of the functionality of two SSE organizations in the study region is presented in table 4. In the study region, SSE intervention created a sustainable value chain in protecting tropical mangrove ecosystem with community participatory approach and alternative sources of income generation (fishery, eco-tourism, conservation work, nursery work at afforestation site) in promoting blue economy.

Table 4: Functionality of the Social and Solidarity Organizations in Study Area

Criteria	NEWS	PEHC
Type of organization	Non-profit organization	Non-profit organization
Headquarter	Kolkata, West Bengal	Lahiripur, South 24 Parganas, West Bengal
Starting year of operation in Gosaba	2010	2010
Scale of operation	National	Neighbourhood
Members	-42 paid employee, -32 voluntary members	8 voluntary members

Running projects at Gosaba	<ol style="list-style-type: none"> 1. India-Sundarbans Mangrove restoration project 2. Supporting Enterprises 3. Rehabilitation and Protection of Tropical Mangrove Ecosystem 	<ul style="list-style-type: none"> -No specific project. -Activities include eco-tourism, mangrove restoration, livelihood promotion
Funding opportunity (External and Internal)	-Grants for specific projects (Livelihood fund through carbon financing, ABN-AMRO Bank)	<ul style="list-style-type: none"> -Earning from eco-tourism activities, -Individual donors
Major barriers	<ul style="list-style-type: none"> -Obtaining grants suiting to particular purpose -Shortage of business skills -Shortage of human resource dedicated to work with technical as well as community perspective 	<ul style="list-style-type: none"> -New sources of charitable fund -Local political intervention

Source: Author's compilation based on the document analysis and official responses

Table 5 presents a brief description on the practices (special reference to the blue economic activities) undertaken by the two SSE initiatives in the light of SSE shared vision principles: socially responsible governance, edifying values, social development services, ecological conservation measures and economic sustainability measures. Depending on the document analysis on the activities of the organizations and perception of the officials on their achievement in the indicators of SSE principles, organizations are assigned with a perception score in the assessment grid (presented in figure 2). SSE principle wise analysis is summarized as follows:

Socially responsible governance: participation of local community (especially women) is common in the activities of the organizations. The scale of operation in NEWS facilitates in reaching out to a large section of women population in their network. PEHS also ensure

participation of local community, but their scale of operation is limited in the Chorgheri-Purbasha region of the block. Formation of grass root level environment protection groups, SWARDS, is a distinguishing characteristic of NEWS⁸. The practice of sharing profits among stakeholders is seen prevalent across organization levels.

Edifying values: In imbibing ethical values in their organizational practices, NEWS succeeded in maintaining a balance between the financial value of carbon credits and the value created for local communities. In implementing India Sundarbans Mangrove Restoration Project, the project developer (NEWS) is closely associated with the project proponent (Livelihood fund⁹). Adopting SHG principles in mangrove nursery (in NEWS) and co-management principles (in PEHC) ensure local community to share revenue in return for their services.

Social development services: SSE organizations are actively engaged in protecting coastal wetland, mangrove restoration and alternative livelihood generation (especially fishery and eco-tourism). In addition, they also provide other marketing services in promoting organic farming (NEWS promoted Badabon Farmers Producer Company in association with Sufal Organic), training and capacity building handholding programme (NEWS), publication of an environmental journal (PEHC) for generating awareness on the environmental issues of the local population in the region.

Ecological conservation measures: in mitigating the impacts of climate change in the region, eco-friendly activities of the organizations include mangrove restoration, reduce the biotic dependence by plantation of other saplings and seedlings for fodder and fuel wood collection, recycling of waste. In addition to promoting eco-tourism activities, PEHC involves in protecting horse shoe crab¹⁰, which can explore marine biotechnology and pharmaceuticals (one of the promising activities in blue economy) in the coastal wetland of Sundarbans in future.

⁸The transition of the project to a voluntary monitoring system with Mangrove Stewardship by the community reflects the sustainability of the project in long term basis (Wylie et al, 2016).

⁹Livelihood fund is a non-profit organization, which does not market, sell, or make any profit out of carbon offset (Wylie et al., 2016).

¹⁰Horseshoe crab is a survivor unlike other mangrove animal alive today. It is what biologists call a 'living fossil' an organism which has remained basically unchanged for millions of years. In fact, fossils of horseshoe crabs over 400 million years old look almost identical to the species alive today. The telson or tail is used to right itself up when overturned and not as a weapon as some believe! The blood of the crab is important in the biomedical world as a purified version can help detect bacterial toxins, important in disease detection as well as ensuring the cleanliness of equipment.

However, the organization do not exploit any commercial advantage (rather than protecting the crab) at the present times.



Figure 1: Watering Mangrove Saplings at NEWS Nursery; Purbasha Mangrove Restoration Cite; Boat Owned by PEHS for Eco-Tourism; Horse Shoe Crab in the Coastal Wetland at PEHS Cite (Clockwise)

Economic sustainability: searching for non-farm sector employment opportunity in fishery, livestock rearing, aquaculture, tourism are some of the common initiatives practiced by the SSE to supplement additional income of the stakeholders. In augmenting livelihood opportunities, NEWS maintains collaboration with other partner NGOs (viz. Nandi Foundation) and linking with Government schemes. PEHC establishing ecotourism facilities (e.g. eco-friendly accommodation options, nature walk, dissemination of local cultural heritages of folk songs, plays, and handicrafts etc.) in neighbouring villages thereby generating greater revenues for local populace.

Table 5: Organization wise Shared Vision of Social and Solidarity Principles

Indicator	NEWS	PEHC
1. Social governance	<ul style="list-style-type: none"> -Livelihood project embedded a community participative model (18000 village women folk and a group of 500 people as Mangrove Stewards) - Rehabilitation project involves more than 250 people from local area and a total 80 stewards (34 women Stewards) - Most of the livelihood financing is distributed to communities as payment for work - Engage the community in the implementation process at every level through intense stakeholders meeting. SHG meeting 	<ul style="list-style-type: none"> - Engaging local stakeholders (i.e. actual forest users) in decision making, planting, monitoring, and usufruct sharing processes - Profit earning from tourism is distributed among stakeholders.
2. Edifying values	<ul style="list-style-type: none"> - Balancing between the financial value of carbon credits and the value created for local communities - Sharing values follows SHG principles -EmbracesStewardship model to build ownerships of local communities - Established a producer company 	<ul style="list-style-type: none"> - Responsibility and accountability -Follow co-management mechanism¹¹ in sharing revenue with villagers in return of their services

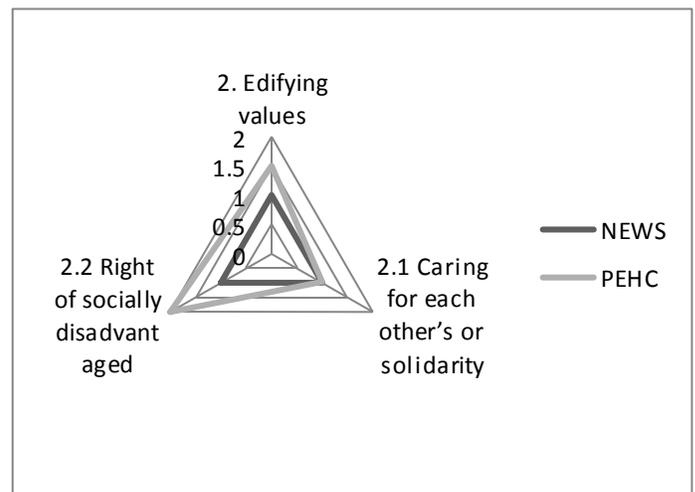
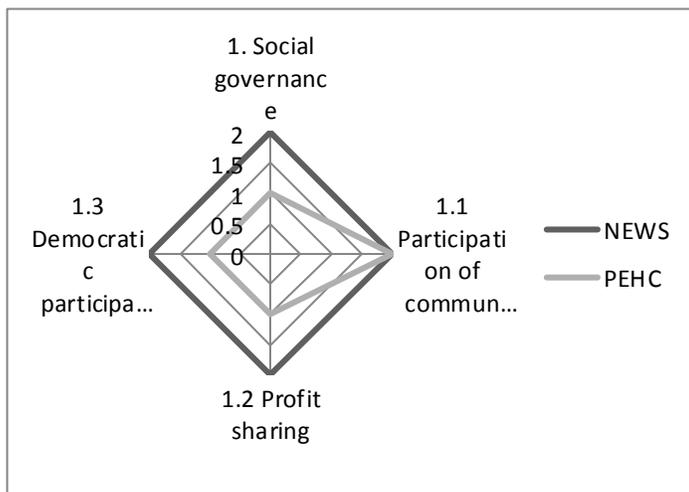
¹¹Co-management mechanism ensures that the villagers would receive the prime share of revenues earned from the controlled extraction of non-timber forest products (NTFPs), sell of mangrove seedlings from the nurseries, apiculture activities through captive bee boxes, and ecotourism facilities in return of their services.

	for the Mangrove stewards	
3. Social development services	<ul style="list-style-type: none"> - Augmenting livelihood opportunities through linking with Government Schemes - Contributing to development of the local economy - Marketing strategy for the Badabon farmers Producer Company in association with Sufal Organic - Training of the women groups - Capacity building handholding for integrated farming, backyard poultry farming and chemical free organic farming 	<ul style="list-style-type: none"> - Eco-tourism provides an alternative income source to the villagers (one permanent boat driver) - Publication of a popular journal on environmental issues
4. Ecological conservation measures	<ul style="list-style-type: none"> - Achieving carbon emission reduction, climate adaptation, and biodiversity conservation - Raising awareness for mangrove protection - Planting 1 km non-mangrove plantations for fodder and fuelwood collection - Supporting communities to grow fodder grass, planting 'Subabul' trees, smokeless <i>challah</i> (cook stoves) to reduce fuelwood consumption 	<ul style="list-style-type: none"> - Diversity of newly planted saplings and seedlings - Planting nearly 4 lac plants of mangroves on the bank of the rivers - Facilitates in protecting horse shoe crabs - Eco-tourists are persuaded to make mudflats as plastic free zone
5. Economic sustainability	<ul style="list-style-type: none"> - Exploring non-farm income opportunities in fishing, livestock 	<ul style="list-style-type: none"> - Employment diversification towards non-farm sector

	rearing, aquaculture, organic farming -payment for work increases income of the beneficiaries.	(especially eco-tourism) - Collect honey, crabs in a bulk quantity from local population to sell to the eco-tourists
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Source: Author’s compilation based on the document analysis and official responses

In the light of this wide range of activities, this study evaluates the performance of the SSE organizations. Evaluation results on the performance score of the SSE cases is based on the responses of the representative of the organizations in the primary survey. The recorded responses are suitable modified in keeping with the differences in the shared vision and actual performance. Evaluation evidences reveals that SSE cases practiced in the study region varies significantly from a low of 1 (lowest possible score is 0) to a high of 1.6 (highest possible score is 2). One general conclusion emanates from the analysis is that NEWS did comparatively better than PEHS. Variations in the scorecard of NGOs can be explained by their scale of operation (national vis-à-vis neighbourhood region) and range of activity levels.



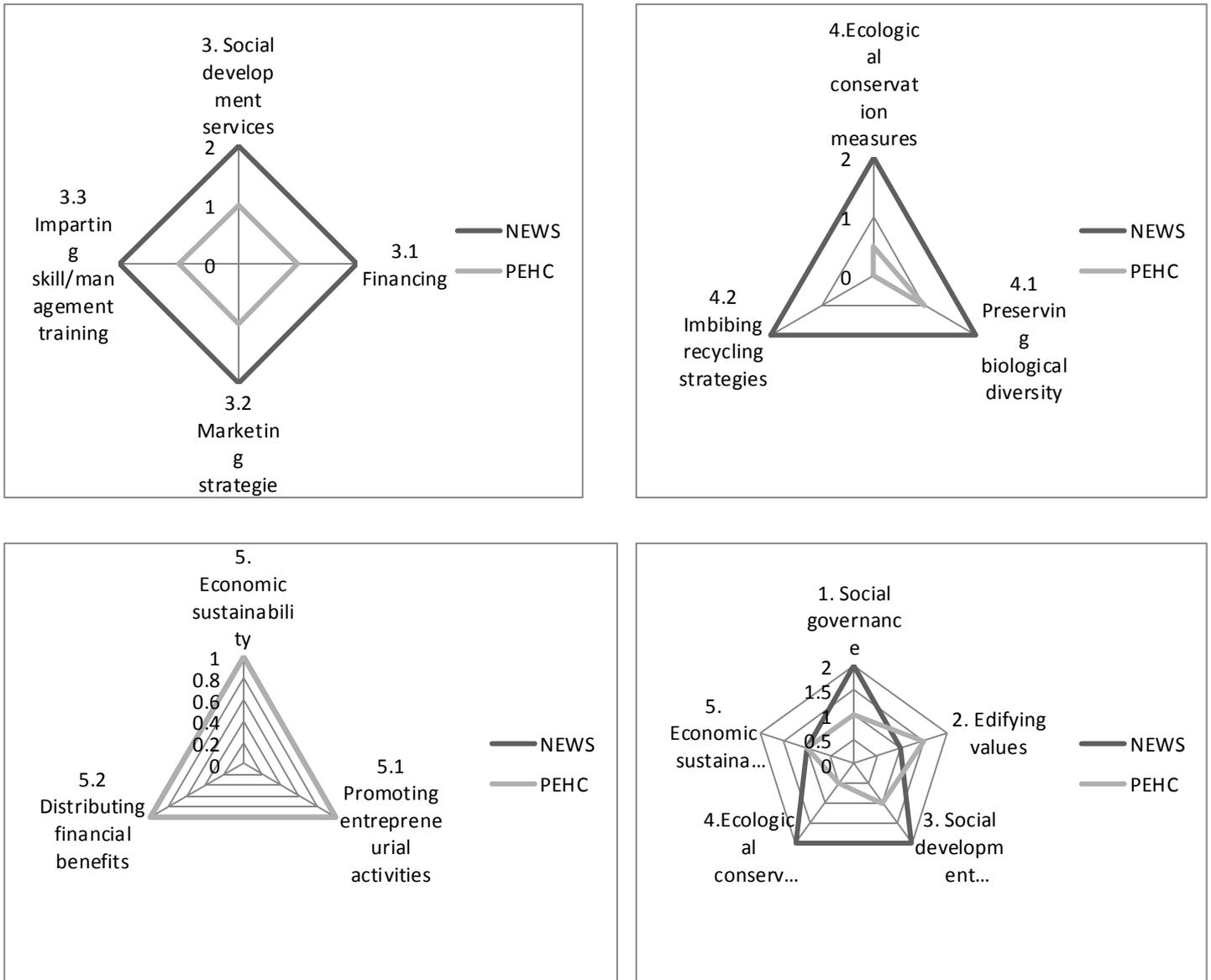


Figure 2: Raddar Plots on Performance Score of the SSE Organizations

5. Conclusion:

This paper tries to maps the regional specific need of our study region (Gosaba block in Indian Sundarbans) in exploring ecotourism practices and sustainable livelihood indicators for the area. Mapping of the study region suggest that there is a relative disparity in ecological security and social security indicators in Gosaba block vis-à-vis remote blocks mostly constituted

by the forest dependent population (i.e. islanders) or other Sundarbans blocks. Specifically, ‘conditions of necessity’ in Gosaba block centres on mangrove restoration works, exploration of non-farm sectors (specifically pisciculture, ecotourism, honey collection etc.) in providing livelihood of asset deprivation households in the region. Under this backdrop, this paper evaluates the performance of SSE Organizations (SSEOs) [some local NGOs, viz. Nature Environment & Wildlife Society (NEWS), Purbasha Eco Helpline Society (PEHC)] in exploring sustainable economic activities in the framework of blue economy approach. Empirical evidences reveals an untiring efforts made by SSEOs in exploring the opportunities of blue economy through mangrove restoration programme (through carbon financing), eco-tourism activities and protecting horse shoe crab (can explore marine biotechnology and pharmaceuticals in future) in the coastal wetland of Sundarbans. Interestingly, variations in the performance of non-governmental organization can be explained by their scale of operation, level of financial assistance and range of activity levels. There is a need for a concerted and coordinated policy for sundarban tourism with non-mass, alternative, small scale tourism development along with other possible subsidiary and informal sectors, particularly in the block areas where tourists arrivals have been registered so far for leisure and recreation.

Appendix

Table A.1: Block wise Result of Pisciculture in Sundarbans`

Block	Net area available for pisciculture (hect.)	Net area under effective pisciculture (hect.)	Percentage of unutilized land	No. of persons engaged in the profession	Approx. annual production (qtl.)	Pisciculture labour productivity	Pisciculture land productivity
Gosaba	4282	3208	25	64740	107740	1.66	33.58
Sagar	4399	3106	29	5977	73856	12.36	23.78
Patharpratima	7997	5805	27	41452	109125	2.63	18.80
Kultali	4683	3568	24	31905	83399	2.61	23.37
Basanti	2706	2115	22	22718	106166	4.67	50.20
Other island block	4946	3649	26	25513	93137	3.65	25.53
Namkhana	4506	3204	29	34343	72645	2.12	22.67
Mathurapur-I	1145	877	23	2169	51511	23.75	58.74

Mathurapur-II	3791	2910	23	17649	97430	5.52	33.48
Kakdwip	4230	2886	32	33389	109980	3.29	38.11
Jaynagar-I	1500	1185	21	10757	52652	4.89	44.43
Jaynagar-II	2500	1885	25	31645	67827	2.14	35.98
Canning-I	9564	6425	33	44445	151940	3.42	23.65
Canning-II	10662	7304	31	54720	161356	2.95	22.09
Other Sundarban block	4737	3335	30	28640	95668	3.34	28.69

Source: Author's calculation on unutilized land, pisciculture productivity based on District Statistical Handbook, South 24 Parganas, 2014.

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