

Assessing the Role of Social and Solidarity Initiatives in exploring Blue Economy: Evidences from Indian Sundarbans

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Abstract

Blue economy approach can mitigate the impacts of climate change on marine and coastal ecosystems. Sundarbans landscape 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. Thematic mapping of the Sundarbans region reveals a high ecological security in this region, whereas it is characterised by insecure economic efficiency and social equity.

Through participatory observation methods, qualitative information of the operation of selected Social and Solidarity Economic (SSE) initiatives is screened in this study in the light of three sustainability pillars of the blue economy: ecological conservation measures, economic sustainability and social development services. Empirical evidence reveals a variation in the performance of the SSE actors, which is conditioned upon their scale of operation, level of financial assistance and range of activities.

Keywords: Blue economy, Climate Change, Coastal Tourism, Mangrove, Sustainable Livelihood Security, Social and Solidarity Economy, Sundarbans.

Introduction

In the post 2015 development agenda, combating climate change through “conserve and sustainably use the oceans, seas and marine resources” is envisioned as important sustainable goals (SDG 14). The greatest challenge 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 area (namely, Ghoramara, Dublat gram panchayat of Sagar Island, G-plot, Lothian, Dhanchi, Bulcheri, Bhangaduani, Jambudwip and Mousuni) and increased frequency of cyclones. In this local context, a blue economy approach can mitigate the impacts of climate change on marine and coastal ecosystems.²¹

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. This approach is based on ‘sustainable consumption and production patterns, enhancing human well-being and social equity, generating economic value and

employment and significantly reducing environmental risks and ecological scarcities’.²⁰ Coastal regions can exploit the opportunities of the blue economy in various scales, ranging from local to regional to global level.

Broad range of activities in the caveat of blue economy not only includes traditional sectors (such as marine fisheries, tourism, marine infrastructure and water desalination), but also new and emerging activities (such as offshore renewable energy, marine aquaculture, seabed extractive activities and marine biotechnology and pharmaceuticals). It also includes other ecosystem services (such as coral reefs and mangroves/wetlands) which contribute to a sustainable economy such as coastline protection, carbon sequestration, nutrient production and recycling.¹⁰ Prioritization of economic activities is conditioned upon the relative importance of each sector of the blue economy.

Implementing ICM necessitates the involvement of concerned local government, private players and local actors that are engaged in the social and solidarity economy (SSE). Historically, a departure from the centralized control strategy in managing common property resources is evident in various settings throughout the Global South and the sharing of local management has proven quite effective in the perspective of ‘growing limitations of the traditional welfare state’.¹ As a potential alternative, SSE is supposed to satisfy human needs and help in the expansion of human capabilities by enhancing social relations through cooperation, association and solidarity.

Conceptually, SSE refers to such organizations namely cooperatives, mutual benefit societies, associations, foundations and social enterprises, which specifically are engaged in producing goods, services and knowledge by means of fostering solidarity. These organizations are supposed to pursue the goal of social value creation rather than earning profits for its owners.

Blue economy encompasses all economic activities that not only reduce wastes, but also ensure participation of coastal communities.² Participatory forest management can ensure participation of local communities in coastal regions. In Indian Sundarbans, Government initiatives in forest management rest on the formation of Eco Development Committees (EDCs) to serve the needs of the forest dependent population living in the fringe areas adjacent to the reserve forest and Forest Protection Committees (FPCs) for the people living within the protected areas. After the devastation of cyclone Aila in the region in 2009, some SSE

initiatives (mainly national and local NGOs) also mobilized local communities (who are dependent on Sundarbans ecosystem for security of subsistence livelihood) in the activities of conservation of mangrove forests.⁹

However, unsustainable livelihood activities, such as illegal deforestation, livelihood grazing and aquaculture in the newly planted mangrove areas are often observed as constraints for the viability of the SSE initiatives. It necessitates SSE involvement in generating alternative livelihood opportunities (fishery, livestock rearing, organic farming, integrated farming, sericulture, marine and coastal eco-tourism) for the forest dependent population. In generating alternative sources of livelihood opportunity, marine and coastal tourism are considered as the fastest growing economic activities in the sphere of blue economy. Marine and coastal tourism are interconnected, both of them are dependent on sea and the marine environment.¹⁸

In the existing literature, research endeavours on the blue economy are relatively scanty in India^{10,13} and Indian Sundarbans region in particular. In this context, this study (Gosaba block in Indian Sundarbans) in exploring the potentials of the blue economy. In addition, this study evaluates the performance of SSE organizations in the study region (Nature Environment and Wildlife Society-NEWS, SANGRAM, Purbasha Eco Helpline Society-PEHC, EDCs) in exploring sustainable economic activities in the framework of the blue economy approach.

Prospects of Blue Economy in Sundarbans: The origin of the sustainable blue economy concept (also known as ocean economy or blue growth) can be traced in the development of the green economy concept endorsed at the Rio + 20 United Nations Conference on Sustainable Development in 2012. In fact, the blue economy (together with the green economy) is considered as a pillar for inclusive sustainable development.²⁰ It is envisioned that oceans and seas hold considerable promise of significant untapped resources and thereby perceived as a great potential for boosting sustainable economic development.¹⁹

However, unsustainable economic activities of human civilization can lead to depletion of natural resources without maintaining the natural ecological balance of Sundarbans. Community participation in afforestation of mangrove plants can save Sundarbans from the forthcoming natural disaster. In such a fragile landscape, mangroves can create a bio-shield, stabilize tidal estuaries and sequester huge amounts of carbon-di-oxide.⁴ Implementing a mangrove restoration programme through carbon financing is seen as a viable mechanism for conservation of carbon pool of the mangroves.

Indian Sundarbans Mangrove Restoration project of NEWS, which was funded by Livelihoods-a non-profit organization is spread over 184 villages from 14 blocks of Sundarbans. Livelihood project implemented by NEWS aimed at carbon

emission reduction, climate adaptation and biodiversity conservation. Costs of supporting the local community restoration activities are financed through the mechanism of voluntary carbon credits.²²

Some other new investment and targeted financial instruments ensuring ocean health include blue bonds, insurance and debt-for-adaptation swaps. However, implementation of such project created a sustainable value chain in the mangrove ecosystem through participation of local communities.

However, viability of this project is dependent on the generation of alternative livelihood opportunities for the forest dependent population living below the poverty line.

Other SSE actors are also engaged in income generation opportunities in the Sundarbans region to reduce biotic pressure on the forest. The Rufford project implemented by Sangram facilitates revival of the aqua system by the construction of a community pond. Restoration of degraded mangrove area, as a part of this project, improves the condition of fishery resources in the Sundarbans. Participation of coastal communities in EDCs facilitates local development activities, redressing wildlife-human conflict and generating alternative employment opportunities.

Development of a sustainable ecotourism model can protect the environment and improve welfare of the community.¹⁸ Such initiatives are required to mitigate environmental damage due to construction of buildings and tourism activities. In the study region of the Gosaba block of Sundarbans, ecotourism initiatives of PEHC provide an alternative income source to the coastal poor population. PEHC specialises in fully-escorted cultural and educational travel programs to Sundarban and other overseas destinations for ecotourists. The earnings from tourism are utilized in other social development activities for overall well-being of the population.

Material and Methods

In defining a set of key indicators of the blue economy, Fosse et al⁶ considered three sustainability pillars: economy, society and environment. A comprehensive Sustainable Livelihood Security Index (SLSI), as developed by Saleth and Swaminathan encompasses these sustainability pillars to reflect the economy-ecology-equity interface of sustainable development. This composite index was applied 'PQLI-HDI methodology in a generic context'.^{15,17}

In this study, three dimensions of SLSI (i.e. ecological security, economic efficiency and social equity) are considered to provide a holistic picture of the regional variations in the Gosaba block in South 24 Parganas.⁹ The following indicators were selected for measuring ecological security, economic efficiency and social equity:

- **Ecology security indicators (ESI):** Percentage of forest area to total area, population density per sq.km.
- **Economic efficiency indicators (EEI):** Cereal yield, pisciculture labour productivity, non-farm employment.
- **Social equity indicators (SEI):** Female literacy rate, percentage of asset worth households.

These indicators (except density of population) maintain a positive functional relationship with sustainable livelihood security. For each positive functional relationship, a

normalisation index for indicator i (z_i) is computed by the following formula:

$$z_i = \frac{A_i - m_i}{M_i - m_i}$$

where A_i = actual value of the indicator i , m_i = minimum value of the indicator i , M_i = maximum value of the indicator i . However, density of population is negatively related to sustainable livelihood security. Then the normalization index can be computed as:

$$z_i = \frac{M_i - A_i}{M_i - m_i}$$

Average value of all such individual normalization indexes corresponds to the dimension itself, ESI, EEI or SEI. Then, SLSI is measured as an average of ESI, EEI and SEI. Following Singh and Hiremath¹⁷, equal weights are given in the construction of the composite index. In this study, secondary sources of data are utilized to compare intra-district (project intervention block vis-à-vis other island blocks / other Sundarbans blocks / rest of the district) variations in the sustainable livelihood security at macro level.

As a part of empirical research, Gosaba block is purposively selected from the district of South 24 Parganas due to the coexistence of government sponsored EDCs and NGOs (viz. NEWS, SANGRAM and PEHC) in this block. To assess the contribution of SSE in exploring the blue economy in the study region, four SSE cases (NEWS, SANGRAM, PEHC, EDCs) are considered for their role in exploring economic activities in the blue economy. Relevant information on the functional areas of such organizations is compiled in compliance with the blue economy framework.

The framework is designed in the light of three sustainability pillars of blue economy: ecological conservation measures (activities of SSE in addressing environmental concerns), economic sustainability (promoting economic benefits to the poor so as to ensure financial sustainability of the SSE) and social development services (services aimed at generating capability of the local people to maintain a dignified life).

Record of official responses on different attributes in the assessment grid is collected by canvassing a semi-structured questionnaire. It enables us to assess the performance of the SSE initiatives in the study region. Organizational level performances are systematically presented in a score card. Objective scores in the scale of 0-2 (0-not practiced, 1-weak practice, 2-strong practice) are assigned to each indicator of sustainability pillars based on the performance level of such organizations.

Results and Discussion

Mapping of the Study Region: In the context of blue economy, the framework of sustainable livelihood security is useful in mapping the regional specific needs (i.e. 'conditions of necessity' of a region). Regional variation in livelihood security in Gosaba vis-à-vis other island blocks, or other Sundarban blocks, or rest of South 24 Parganas (i.e. the district) is presented in table 1.

Ecological Security: Ecological security is measured by the block level information on the extent of forest cover and density of population. Island blocks are predominantly endowed with the forest cover. Gosaba block is bounded by the forests in the east (Sajnekhali Wildlife Sanctuary) and south (Sundarban National Park). Extensive area of forest land is observed in all other blocks of the islands (Patharpratima, Kultali, Basanti and Sagar) and Namkhana block in other Sundarban region. On the other hand, density of population indicates the extent of pressure on the overall ecological security.¹¹

In fact, historical evidences suggest that forest cover of the interior blocks of Indian Sundarban (Sandeshkhali, Kakdwip, Patharpratima, Basanti, Kultali and Gosaba) were cleared 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). However, human density in island blocks is comparatively low than other Sundarbans blocks and other blocks in the district.

Economic efficiency: Gosaba and other island blocks are relatively secure on economic opportunity than other Sundarban blocks. Gosaba excels in agricultural productivity in comparison to all other regions. However, pisciculture productivity in the Gosaba block is distinctly low. Non-farm employment generation in Gosaba block is at the lowest level (22 percent) in comparison to other blocks in the district.

Social equity: In comparison to other regions (island blocks or Sundarbans blocks), female literacy rate is above 70% in Gosaba block. However, a sizable number of asset deprivation households (nearly 51 percent of total households) reside in Gosaba block.

Table 2 summarizes the region wise score of the three component indices (i.e. ESI, EEI, SEI) and the combined

score of the comprehensive index (SLSI). It can be seen that other island blocks are relatively secure than other Sundarbans blocks in ecological security and social equity status. Interestingly, Gosaba block secures a modest achievement in ecological security (6th rank) in the district (due to low density of population), but performs poorly in the economic (25th rank) and social security indicators (24th rank).

Ultimately, the block is placed in the lower stratum of sustainable livelihood security (26th rank among 29 blocks of the district). Therefore, 'conditions of necessity' in the Gosaba block of Sundarbans (as reflected in the mapping of the region) warrant SSE interventions in the following development priorities of blue economy:

- **Ecological security:** Mangrove afforestation work.
- **Economic efficiency:** Restoration work in the aqua system, improvement in pisciculture productivity, exploration of non-farm employment.

- **Social equity:** Upliftment of asset deprivation households.

Regional variation in the attainment of livelihood security across blocks in South 24 Parganas is presented in multiple thematic mapping figures 1a-1d. Depending on the value of ESI, EEI, SEI, or SLSI, blocks are categorized into four categories: very low, low, medium and high. Quartile measure is used in classifying regions in the following groups: very low ($<Q_1$), low ($Q_1 < \text{estimated score} < Q_2$), medium ($Q_2 < \text{estimated score} < Q_3$) and high ($\text{estimated score} > Q_3$). Such classification in this thematic mapping (figure 1) helps us in determining policy priority in Sundarbans region. Specific efforts need to be undertaken in improving economic efficiency and social equity. Policy priority remains the same in the context of island blocks of Sundarbans region, in general, or Gosaba blocks, in particular.

Table 1
Region-wise State of Individual Indicators on Sustainable Livelihood Security

Name of Block/Region	Ecology security indicators(ESI)		Economic efficiency indicators (EEI)			Social equity indicators (SEI)	
	Percentage of forest area to total area	Density of population (per sq.km.)	Cereal yield (in kg./hect.)	Pisci culture labour productivity (annual production, in qtl., per person)	Non-farm employment (in %)	Female literacy (in %)	Households having at least one of asset (in %)
Gosaba block	0	831	2831.8	1.7	21.66	71.22	48.72
Other Island blocks	9.83	754.50	2314.9	5.6	24.76	68.14	63.25
Other Sundarban blocks	0.53	1258.13	2416.2	6.0	40.79	67.21	60.50
Rest of South 24Parganas	0.00	2178.06	2450.2	7.1	59.50	71.68	71.15

Table 2
Performance Score of the Regions in the Three Dimensions of Sustainable Livelihood Security

Dimensions	Performance Score/ Average rank	Gosaba	Other Island-blocks around forest boundary	Other Sundarban blocks	Rest of South 24 Parganas
ESI	Average score	0.455	0.785	0.416	0.276
	Average rank of blocks	6	2.8	10.9	20.7
EEI	Average score	0.289	0.292	0.395	0.513
	Average rank of blocks	25	24	18.3	10.5
SEI	Average score	0.295	0.395	0.340	0.577
	Average rank of blocks	24	17	20	11.4
SLSI	Average score	0.346	0.491	0.383	0.456
	Average rank of blocks	26	10.5	20.3	12.8

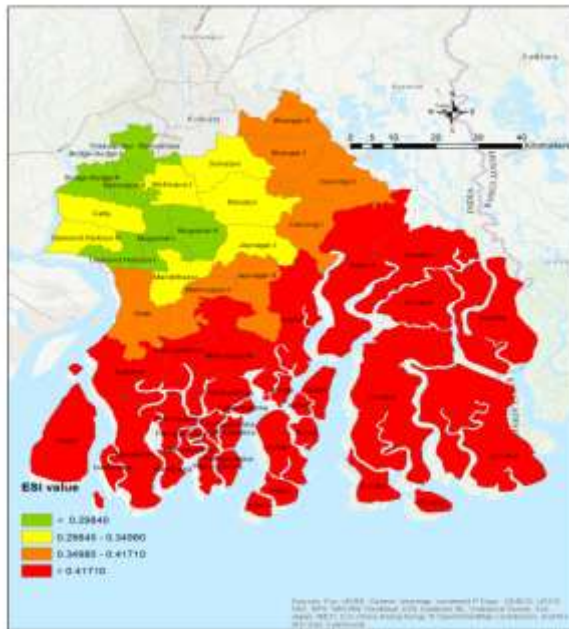


Figure 1a: Ecological Security Index Map of South 24 Parganas

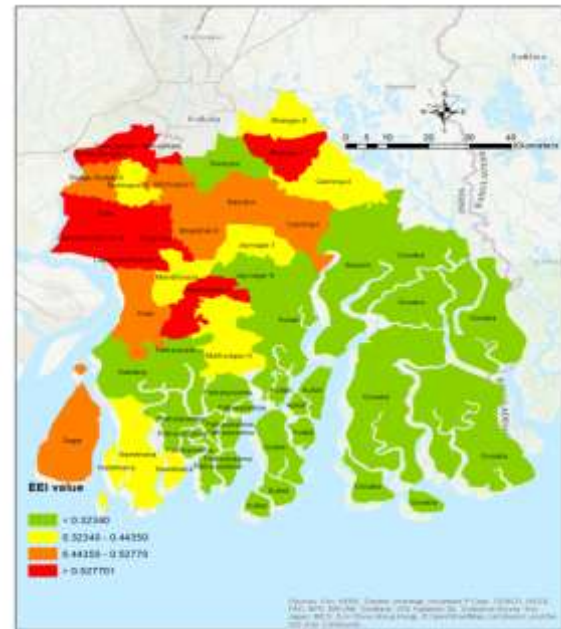


Figure 1b: Economic Efficiency Index Map of South 24 Parganas

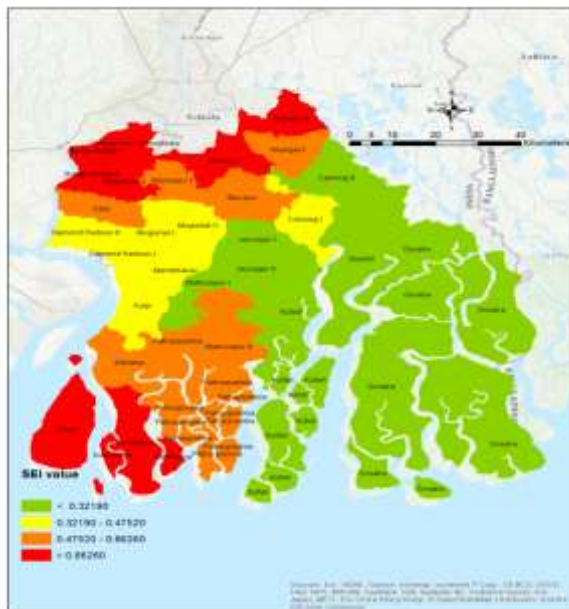


Figure 1c: Social Equity Index Map of South 24 Parganas

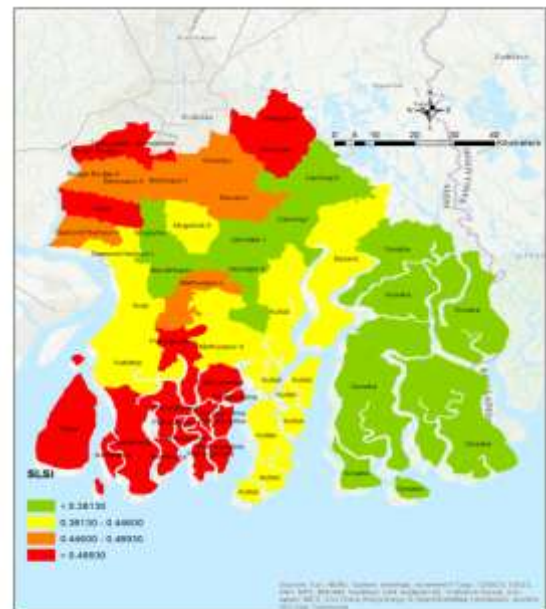


Figure 1d: Sustainable Livelihood Security Index Map of South 24 Parganas

Figure 1: Regional Variation in Sustainable Livelihood Security in South 24 Parganas

Activities of SSE Organizations in the Study Region in Compliance with the Three Sustainability Pillars of Blue Economy Framework: In the light of these 'conditions of necessity' of Gosaba block, it is fair to draw inferences that blue economic activities in this region can explore the non-farm employment (fishery, coastal tourism, mangrove afforestation) and thereby provides alternative income opportunities to the asset deprivation households. Table 3 presents a brief description on the practices undertaken by the SSE actors in ecological conservation, economic sustainability and social development services. In the study region, SSE interventions create a sustainable value chain in

protecting the tropical mangrove ecosystem and generate alternative economic activities in promoting the blue economy. Activities of SSE organizations in the blue economy framework are summarized as follows:

Ecological conservation measures: A variety of measures are undertaken by SSE organizations in conserving ecological resources such as restoring mangrove plantation (NEWS, SANGRAM, PEHC, EDCs), reducing biotic pressure by exploring other substitutes of fodder and fuelwood consumption (NEWS effort in encouraging fodder grass, 'subabul' trees, smokeless cook stoves), recycling of

waste (SANGRAM effort in forming SHGs for crating daily utility articles with plastic litters and other wastes). Eco-development activities of the EDCs are directly or indirectly linked with conservation of biodiversity measures.

In addition to promoting ecotourism activities, PEHC involved in protecting horseshoe crab can explore marine biotechnology and pharmaceuticals (one of the promising activities in the blue economy) in the coastal wetland of Sundarbans in future.

However, this organization does not exploit any commercial advantage by protecting the crab. In fact, 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. Formation of grass root level environment protection groups (SWARDS) for monitoring mangrove ecosystem voluntarily ensures long term sustainability of the livelihood project. Sharing profits among stakeholders is a common practice across organization levels.

Economic sustainability: Fishery, aquaculture, ecotourism are some of the common blue economy initiatives practiced by the SSE organizations to supplement additional income of the stakeholders. In fact, fishing is the second important source of livelihood opportunity in Gosaba block.¹⁶ Distribution of project financing (Livelihood project by NEWS and Rufford project by SANGRAM) as a payment of work increases income of the beneficiaries.

Project on revival of the aqua system (SANGRAM) not only facilitates indirect employment in community ponds, but also helps in undertaking agricultural activities. In augmenting livelihood opportunities, NEWS collaborates with other partner NGOs (viz. Naandi Foundation) and establishes linkages with other Government schemes to ensure sustainable income generation streams. PEHC designs innovative ecotourism packages such as eco-friendly accommodation, nature walk, dissemination of local cultural heritages (folk songs, plays and handicrafts). Forward and backward linkages of tourism in the neighbouring villages generate revenues to the local population.

Social development services: SSE organizations are actively engaged in protecting coastal wetland, mangrove restoration and alternative livelihood generation (especially fishery and ecotourism) through participation of local communities (especially women).

In addition, they also provide other marketing services in promoting organic farming (NEWS promoted Badabon Farmers Producer Company in association with Sufal Organic; SANGRAM facilitates fish and crabs marketing), training and capacity building programme (NEWS, SANGRAM, EDCs), publication of an environmental journal (PEHC) for generating environmental awareness to

the local population. In the light of these wide ranges of activities, this study evaluates the performance of the SSE organizations. Based on the document analysis on the activities of the organizations and perception of the representatives of the organizations (collected through semi-structured questionnaire) on their achievement in the blue economy framework, organizations are ranked by assigning a score in the assessment grid (table 4).

Organization wise scores are suitably modified by considering the differences in their reported (responses of the representatives) and actual (as evident in the document analysis) performance.

Evidence on performance evaluation reveals that the average score of four SSE organizations in the study region varies significantly from a low score of 0.71 (lowest possible score is 0) to a high score of 1.71 (highest possible score is 2). No such difference in the average score is observed on economic sustainability. However, organization level differences are observed in their social development services and ecological conservation measures (figure 2).

In comparison to national level organizations (NEWS, SANGRAM), performance scores of local level organizations (PEHC, EDCs) are observed to be relatively low on social development services and ecological conservation measures. Thus, variations in ecological and social services are marked as source of differences in organizational level performance analysis. One general conclusion that can be drawn from this analysis is that the performance of non-government organizations (NEWS, SANGRAM, PEHC) is comparatively better than government controlled voluntary organizations (EDCs).

Finding of the study is similar to the results of other independent researches that suggest 'overall performance of the site managed by a non-governmental organizations in collaboration with local forest dependents was better than the other two sites managed by forest department and joint forest-community institution respectively'.⁵ Variations in the performance of the SSE organizations can be explained by their scale of operation (national vis-à-vis neighbourhood region), level of financial assistance and range of activity levels.

Conclusion

This study identifies the regional specific need of our study region (Gosaba block in Indian Sundarbans) to explore the need for sustainable economic activities in blue economy. Mapping of the Sundarbans region suggests that a high ecological security in this region is also associated with insecure economic opportunity and social equity. Within Sundarbans, relative insecurity in economic opportunity and social equity is noticeable in Gosaba block vis-à-vis other remote blocks mostly constituted by the forest dependent population (i.e. islanders) or other Sundarbans blocks.

Table 3
List of Contributions of SSE Organizations in Promoting Blue Economic Activities in the Region

Indicator	NEWS	SANGRAM	PEHC	EDCs
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"> - Planting mangroves of more than 14 species by covering about 19.5 hectares of terrain alongside the bed of a river. - Forming five self-help groups of six members each for creating daily utility articles as baskets, storage of different sizes amongst others with plastic litters and other wastes - Encourage utilization of dried up wood, leaves and other plant parts as sources for domestic fuelwood -Introduce cheaper, climate resilient and natural farming practices 	<ul style="list-style-type: none"> -Planted nearly 4 lakhs mangrove plants - Diversify newly planted saplings and seedlings of mangrove trees - Facilitates in protecting horseshoe crabs - Eco-tourists are persuaded to make mud field as plastic free zone 	<ul style="list-style-type: none"> - Every selected eco-development activity has direct or indirect linkage with conservation of biodiversity
Economic sustainability	<ul style="list-style-type: none"> - Exploring non-farm income opportunities in fishing, livestock rearing, aquaculture, organic farming - Most of the livelihood financing is distributed to communities as payment for work to increase income of the beneficiaries. 	<ul style="list-style-type: none"> - Direct employment of 70- 75 persons in community pond besides 360 - 400 indirectly dependent persons -Revival of these aqua systems has explored possibilities of agriculture 	<ul style="list-style-type: none"> - Employment diversification towards non-farm sector (especially eco-tourism) - Collect honey, crabs in a bulk quantity from local population to sell to the eco-tourists 	<ul style="list-style-type: none"> - EDC also encouraged local women to form self-help groups - EDCs also help impoverished people to find temporary employment with the Forest Department as cooks in the patrolling boats.
Social development services	<ul style="list-style-type: none"> - Augmenting livelihood opportunities through linking with Government Schemes - 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"> - Providing finance for livestock rearing, inputs for organic farming - Facilitating marketing of fish and crabs - Counselling, technical assistance to SHG members - Profit earned from fishing in community ponds is distributed among stakeholders. 	<ul style="list-style-type: none"> - Ecotourism provides an alternative income source to the villagers (one permanent boat driver) -Profit earning from tourism is distributed among stakeholders. - Publication of a popular journal on environmental issues 	<ul style="list-style-type: none"> -Majority of elected members in EDCs belong to SC/ST category (an economically backward section of population) and they are living in the vicinity of the protected areas. -At least 30% of the elected members are women. -Revenue of EDCs are used for development work - Govt. organizations are actively involved in training and orientation of SHGs target groups

Table 4
Objective Scores of SSE Organizations in the Assessment Grid of Performance Evaluation

Principles/Indicators	NEWS	SANGRAM	PEHC	EDCs
1. Ecological conservation measures	2	2	0.5	0.5
1.1 Preserving biological diversity in a community participatory manner	2	2	1	1
1.2 Imbibing recycling and reuse strategies	2	2	0	0
2. Economic sustainability	1	1	1	1
2.1 Promoting entrepreneurial activities for the poor	1	1	1	1
2.2 Distributing financial benefits to the poor and socially disadvantaged	1	1	1	1
3. Social development services	2	1	1	0.6
3.1 Financing tactics in meeting community needs	2	1	1	1
3.2 Marketing strategies in meeting community needs	2	1	1	0
3.3 Imparting skill/management training for the poor	2	1	1	1
Total score	12	9	6	5
Average score	1.71	1.29	0.86	0.71

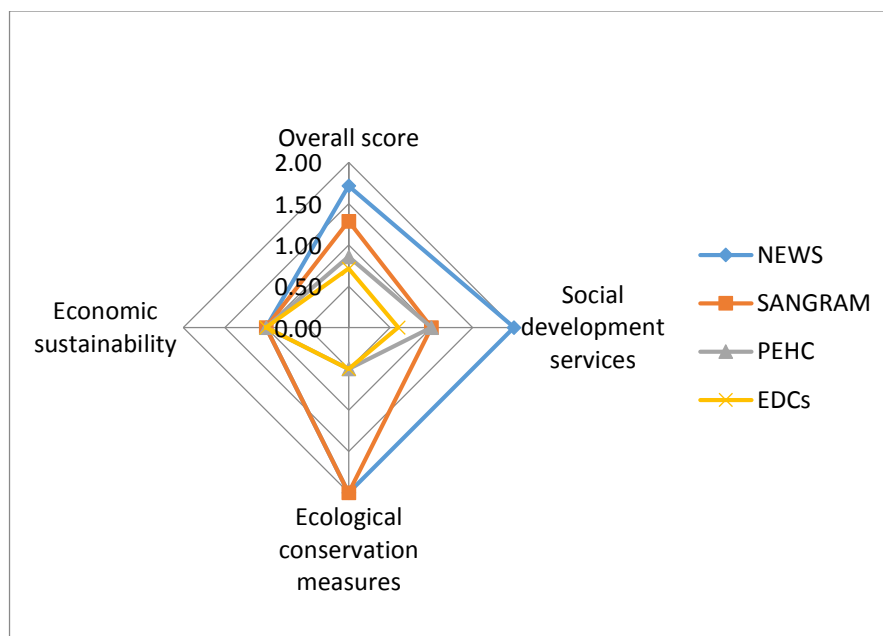


Figure 2: Performances of SSE Organizations in the Social Development, Ecological Conservation and Economic Sustainability Scores

‘Conditions of necessity’ in Gosaba block calls for a development priority in mangrove restoration works, exploration of non-farm employment opportunity (specifically pisciculture, ecotourism) to asset deprivation households in the region.

This study evaluates the performance of SSE organizations in addressing sustainability issues in the framework of blue economy: ecological conservation measures, economic sustainability and social development services. Empirical evidence reveals their untiring efforts in exploiting the blue economic activities through mangrove restoration

programmes (by means of carbon financing or other sources of financing), ecotourism and protecting horseshoe crab (potentiality of marine biotechnology and pharmaceuticals) in the coastal wetland of Sundarbans. Interestingly, variations in the performance of SSE organizations can be explained by their scale of operation, level of financial assistance and range of activity levels.

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