



Inter-Agency Task Force on
Social and Solidarity Economy

Mitigating Climate Change in Sundarbans

*Role of Social and Solidarity Economy in Mangrove
Conservation and Livelihood Generation*

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**Implementing the Sustainable Development Goals:
What Role for Social and Solidarity Economy?**

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Abstract

This paper shed some lights on the role of SSE actors in meeting regional specific needs (Gosaba community block of Indian Sundarbans) in the light of the global target (SDGs). Mapping of the ‘conditions of necessity’ in the study region enables us to specify regional specific needs of Gosaba block (viz. mangrove restoration works, exploration of non-farm sectors (specifically pisciculture) in providing livelihood of asset deprivation households), which warrants SSE intervention. In the post Aila scenario, effective intervention of SSE change agents in mitigating climate change in Gosaba block ultimately rests on the generation of alternative livelihood opportunity of the forest dependent population so as to reduce biotic pressure of the mangrove forests. An assessment of the current practice of SSE actors in the light of shared vision principles (socially responsible governance, edifying values, social development services, ecological conservation measures and economic sustainability measures) reveals that non-governmental organizations (NEWS, SANGRAM, PEHC) secured higher performance score than state sponsored voluntary organizations (EDCs). Interestingly, scale of operation, level of financial assistance and range of activity levels can significantly determine the variation in the performance score of SSE initiatives in this regional context.

Keywords

Climate change, Mangrove afforestation, Sustainable livelihood security, Social and Solidarity Economy, Sundarbans.

Bio

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Introduction

In a search of egalitarian forms of community, development thoughts in the 21st century devoted attention towards shaping of a social and solidarity economy (SSE). However, the development of SSE is expected to address the economic, social and environmental objectives and thereby holds considerable promise in adopting integrated approaches inherent in the concept of sustainable development (TFSSE, 2014). Combating climate change through sustainable management of natural forest resources¹ is envisioned as important sustainable goals (SDG 13, 15) in post 2015 development agenda. However, management effort may not yield desired outcome on a sustainable basis without a holistic perspective towards development of local communities, resources and livelihood opportunities (DasGupta and Shaw, 2013). Accordingly, there is a need to establish linkages among other interrelated goals of sustainable development (United Nations, 2015).

In the present case study of forest management in Indian Sundarbans, social and solidarity organizations (such as non-governmental organizations and state sponsored community forestry groups) play an important role in sustainable management of biodiversity resources and generation of alternative livelihood opportunities to reduce biotic pressure. The Sundarbans² landscape is the world's largest delta covering 800,000 hectares of land (roughly 200,000 hectares in the 24 Parganas district of West Bengal and 600,000 in the Khuna district of Bangladesh) and home to 123 million people. The greatest challenge to the sustainability 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, increased frequency of cyclones, and island loss³. In such landscape, mangroves can create a bio-shield, stabilizes tidal estuaries, sequester huge amount of carbon-di-oxide and dissuades wind and wave energy (Dey and 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.

Community participation in afforestation of mangrove plants can save Sundarbans from the forthcoming natural disaster. 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 the perspective of 'growing limitations of the traditional welfare state'. In Indian Sundarbans, government initiatives in participatory forest management principles rests on the formation of Eco Development Committees (EDCs)⁴ to serve the needs of the forest dependent population people living in the fringe areas of the reserved forest area, and Forest Protection Committees (FPCs) for the people living within the wildlife or protected areas. Especially after devastation of

¹This goal is compatible with the UN Convention on Biological Diversity and generation of traditional livelihood opportunity.

²Sundarbans was declared as a World Heritage site by UNESCO. Rich biodiversity elements in the area were also recognized by the declaration of biosphere reserve in 1989. The landscape of Sundarbans is now recognized as a trans-boundary protected area (i.e. a single ecosystem) shared between India and Bangladesh. Presently, India's share of this forest area is around 4,200 sq. km. out of a total forest cover area of 10,200 sq. km. of Sundarbans. The delta lies in Bangladesh and India with rivers draining Bhutan, China, India and Nepal. In Sundarbans (known as the largest mangrove forests area in the world), mangrove forests area is situated in the delta of Ganga and Brahmaputra rivers.

³ An 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 Sagar island, 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).

⁴ At present, 14 EDCs are operational with the involvement of 4483 members, who are responsible for protecting 12350 hectares of forest in the Sajnekhali Wildlife Sancturay Range and National Park West (see table A.1). Existing empirical evidences suggest that the performance of such committees is quite satisfactory in ensuring development activities, redressing wildlife-human conflict and generating alternative employment opportunities. The trust developed between Forest Department and the Sundarbans people is mainly attributable to the good governance practice adopted by FPCs and EDCs.

cyclone Aila in the region on 2009, some NGOs [viz. Nature Environment & Wildlife Society (NEWS), SANGRAM, Purbasha Eco Helpline Society (PEHC)] in Gosaba block of Indian Sundarbans also mobilizes local communities, who are dependent on Sundarbans ecosystem for security of subsistence livelihood, in the activities of conservation of mangrove forests. Involvement of SSE actors in implementing mangrove restoration programme through carbon financing is seen as a viable mechanism for conservation of carbon pool of the mangroves. In this direction, the Indian Sundarbans Mangrove Restoration project of NEWS, which spread over 184 villages from 14 blocks of Sundarbans, is funded by Livelihoods (a non-profit organization, who does not market, sell, or make any profit out of carbon offsets). This project 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 (Wylie et al, 2016). However, unsustainable livelihood activities, such as illegal deforestation, livelihood grazing, and aquaculture in the newly planted mangrove areas are often observed as a constraints for the viability of the project. It necessitates SSE involvement in generation of alternative livelihood opportunities (fishery, livestock rearing, organic farming, integrated farming, sericulture, eco-tourism) for the forest dependent population living below poverty line in the Sundarbans region to reduce biotic pressure on the forest.

In evaluating the performance of SSE organizations, the study utilizes shared visions of SSE in the light of five principles: socially responsible governance, edifying values, social development services, ecological conservation measures and economic sustainability measures (following Quinones, 2013). These principles have been extensively applied in evaluating the practice of fifteen SSE cases from Asian countries (i.e. nine SSE cases from Indonesia, five cases from Philippines, and one from Cambodia). SSE models from the Philippines and Cambodia secured higher performance score than most SSE models from Indonesia. It can be explained by the ownership, management and scale of the enterprises (Quinones, 2013). In another paper, the framework has been extended to incorporate community forestry in Nepal (Quinones, 2014), value chain of Kishan Swaraj Welfare Society (KSWS) in West Bengal (India) (Purkayastha, 2013)⁵. However, no such systematic effort has been made in evaluating the performance of SSE actors in Sundarban region. Under this backdrop, this paper attempts to evaluate the performance of SSE change agents in mitigating challenges of climate change through mangrove conservation and employment generation in the local context of Gosaba block in Indian Sundarbans.

Data Sources and Methodology

In this paper, the following methodology is applied in a systematic enquiry on the role of social and solidarity economy in ensuring environmental conservation and livelihood generation (SDG 8, 11, 14).

⁵ Even though such new SSE initiatives were linked to the neoliberal economy, but they have garnered innate capacity to change the mode and relations of production. However, such small-scale localized capacity is often determined by the limited resources at their disposal (Quinones, 2014). In the context of Indian economy, Purkayastha (2013) evaluated the SSE value chain of Kishan Swaraj Welfare Society (KSWS) in Teorkhali, Purba Medinipur, West Bengal. Focus group discussion of all the stakeholders of KSWS in five key dimensions of SSE reported a ‘gradual onset of a sustainable SSE value chain, incepting at the village level’.

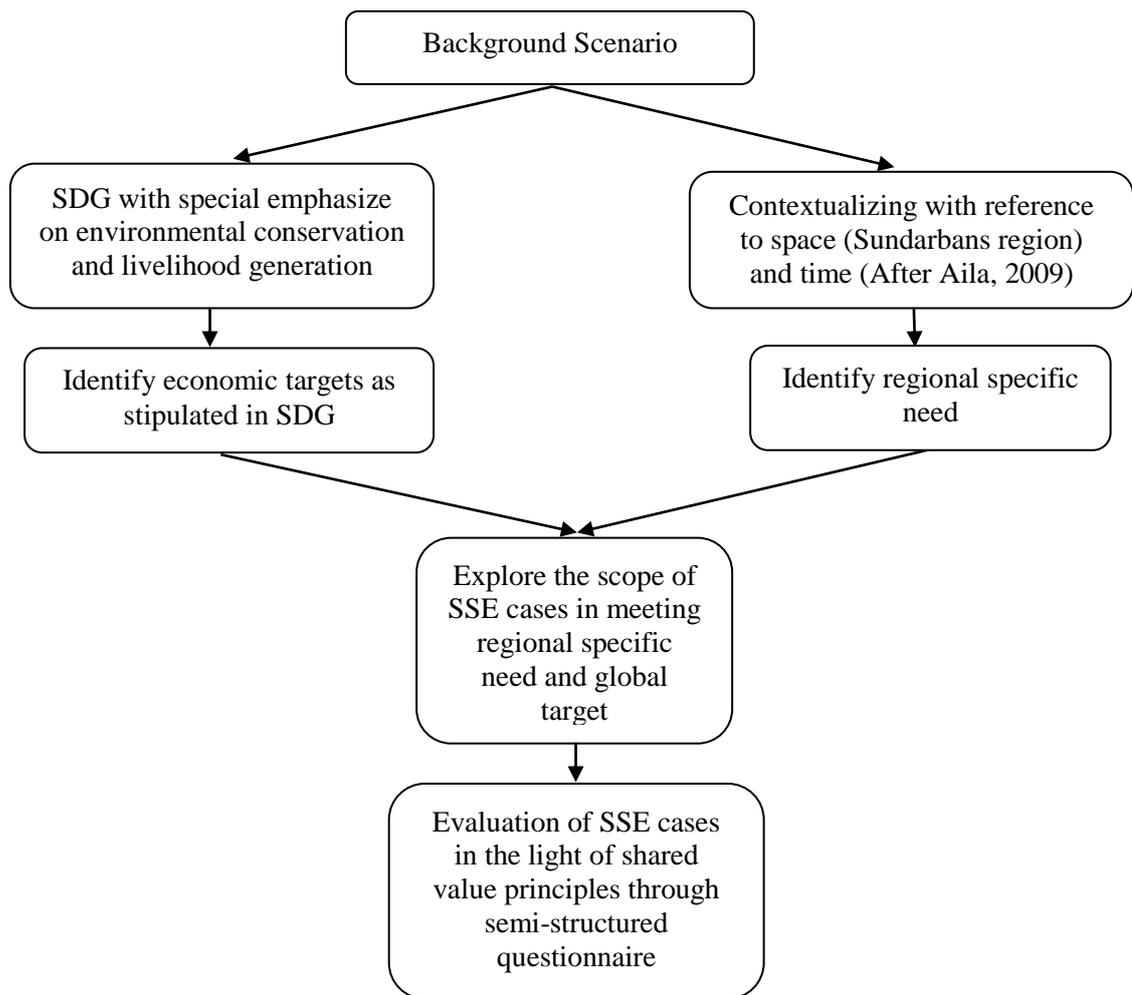


Figure 1: Methodological Approach of the Study

First stage: Consideration of SDGs without contextualizing the space (i.e. regions) and time of the study may not become effective in exploring the scope of social and solidarity economy in meeting regional specific needs in the light of the global target (as mentioned in SDGs). To examine the working space of grass root level SSE organizations, an evaluation of the mapping of the study region is prerequisite in the light of quantitative indicators of sustainable livelihood opportunity. To consider regional variation, the study sub-divided the region into Gosaba block (study area), other island blocks around forest boundary, other Sundarban blocks, and rest of South 24 Parganas.

In measuring overall livelihood opportunities in the regional context, the study employs a comprehensive Sustainable Livelihood Security Index (SLSI)⁶ at macro level (following Saleth and Swaminathan, 1993) to reflect the economy-ecology-equity interface of sustainable development. Consideration of three dimensions of SLSI (i.e. ecological security, economic efficiency and social equity) provides a holistic picture of the implications of micro level intervention measures on livelihood security of population in the selected block. In fact, secondary sources of data (District Statistical Handbook, South 24 Parganas, 2014 and Census,

⁶ In 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). For the analytical and methodological framework for constructing SLSI, see Singh and Hiremath (2010), p. 443-445.

2011) enable us to compare intra-district (project intervention block vis-à-vis other island blocks or other Sundarbans blocks) variation in the sustainable livelihood security at macro level.

- *Ecology security indicators (ESI)*: percentage of forest area to total area⁷, 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 rate⁸, non-farm employment⁹
- *Social equity indicators (SEI)*: female literacy rate and percentage of asset worth households¹⁰

This paper utilises three dimensional approach of measuring a composite SLSI, which reflects the application of ‘PQLI-HDI methodology in a generic context’ (Saleth and Swaminathan, 1993; Singh and Hiremath, 2010).

Second stage: In addition to the secondary sources of data, the study also presents primary survey evidences to assess the organizational structure and functioning of EDCs, and non-profit associations implementing the programmes of mangrove afforestation and livelihood promotion. As a part of primary survey, coexistence of government sponsored EDCs and NGOs (viz. NEWS, SANGRAM, and PEHC) led us to select purposively Gosaba block from the district of South 24 Parganas, West Bengal. Through participatory observation method, qualitative information of the operation of these EDCs and non-profit associations is collected from official level with a semi-structured questionnaire¹¹. It is followed by the task of screening of the collected observations in the light of the following SSE principles¹² (following Quiñones, 2013) and it’s linked to SDGs (table 1).

Table 1: SSE Shared Vision and It’s Linked to SDGs

Shared vision principles	Explanation	Individual indicators	SDG being addressed
Socially responsible governance	Governance practices of SSE to enable stakeholders in protecting the environment and meeting SDGs	-Participation of marginalised communities, especially women -Profit sharing among the stakeholders -Democratic participation	SDG 5: Gender equality SDG 16: Peace, justice and strong institutions

⁷ 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.

⁸Work 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.

⁹It 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.

¹⁰ In the Census report, asset worth households are identified as having any of the assets: radio/transistors, television, computer/laptop with or without internet, landline telephone, mobile telephone, bicycle, scooter/moped/motor cycle, car/jeep/van. 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).

¹¹Document analysis is employed in setting pre-determined set of open questions in the semi-structured questionnaire (as a part of desk research).

¹²These five dimensional framework for evaluating SSE performance was formally adopted at the Asian Solidarity Economy Forum, Indonesia.

		of members in annual meeting	
Edifying values/ethical principles	Ethical principles that bind stakeholders in placing priority of the people centered development over profits	-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 management	SDG 16: Peace, justice and strong institutions
Social development services	Services result in capability of the local people to maintain a dignified sustainable way of life	-Financing provisions in meeting community needs -Marketing strategies in meeting community needs -Imparting skill / management training for the poor	SDG 1: No poverty SDG 2: Zero hunger SDG 10: Reduced inequality SDG 13: Climate action
Ecological conservation measures	Activities of SSE in addressing environmental concerns	-Preserving biological diversity in a community participatory manner -Imbibing recycling and reuse strategies	SDG 12: Responsible consumption and production SDG 13: Climate action SDG 14: Conservation SDG 15: Protecting ecosystems
Economic sustainability	Promoting economic benefits of the poor so as to ensure financial sustainability of the SSE	-Promoting entrepreneurial activities for the poor -Distributing financial benefits to the poor and socially disadvantaged	SDG 8: Decent work and economic growth

Source: Author's compilation

Evaluation of SSE cases is essentially built upon the responses collected from the officials of the organizations on different attributes in the assessment grid belonging to the shared SSE vision. A scorecard in the scale of 0-2¹³ is assigned to each of the SSE principles. A comparison on performance scorecard across organization level (EDCs, NEWS, SANGRAM, and PEHC) can also identify the actors' compliance with SSE principles.

Mapping of the Study Region:

In the context of diverse landscape of SSE cases across regions of the world, it is now pertinent to mapping the regional specific needs (i.e. 'conditions of necessity' of a region)¹⁴. Inter-

¹³Depending on the performance level of the organizations, a scorecard in the scale of 0-2 is assigned: 0-not practiced, 1-weak practice, 3-strong practice.

¹⁴The 'conditions of necessity' is essentially dynamic phenomenon. Emergence of SSE cases was the manifestation of the historical transformation of the prevailing economic system. In such deep rooted transformation, a 'condition of necessity' and a 'condition of shared destiny' acted as a major driving force in scaling up social economy organizations across countries of the world (Defourny and Develtere, 1999).

regional disparity in the attainment of targets of SDG has guided us in shaping the ‘conditions of necessity’, which is expected to be addressed by SSE organizations. In this paper, SD paradigm is widened to encompass ecological, economic, and social equity concerns in the concept of sustainable livelihood security (table 2).

Ecological security: empirical evidences on secondary sources of data observed that other Sundarban blocks holds a sizable land for cultivation and pisciculture, whereas island blocks are predominantly endowed with the forest cover¹⁵. In Gosaba block, only 10.81% of the area (i.e. lowest among other island blocks) is devoted as net pisciculture area (see table A.2), whereas 25% of the net area available for pisciculture remained unutilized.

Economic efficiency: on the count of economic efficiency, island and Sundarban blocks are lagging behind in compared to the rest of the district. Pisciculture productivity in the Gosaba block is distinctly low. However, Gosaba excel in the agricultural productivity in comparison to all other regions. However, other island blocks (in particular Gosaba block¹⁶) perform poorly in generating employment opportunity in non-farm sector in comparison to other Sundarban blocks. Unlike other four island blocks close to the forest, Sagar (a newly developed island) is somewhat different in substituting forest based earning by tourism related earning (see table A.3).

Social equity: Gosaba block experiences a higher female literacy rate (more than 70%) in comparison to other regions. However, a sizable number of asset deprivation households reside in Sundarban blocks (in particular Gosaba block).

Table 2: Region-wise Pattern of Sustainable Livelihood Security Indicators

Indicator	Score/Rank	Gosaba	Other island-blocks around forest boundary	Other Sundarbans blocks	Rest of South 24 Parganas
ESI	Average score	0.312	0.489	0.402	0.293
	Average rank of blocks	17	9.0	10.5	18.6
EEI	Average score	0.467	0.370	0.352	0.439
	Average rank of blocks	7	18.0	20.5	12.0
SEI	Average score	0.295	0.395	0.340	0.577
	Average rank of blocks	24	17.0	20.0	11.4
SLSI	Average score	0.358	0.418	0.364	0.437
	Average rank of blocks	21	14.5	19.6	12.4

Source: Author’ calculation

The score of the three component indices (i.e. ESI, EEI, SEI) and its combined score (SLSI) across the regions are summarized in table 2. The ‘average rank’ is the average of ranks¹⁷ for

¹⁵ Except Gosaba, a demarcation of forest land is observed in all other blocks in the islands: Patharpratima, Kultali, Basanti and Sagar. 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). Census of India data suggests that Namkhana block in other Sundarban region marked a distinct reduction in the forest cover area by the magnitude of 47 percent in the last decade. However, three blocks of islands (except Kultali) also experiences a decline in forest cover area, but the extent of decline is much lower than Namkhana block (see table A.2).

¹⁶ Nature of employment opportunity in Gosaba block differs significantly depending on the consideration of work force participation rate or non-farm employment. It is evident that 45 percent (highest participation across blocks in the district) of the total workers are involved as main and marginal workers, whereas engagement of workers in non-farm employment is only 22 percent (lowest across blocks) (see table A.3).

¹⁷It also signifies the relative differences in the score associated with the ranks in four regional categories.

blocks combined under three categories of regions (except the first category-Gosaba block). It can be suggest that Sundarban region (including other island blocks) perform satisfactorily in terms of ecological security status, but laggard behind the rest of the district in economic efficiency and social equity. Interestingly, island blocks perform fairly well in ecological, economic and social dimensions of sustainable livelihood in comparison to other Sundarban region. However, Gosaba block marked a distinct achievement in economic efficiency in the district (due to the contribution of agricultural productivity, work force participation rate), but perform miserably poor in the ecological and social security indicators. It is ultimately reflected in the placement of Gosaba block in the lower stratum of sustainable livelihood security (21st 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) warrants SSE interventions in the following development priorities:

- Ecological security: mangrove afforestation work, improvement in net area under effective pisciculture.
- Economic efficiency: restoration work in the aqua system, improvement in pisciculture productivity, exploration of non-farm employment.
- Social equity: upliftment of asset deprivation households.

Evaluation of Social and Solidarity Organizations in the Study Region: Compliance with the SSE Shared Vision Principles

Mapping of the region provides us an opportunity in identifying the regional specific problems (ecological, economic, and social equity concerns) and the scope for social intervention by the SSE initiatives. In the light of these ‘conditions of necessity’, this paper seeks to evaluate SSE initiatives (ecological conservation measures, economic sustainability measures, and social development services) in addressing such regional specific needs. In addition to such measures, this paper incorporates two other organizational level SSE shared vision principles (socially responsible governance, and edifying values). Table 4 presents a brief description on the practices undertaken by the four SSE cases in compliance with the SSE shared vision. Depending on official responses on their achievement in the indicators of SSE principles, organizations are assigned with a perception score in the assessment grid (presented in table 4). However, authors’ discretion usually applies in modifying the records of their perception score to maintain parity in the scorecard of the organizations.

In the study region, SSE intervention created alternative sources of income generation (livestock rearing, fishery, eco-tourism, conservation work, nursery work at afforestation site) and sustainable value chain in mangrove ecosystem. Community participatory approach is followed through formation of voluntary groups (EDCs and PEHC), and community-based women self-help groups (NEWS, SANGRAM). The core functionality of the SSE organizations in the study region is presented in the appendix table A.4. However, an analysis on the SSE cases in compliance with SSE vision principles is summarized as follows:

Socially responsible governance: even though participation of local community is common in the governance framework of the organizations, but variations in the targeted section of poor women locals marked a difference. The scale of operation facilitates NEWS and EDCs in ensuring participation of a large section of women population in their project network. Formation of grass root level environment protection groups, Mangrove Stewardship and SWARDS, acts as voluntary monitoring organizations, which supervises the progress of project activities undertaken by NEWS¹⁸ and SANGRAM. Bereaved families are given priority in becoming a member of SWARDS constituted by SANGRAM. The sharing of profits (i.e. disbursement of wages, earning from fishery and tourism, distribution of usufructuary benefits of forest products and eco-development benefit) among stakeholders is seen practiced across organization level.

¹⁸The 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).

Edifying values: SSE cases in the study area upheld ethical values in their organizational practices. In value creation, NEWS excels in maintaining 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 fund). Social value generation has been given a centre stage a livelihood fund is a non-profit organization, which does not market, sell, or make any profit out of carbon offset (Wylie et al., 2016). Adopting SHG principles in mangrove nursery (especially NEWS and SANGRAM) signifies embedded sharing values in their organizations. Following co-management principles in PEHC ensure local community to share revenue in return for their services. Collective dimension particularly in terms of pooling financial resources (i.e. common fund) is a unique characteristic of EDCs.

Social development services: All four SSE cases not only engaged in social development works, mangrove restoration and alternative livelihood generation (fishery, livestock rearing, organic farming, integrated farming, sericulture, eco-tourism), but they also provide other marketing services (NEWS promoted Badabon farmers Producer Company in association with Sufal Organic; SANGRAM facilitates marketing of fish, crabs), training (NEWS, SANGRAM, EDCs), capacity building handholding programme (NEWS), publication of an environmental journal (PEHC) for the development of social and solidarity ecosystem of the beneficiaries.

Ecological conservation measures: SSE cases in this study have a common objective to mitigate impacts of climate change in the region. In addition to promoting eco-tourism activities, PEHC involves in protecting horse shoe crab, which can explore opportunity in marine biotechnology and pharmaceuticals (one of the promising activities in blue economy¹⁹) in the coastal wetland of Sundarbans in future. Other conservation measures of SSE include restoring mangrove plantation (NEWS, SANGRAM, PEHC, EDCs), reducing biotic dependence 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.

Economic sustainability: generation of non-farm sector employment is the common practice of all the SSE initiatives to supplement the income of the stakeholders. Distribution of livelihood financing by NEWS as a payment of work increases income of the beneficiaries. Given the fact that fishing is the second important source of livelihood opportunity in Gosaba block, SANGRAM initiative in revival of the aqua system by the construction of community pond not only facilitates in direct employment in community pond, but also helps in undertaking agricultural activities. Livestock rearing is another source of livelihood opportunity exercised by EDCs through formation of women SHGs. In augmenting livelihood opportunities, NEWS maintains collaboration with other partner NGOs (viz. Nandi Foundation) and linking with Government schemes to promote backyard poultry farming.

Table 3: Organization wise Shared Vision of Social and Solidarity Principles

Indicator (SDG being addressed)	NEWS	SANGRAM	PEHC	EDCs
1. Social governance (SDG 5, 16)	-Livelihood project embedded a community participative model	-Ensure maximum involvement of the local communities	- Engaging local stakeholders (i.e. actual forest users)	-Members, elected by the local villagers, are ordinarily

¹⁹ Blue Economy is a concept addressing economic activities that not only reduce wastes, but also increase the community's economy (Bidayani et al., 2016). Empirical evidences reveals an untiring efforts made by SSE change agents 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.

	(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) - Engage the community in the implementation process at every level through intense stakeholders meeting. SHG meeting	through decision making and management - SWARDS largely comprises of members of bereaved families of those killed in tiger attacks, tiger widows, survivors in tiger attacks and other villagers - Profit earning from fishing in community pond is distributed among shareholders	in decision making, planting, monitoring, and usufruct sharing processes - Profit earning from tourism is distributed among stakeholders.	economically backward people ²⁰ living in the vicinity of the protected areas. -At least 30% of the elected members are women. - Getting usufructuary benefits of forest products ²¹ - Eligible for 25% share of Government receipts - Distribution of usufructuary and eco-development benefit are discussed in the Annual General Meeting
2. Edifying values (SDG 16)	- Balancing between the financial value of carbon credits and the value created for local communities - Sharing values follows SHG principles -Create sustainable value chain mangrove ecosystem with participatory approach involving communities -Embraces Stewardship model to build ownerships of local communities - Established a producer company for the Mangrove stewards	- Caring for each other's or solidarity - Sharing values follows SHG principles - Ownership of organic cultivation besides community pond - Folk dispensaries	- Responsibility and accountability -Follow co-management mechanism ²² in sharing revenue with villagers in return of their services	- Moving from a conventional top-down forest management to the community based conservation -Collective mechanism of maintaining a common fund ²³
3. Social development services (SDG 1, 2,	- Augmenting livelihood opportunities through linking with Government Schemes ²⁴	- Providing finance for livestock rearing, inputs for organic farming	- Eco-tourism provides an alternative income source to the	-Revenue of EDCs are used for development work ²⁵ - Govt. organizations

²⁰ More than 92% of elected members belong to scheduled caste and tribes (see table A.1).

²¹Each member of the EDC retains 100% share of intercrop, 100% share of thinning produce & firewood, sharing profit of the sale value of final harvest of timber and poles, and goods and services generated by community benefits oriented village eco-development activities in equal proportion.

²²Co-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.

²³EDC has an account in bank/post office maintaining a common fund by deposits from the members and/or other source.

²⁴ NEWS initiative in linking with schemes of Animal Resource Department, Govt. of West Bengal for backyard poultry farming ensure sustainable income generation streams.

10, 13)	<ul style="list-style-type: none"> - 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"> - Facilitating marketing of fish, crabs - Counselling, technical assistance to SHG members 	<ul style="list-style-type: none"> villagers (one permanent boat driver) - Publication of a popular journal on environmental issues 	<ul style="list-style-type: none"> were actively involved in training and orientation of SHGs target groups²⁶
4. Ecological conservation measures (SDG 12, 13, 14, 15)	<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 vacant (<i>Chor</i>) land - 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 are good sources for domestic fuel wood - Introduce cheaper, climate resilient and natural farming practices 	<ul style="list-style-type: none"> - Planted nearly 4 lac plants of mangrove - Diversify newly planted saplings and seedlings of mangrove trees - Facilitates in protecting horse shoe 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
5. Economic sustainability (SDG 8)	<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 	<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 	<ul style="list-style-type: none"> - Employment diversification towards non-farm sector (especially eco-tourism) - Collect honey, crabs in a bulk quantity from local 	<ul style="list-style-type: none"> - EDC also encouraged local women to form self-help groups²⁷ - EDCs also help impoverished people to find temporary employment with the

²⁵ Development works are construction of irrigation canals, jetties, community halls to organize any public meeting, digging tube -wells to supply drinking water, building of brick paths, and distribution of van-rickshaws etc.

²⁶NABARD, DRDC and some NGOs along with officers of some line departments, eg, Rural Development, Health, Animal Resource Development Department, Sericulture, Agriculture, Fishery etc. and local authorities were actively involved training and orientation of SHGs target groups.

²⁷These groups were supplied goats, chicken and ducks to run their small businesses.

	payment for work for increase income of the beneficiaries.	explored possibilities of agriculture	population to sell to the eco-tourists	Forest Department as cook in the patrolling boats.
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Source: Author's compilation based on the document analysis and official responses

Document analysis and a systematic enquiry on the current practice of SSE cases provide an opportunity in identifying the gap between the shared vision and concrete practices of the organizations. Evaluation results on the performance score of the SSE cases (as presented in table 4 and figure 2) is based on the responses of the representative of the organizations in the primary survey. The recorded responses are suitably modified to examine objective differences in their actual performance. Evaluation evidences reveals that the average score of four SSE cases practiced in the study region varies significantly from a low score of 0.9 (lowest possible score is 0) to a high score of 1.6 (highest possible score is 2). The smaller difference in the average score is observed on the edifying values and economic sustainability. More important differences are however observed on the social governance, social development services and ecological conservation method (figure 2). Interestingly, all other SSE initiatives are still weak on these three principles (which marked as a source of differences in performance level) in comparison to NEWS. One general conclusion emanates from the analysis is that non-government organizations (NEWS, SANGRAM, PEHC) did comparatively well than government controlled voluntary organizations (EDCs). Findings 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' (Datta, 2018²⁸). However, variations in the scorecard of NGOs can be explained by their scale of operation (national vis-à-vis neighbourhood region), level of financial assistance, and range of activity levels.

Table 4: Organization wise Assessment Grid on Social and Solidarity Principles

Principles/Indicators	NEWS	SANGRAM	PEHC	EDCs
1. Social governance	2	1.3	1	1
1.1 Participation of marginalised communities, especially women	2	2	2	2
1.2 Profit sharing among the stakeholders	2	1	1	1
1.3 Democratic participation of members in annual meeting	2	1	1	0
2. Edifying values	1	1.5	1.5	1.5
2.1 Caring for each other's or solidarity, sharing, collective dimension, responsibility and accountability, value creation	1	1	1	2
2.2 Strives to meet the need and right of socially disadvantaged in the ownership and management	1	2	2	1
3. Social development services	2	1	1	.6

²⁸Evaluation of performance of EDCs suggest that out of 14 EDCs, 4 are very active, 3 as active, 4 as less active, 3 as not active. Dayapur and Sonagaon of SWSR range emerge as the EDCs with highest score. However, Satyanarayanpur and Bijoy nagore EDCs of NPW range had scored very poorly and appeared as not active. There is a marked difference in the functioning of EDCs in SWSR vis-à-vis NPW range. Performance of EDCs in SWSR range is quite satisfactory than EDCs in NPW range. This is probably related to the fact that beside less dependence on timber oriented economy, increased eco-tourism activities and consequent revenue generation had led to better performances in SWLS. Also, greater participation in social forestry by planting fruit-bearing trees in villages and creation of aquaculture ponds with rainwater harvesting facility in farmlands had reduced the dependence on forestry within sanctuaries and hence resulting in a better performance of this range (Dutta, 2012, p.128).

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
4. Ecological conservation measures	2	2	0.5	0.5
4.1 Preserving biological diversity in a community participatory manner	2	2	1	1
4.2 Imbibing recycling and reuse strategies	2	2	0	0
5. Economic sustainability	1	1	1	1
5.1 Promoting entrepreneurial activities for the poor	1	1	1	1
5.2 Distributing financial benefits to the poor and socially disadvantaged	1	1	1	1
Total score	20	16	12	11
Average score	1.6	1.3	1	0.9

Source: Author's compilation based on the suitable modification of the official responses

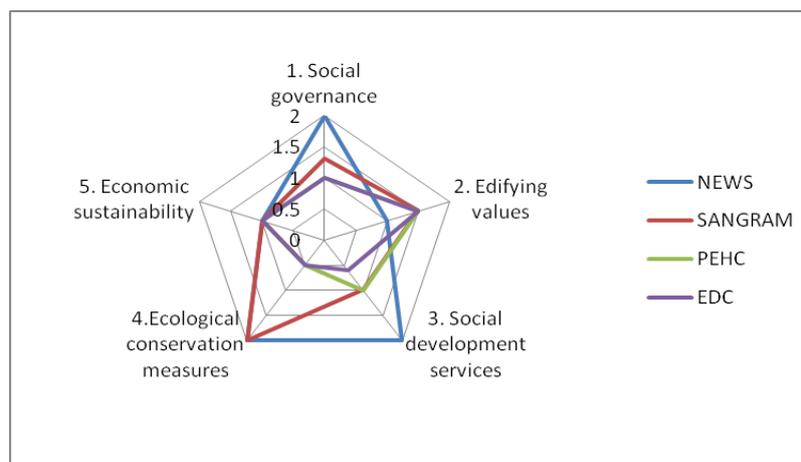


Figure 2: Comparison of the Score of the SSE Initiatives in the Shared Principles

Conclusion

This paper examines the role of SSE actors in localising SDGs in mitigating challenges of climate change in the context of Gosaba block of Indian Sundarbans. Selection of Gosaba block is primarily rests on the coexistence of alternative institutional forms of SSE actors, viz. non-profit organizations (NEWS, SANGRAM, PEHC) and state sponsored voluntary organization (EDCs). Mapping of the study region identifies ecological security and social equity as a development priority, which warrants effective SSE intervention. Specifically, 'conditions of necessity' in Gosaba block centres on restoration of mangrove ecosystem and exploration of non-farm sectors (specifically pisciculture) to provide livelihood opportunity of asset deprivation households in the region. Under this backdrop, this paper evaluates the role of SSE change agents in mitigating climate change challenges in Gosaba block through generation of alternative livelihood opportunity of the forest dependent population to reduce biotic pressure of the mangrove forests. On this count, empirical evidences on the practices of SSE cases suggest that non-governmental organizations (NEWS, SANGRAM, PEHC) embedded shared vision principles effectively in their development works in comparison to state sponsored voluntary organizations (EDCs). 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. At their current development stage, the underlying factors determining SSE performance in this study region are closely linked with the factors influencing performance of other SSE initiatives in Asian countries (Quinones, 2013; 2014).

Appendix

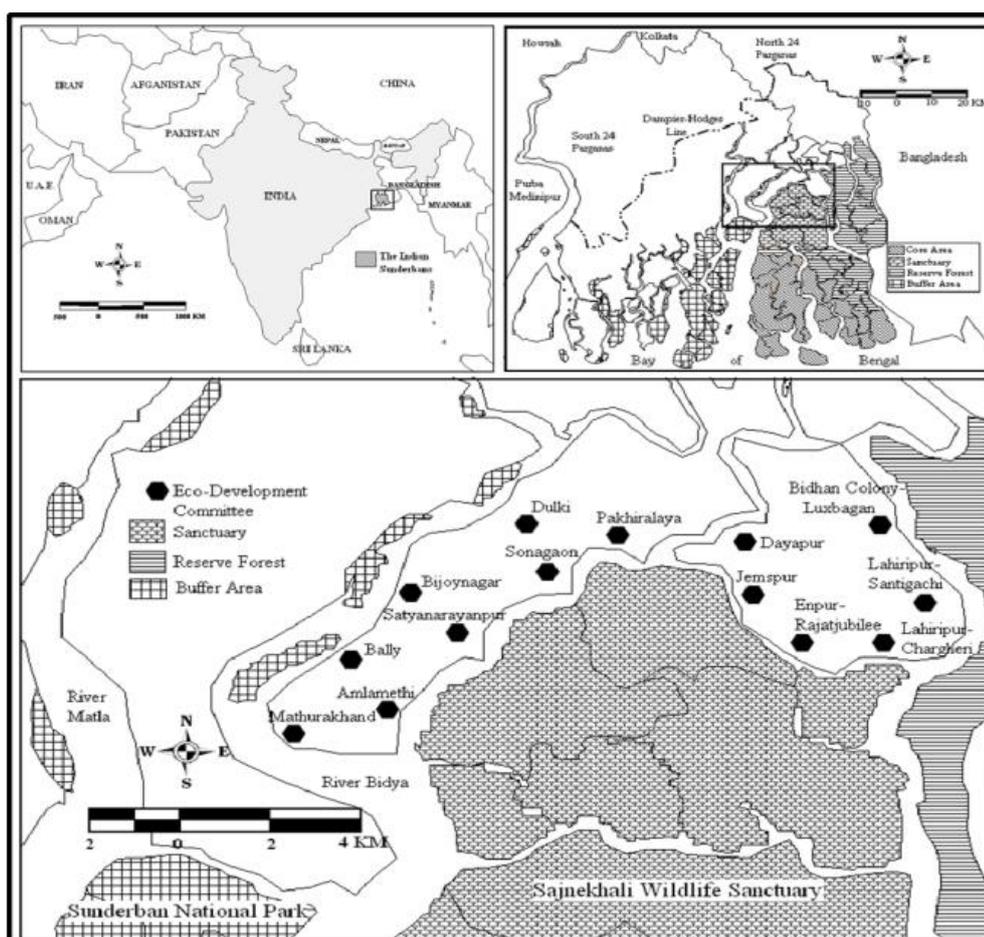


Figure A.1: Location Map of EDCs²⁹ in the Study Region

Table A.1: Profile of EDCs in the Gosaba Block of Indian Sundarbans

Name of the EDCs	General category	Scheduled caste	Scheduled tribe	Total members	Forest Protected Area (in hec.)
Sajnekhali Wildlife Sanctuary Range (SWSR)					
Dayapur	--	319	7	326	960
Pakhiralaya	76	441	--	517	480
Dulki	--	189	--	189	640
Sonagaon	--	68	--	68	700
Jemspur	1	346	--	347	650
Lahiripur-Chargheri	--	328	--	328	2000
Bidhan Colony-Luxbagan	12	197	18	227	520
Lahiripur-Santigachhi	--	328	--	328	2400
Enpur-Rajatjubilee	--	155	--	155	700
Total (SWSR)	89	2371	25	2485	9050
National Park West (NPW) Range within STR					
Bijoynagar	76	389	6	471	680

²⁹ See Dutta (2010), p. 270. The map is reproduced in this paper with the due permission taken from the author.

Mathurakhand	62	419	38	519	550
Satyanarayanpur	5	554	21	580	800
Amlamethi	24	138	8	170	500
Bally	72	176	10	258	770
Total (NPW)	239	1676	83	1998	3300
Total (SWSR & NPW)	328	4047	108	4483	12350

Source: Sundarban Biosphere Reserve (http://www.sundarbanbiosphere.org/html_files/eco-development_committees.htm)

Table A.2: Changing Statistics of Forest Cover in the Last Decade (2001-11)

Name of Block	Forest cover (in hectare) 2011	Forest cover (in hectare) 2001	Area change per decade (in %)*
Islands blocks			
Kultali	3744.3	3744.3	0
Basanti	3638	3860	-5.75
Sagar	280.1	298.4	-6.13
Patharpratima	5232.7	5826.5	-10.19
Total	12895.1	13729.2	-6.08
Other Sundarban blocks			
Namkhana	901.3	1714.6	-47.43
South 24 Parganas	13796.4	15443.8	-10.67

Source: Census of India, 2001, 2011

Note: * implies the estimated figures on the decadal change in the forest area of the blocks

Table A.3: Indicator wise Analysis of Sustainable Livelihood Security

Dimensions	Indicators	Gosaba	Other island-blocks around forest boundary	Other Sundarban blocks	Rest of South 24 Parganas
Ecology security indicators (ESI)	Percentage of cultivable area to total area (in %)	78.11	68.62	82.04	73.00
	Percentage of net pisciculture area to total area (in %)	10.81	11.63	17.95	11.34
	Percentage of forest area to total area (in %)	0.00	9.83	0.53	0.00
Economic efficiency indicators (EEI)	Cereal yield (in kg./hect.)	2831.80	2314.93	2416.18	2450.21
	Pisciculture labour productivity (in qtl./persons)	1.66	5.57	6.01	7.12
	Work participation rate (in %)	45	40	35	35
	Non-farm employment (in %)	22	25	41	60
Social equity indicators (SEI)	Female literacy (in %)	71.22	68.14	67.21	71.68
	Asset worth households (in %)	48.72	63.25	60.50	71.15

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

Table A.4: Core Functionality of the SSE Organizations in Study Area

Criteria	NEWS	SANGRAM	PEHC	EDC
Type of organization	Non-profit organization	Non-profit organization	Non-profit organization	Voluntary Organization
Headquarter	Kolkata, West Bengal	Mayurbhanj, Orissa	Lahiripur, South 24 Parganas, West Bengal	Forest department, Govt. of West Bengal
Starting year of operation in Gosaba (i.e. study region)	2010	2011	2010	1998
Scale of operation	National	National	Neighbourhood	State
Members	-42 paid employee, -32 voluntary members	20-25 voluntary members	8 voluntary members	4483 members
Running projects at Gosaba	1. India-Sundarbans Mangrove restoration project 2. Supporting Enterprises 3. Rehabilitation and Protection of Tropical Mangrove Ecosystem	1. Managing Man Tiger Conflicts and Conserving Tigers in Indian Sunderbans by Restoring Mangrove Bio Diversity with Community Participation	-No specific project. -Activities include eco-tourism, mangrove restoration, livelihood promotion	Activities include community development, alternative livelihood generation, fencing of the forest boundary
Funding opportunity (External and Internal)	-Grants for specific projects (Livelihood fund through carbon financing, ABN-AMRO Bank)	-Grants for specific projects (Rufford grant), -Other sources of internal fund generation	-Earning from eco-tourism activities, -Individual donors	-State government share 25 percent of tourism income -Maintaining a common fund by deposit from members and/or other source.
Major barriers	-Obtaining grants suitable for particular purpose -Shortage of business skills -Shortage of human resource dedicated to work with technical as well as community perspective	-Bringing about attitude change of the beneficiaries -Local political intervention	-New sources of charitable fund -Local political intervention	-Misusing govt. fund in distributing benefits to local people -Overlapping institutional arrangements -Ineffective enforcement apparatus -Male dominated elitist institutional arrangement -Analogous to state machinery in general and

				ruling political groups in particular -Inactive participation in the meetings and activities of institutions ³⁰
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Source: Author's compilation based on the document analysis and official responses

³⁰ See Dutta (2012)

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