INDIA SUNDARBANS MANGROVE RESTORATION

Document Prepared By NEWS& UNIQUE forestry and land use

Project Title	India Sundarbans Mangrove Restoration
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1 INTERNAL RISK

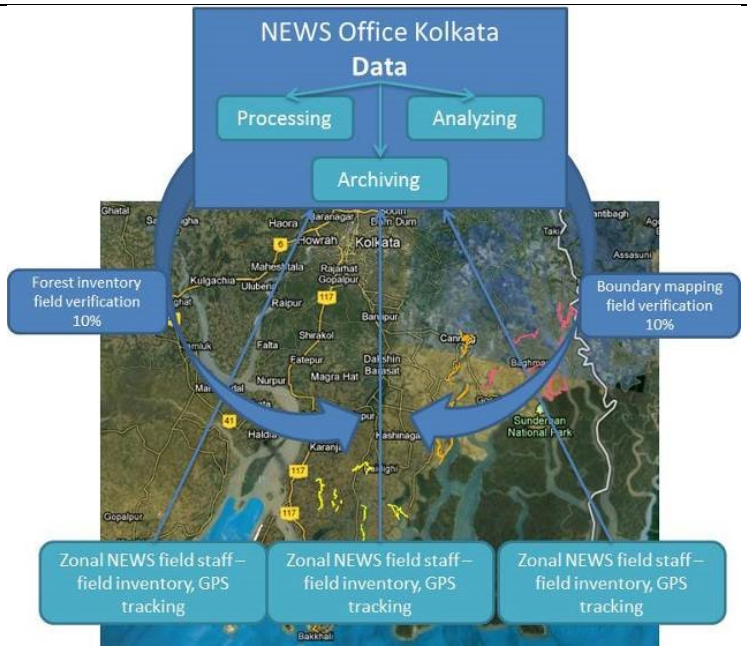
<table>
<tr><th colspan="3">Project Management</th></tr>
<tr><th>Risk Factor</th><th>Risk Factor and/or Mitigation Description</th><th>Risk Rating</th></tr>
<tr><td>a)</td><td>Species planted (where applicable) associated with more than 25% of the stocks on which GHG credits have previously been issued are not native or proven to be adapted to the same or similar agro-ecological zone(s) in which the project is located.
The Sundarbans is the world's largest mangrove forest and a unique ecosystem. There are several types of mangroves in this region. Species selection for the project has been done as described in the Project Description. The species being planted are dominated at approximately 80–90% by Avicennia species. Other species include: Rhizophora, Bruguiera, Ceriops, Xylocarpus, Excoecaria, Aegiceras and Aegialitis species. All of these are native species. Barik and Chowdhury (2014) undertook a study that described true/native mangrove species of the Sudarbans Delta. All the species being planted in this project are included in that list – shown below – as native/true mangrove species from the Indian Sundarbans region:

<table>
<tr><th>FAMILY</th><th>GENUS</th><th>SPECIES</th><th>VOUCHER NO.</th><th>IUCN STATUS</th></tr>
<tr><td rowspan="10">Rhizophoraceae</td><td rowspan="3">Bruguiera</td><td>cylindrica Blume</td><td>CBES403</td><td>Least Concern</td></tr>
<tr><td>gymnorhiza Lamk.</td><td>CBES456</td><td>Least Concern</td></tr>
<tr><td>parviflora Wt. and Arn.</td><td>CBES459</td><td>Least Concern</td></tr>
<tr><td rowspan="3">Ceriops</td><td>sexangula Poir</td><td>CBES460</td><td>Least Concern</td></tr>
<tr><td>decandra Ding Hou /roxburghiana Arn.</td><td>CBES471</td><td>Near Threatened</td></tr>
<tr><td>tagal Robinson/candolleana Robinson</td><td>CBES472</td><td>Least Concern</td></tr>
<tr><td rowspan="2">Rhizophora</td><td>apiculata Blume/conjugata Arn.</td><td>CBES507</td><td>Least Concern</td></tr>
<tr><td>mucronata Lamk.</td><td>CBES549</td><td>Least Concern</td></tr>
<tr><td>Kandelia</td><td>candel Druce</td><td>CBES664</td><td>Least Concern</td></tr>
<tr><td rowspan="3">Sonneratiaceae</td><td rowspan="3">Sonneratia</td><td>apetala Buch. Ham.</td><td>CBES692</td><td>Least Concern</td></tr>
<tr><td>caseolaris Engler</td><td>CBES598</td><td>Not Listed</td></tr>
<tr><td>griffithii Kurz.</td><td>CBES538</td><td>Critically Endangered</td></tr>
<tr><td>Combretaceae</td><td>Lumnitzera</td><td>racemosa Willd.</td><td>CBES612</td><td>Least Concern</td></tr>
<tr><td rowspan="3">Meliaceae</td><td rowspan="2">Xylocarpus</td><td>granatum Koen</td><td>CBES588</td><td>Least Concern</td></tr>
<tr><td>mekongensis Pieree</td><td>CBES476</td><td>Least Concern</td></tr>
<tr><td>Aglaia</td><td>cuculata Pellegrin</td><td>CBES440</td><td>Data Deficient</td></tr>
<tr><td rowspan="3">Avicenniaceae</td><td rowspan="3">Avicennia</td><td>alba Blume</td><td>CBES518</td><td>Least Concern</td></tr>
<tr><td>marina vierh.</td><td>CBES432</td><td>Least Concern</td></tr>
<tr><td>officinalis L.</td><td>CBES504</td><td>Least Concern</td></tr>
<tr><td>Plumbaginaceae</td><td>Aegialitis</td><td>rotundifolia Roxb.</td><td>CBES621</td><td>Near Threatened</td></tr>
<tr><td>Sterculiaceae</td><td>Heritiera</td><td>fomes Buch. Ham.</td><td>CBES556</td><td>Endangered</td></tr>
<tr><td>Myrsinaceae</td><td>Aegiceras</td><td>corniculatum Blanco</td><td>CBES484</td><td>Least Concern</td></tr>
<tr><td rowspan="2">Palmae/Arecaceae</td><td>Nypa</td><td>fruticans Wumb.</td><td>CBES579</td><td>Least Concern</td></tr>
<tr><td>Phoenix</td><td>paludosa Roxb.</td><td>CBES614</td><td>Near Threatened</td></tr>
</table>
Source: Barik and Chowdhury (2014) [1]</td><td>Not applicable</td></tr>
</table>

[1] Barik, J., and Chowdhury, S., 2014. True mangrove Species of Sundarbans Delta, West Bengal, Eastern India. Chek List 10(2): 329-334. URL: http://www.checklist.org.br/getpdf?SL137-13

b)	**Ongoing enforcement to prevent encroachment by outside actors is required to protect more than 50% of stocks on which GHG credits have previously been issued.** One of the most important tasks in this project is the empowerment of communities and collaboration with all relevant stakeholders to replant/restore and maintain the mangrove ecosystem based on a good understanding and appreciation of the importance of the ecosystem. To this end, NEWS is working very closely with both local communities and other stakeholders in and around the project in the following ways: • Consultation and sensitization of communities, and inquiry of community support for mangrove restoration. • Affirmation of support though consultations, discussions and agreements with *Panchayats* (i.e. community governance institutions) as follows: o Discussions and community orientation on the project, its objectives, benefits and community needs o Periodic meetings are held with the community to further explain the project objectives, orient communities, discuss benefits, obligations and understand community needs o Consent to undertake the project in every concerned village and group formation from the village people to participate/implement the project activities. o Agreements are signed for execution of the project in the village concerned. o Democratic election of representatives from the village to supervise the project activities. • Community meetings, awareness camps to organize seed collections, nursery preparations, and plantations as well as to appoint local guards from the community for patrolling/monitoring of the restoration/planting sites. • Management of degradation drivers: (a) illegal grazing: supporting communities to grow fodder grass in homesteads; planting '*Subabul'* trees along the embankments; (b) fuelwood consumption: introduction of smokeless *challah* (cook stoves) to reduce fuelwood consumption and dependence on mangroves; (c) continuous awareness raising activities for mangrove protection: street plays, and skits on mangrove protection with school children, etc. With all stakeholders: • Continuous networking with all stakeholders concerned about mangrove protection, namely: regular Panchayat meetings, *Bon-o-Bhumi Raksha* Committee meetings, meetings with policymakers at all administrative levels such as district magistrate, environment secretary, sub divisional officers, block development officers, sub divisional police officers to update and coordinate the mangrove restoration and conservation activities. • Strong cooperation with National Green Tribunal, Eastern Zone to enforce	Not applicable

	and monitor regulations for mangrove protection and conservation, and to reduce potential for reclamation and change in land use of the mudflats in Sundarbans. All these activities constitute a very strong effort from NEWS to ensure that all stakeholders from within and around the project area are directly involved in and aware of the positive impact of the project. Therefore, ongoing enforcement to prevent encroachment by outside actors is not required.	
c)	**Management team does not include individuals with significant experience in all skills necessary to successfully undertake all project activities (ie, any area of required experience is not covered by at least one individual with at least 5 years experience in the area).** The project implementing entity – Nature Environment & Wildlife Society (NEWS) – has been working on restoration of habitats and wildlife conservation in the Indian Sundarbans for more than 20 years. NEWS and the project management team (including Ms. Ajanta Dey and Mr. Dibyajyoti Chatterjee) have also been involved in the development of several projects and studies of conservation. For example, since 2008, NEWS is involved in mangrove restoration project called "Sustainable Livelihood and Mangrove restoration in Four Forest Finge villages of the Sundarbans Biosphere Reserve" funded by the Royal Bank of Scotland.	Not applicable
d)	**Management team does not maintain a presence in the country or is located more than a day of travel from the project site, considering all parcels or polygons in the project area.** NEWS has their main office in Kolkata, less than 4 hours by car from the start of the Sundarbans. All project areas are located about 4-5 hours' journey from the office of the management team. NEWS further has zonal project coordinators in each of the project zones which are based permanently in these zones responsible for all project activities including community sensitization, plantation campaigns and monitoring (with continuous support from the management team in Kolkata). The graph below exemplarily shows the management structure of the monitoring, which is the same structure as for project planning and implementation.	Not applicable

		
e)	**Mitigation: Management team includes individuals with significant experience in AFOLU project design and implementation, carbon accounting and reporting (eg, individuals who have successfully managed projects through validation, verification and issuance of GHG credits) under the VCS Program or other approved GHG programs.** The project developer (NEWS) and the project proponent (Livelihoods Fund) both have developed the capacity to design this AFOLU project, account for carbon removals, and report and participate in validation and verification under respective VCS methodology and standard requirements. The Livelihoods Fund has established a strong network among all Livelihoods AFOLU projects to improve overall management, implementation, carbon accounting, evaluation, validation and verification processes. To achieve these goals, constant follow-up and support is organized for all projects funded by Livelihoods Fund[2]. The Fund has also developed a standardized project carbon monitoring process including monitoring of other benefits (livelihood impacts). This has been institutionalized within this and other projects funded by Livelihoods Fund, and are disseminated through joint monitoring training workshops, online conferences and online blogs. The structure below illustrates the general Livelihoods monitoring process, which all projects including this one, follow:	-2

[2] URL: http://www.livelihoods.eu/livelihoods-network.html

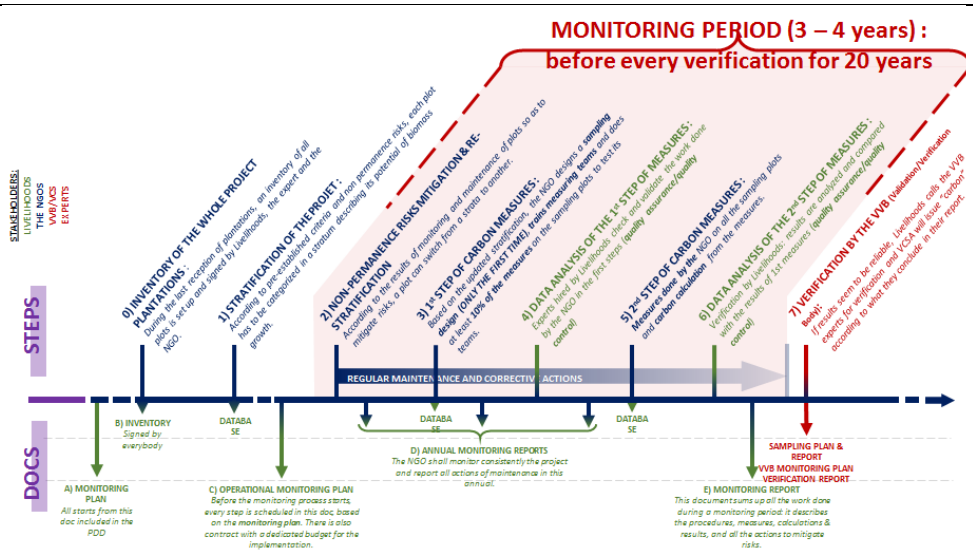
	 Therefore, there is significant experience in AFOLU projects to successfully accomplish this project.	
f)	**Mitigation: Adaptive management plan in place** The project has adaptive operational, monitoring, roll out, feedback, supervisory, and internal control systems in place. As shown in the summary of the standardized project carbon monitoring process in e) above, there is also a strong monitoring and evaluation system that is implemented in the project to assess progress and identify bottlenecks to successful project implementation. Measures to deal with such bottlenecks including non-permanence risk mitigations are then devised and implemented. In addition, at the start of the project activities in each site, there is a systematic process of identifying eligible planting plots/sites through extensive consultations with the community governance institutions. In this way, suitable species and restoration activities – either planting or natural regeneration are selected and applied to meet the site conditions. Being a community driven restoration project, periodic Participatory Rural Appraisals are conducted in the different areas and with all actors involved. The contact with the different actors is continuous and any comments, concerns are analyzed and incorporated in micro-management of the mangrove restoration plots. NEWS further conducts periodical risk analysis in the different plots where the project takes place. NEWS analyzes different risks concerning the plantations such as fishing activities, grazing, felling, prawn seed collection, insect attack, wave action and the accretion by sand or silt.	-2

	 Figure PRA discussion with communities on plantation management With regards to hydrological monitoring, studies of salinity, pH, and water levels of the river system is conducted periodically, to ensure that the plantation activities do not have any influence in the river dynamics as well as to adapt project implementation to any natural changes occurring. Office coordinators of the project realize periodic assessments within the five different zones of the project, and analyze all potential matters related to the project. In addition, NEWS through its network established a scientific collaboration with local mangrove scientists in Kolkata as well as international mangrove think tanks such as IUCN. These experts continuously support the project in the frame of feasibility assessments, recommendations and best practices guidance. This holistic project M&E system is well-documented and archived in the head quarter in Kolkata, the documents are available as supporting documentation. Besides all this evaluations, external plantation audits are commissioned periodically by the Livelihoods Fund to assess that the project and the plantations is performing under the best practices methods in line with the contract agreements between NEWS and Livelihoods	
Total Project Management (PM) [as applicable, (a + b + c + d + e + f)] Total may be less than zero.		**-4**

Financial Viability

Financial Viability		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Project cash flow breakeven point is greater than 10 years from the current risk assessment	Not applicable
b)	Project cash flow breakeven point is between 7 and up to less than 10 years from the current risk assessment	Not applicable
c)	**Project cash flow breakeven point between 4 and up to less than 7 years from the current risk assessment** Breakeven point has been calculated to be reached in 6 years from the current risk assessment, as indicated in the cash flow supporting document.	1
d)	Project cash flow breakeven point is less than 4 years from the current risk assessment	Not applicable
e)	Project has secured less than 15% of funding needed to cover the total cash out before the project reaches breakeven	Not applicable
f)	Project has secured 15% to less than 40% of funding needed to cover the total cash out required before the project reaches breakeven	Not applicable
g)	Project has secured 40% to less than 80% of funding needed to cover the total cash out required before the project reaches breakeven	Not applicable
h)	**Project has secured 80% or more of funding needed to cover the total cash out before the project reaches breakeven.** The Livelihoods Fund is paying for the full cost of this project based on a performance contract, i.e., the cost required to establish a plantation or restore 1 hectare. Other costs such as project validation and verification are covered fully and separately by Livelihoods Fund. Funding for the project has been secured through a performance-based agreement, i.e., Carbon Emissions Reduction Agreement signed between Livelihoods Fund and NEWS. The NEWS – Livelihoods contract agreements are available as supporting documentation. Before breakeven the project will secure more than 80% of the investments done by Livelihoods (see next section i)	Not applicable
i)	**Mitigation: Project has available as callable financial resources at least 50% of total cash out before project reaches breakeven** Livelihoods Fund, the project financier, has sufficient financial resources to cover total cash out till the project reaches breakeven, and even beyond. The Fund's ability and commitment is demonstrated by the agreement it signed with NEWS (Carbon Emissions Reduction Agreement) in which the Fund will cover all project development costs. Based on the cash flow analysis done in March 2015, the total investment of the Fund for the project will be around 1,9 Mio Euros, and in year 1 more than 50% of the investment was done. During	-2

	breakeven more than 80% is already invested. This was confirmed in the last Livelihoods board of investors meeting in Dec 2014.	
Total Financial Viability (FV) [as applicable, ((a, b, c or d) + (e, f, g or h) + i)] Total may not be less than zero.		**0**

Opportunity cost

Opportunity Cost		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	NPV from the most profitable alternative land use activity is expected to be at least 100% more than that associated with project activities; or where baseline activities are subsistence-driven, net positive community impacts are not demonstrated	Not applicable
b)	NPV from the most profitable alternative land use activity is expected to be between 50% and up to100% more than from project activities	Not applicable
c)	NPV from the most profitable alternative land use activity is expected to be between 20% and up to 50% more than from project activities	Not applicable
d)	**NPV from the most profitable alternative land use activity is expected to be between 20% more than and up to 20% less than from project activities; or where baseline activities are subsistence-driven, net positive community impacts are demonstrated.** Based on the recently published World Bank Report 'Building Resilience for Sustainable Development of the Sundarbans' (2014)[3], the population of the Sundarbans blocks is primarily engaged in subsistence agriculture, and the great majority of farmers are classified as "small" and "marginal," with typical landholdings of less than 1 ha per family. The 2011 household survey found that for more than half of all households in the Sundarbans blocks who owned their own land (55.5 percent), the size of the holding was only between 0.01 and 0.20 ha. Agriculture, fisheries, forestry, and tourism constitute the region's main economic activities, with agriculture and aquaculture standing out as significant drivers of the economy. Under current conditions, these activities have a modest effect on poverty reduction; profit made from selling crops, fish, or other goods is limited because of the isolation of the Sundarbans from markets (Danda 2007). Indeed, many local residents are unemployed or underemployed. The Report further concludes that without efforts to improve the health, education, and skills	0

[3] http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2014/09/02/000470435_20140902103107/Rendered/PDF/880610REVISED00ns000Strategy0Report.pdf

	of the local population, residents of the Sundarbans will continue to face limited opportunities outside the high-risk areas. And when subsistence in the Sundarbans is no longer a viable option, poverty and limited opportunities will drive out residents. The household survey of the Sundarbans blocks found that current population movements are driven in part by limited work opportunities in the Sundarbans, and in part by growing opportunities outside the Sundarbans. Prawn seed collection became very popular and was one of the most stable sources of revenue for the islanders of the Sundarbans and in particular after catastrophic events such as Cyclone Aila little land owned was lost and many women, to prevent their families from starving, resorted to prawn seed collection as they were offered ready cash for the prawn seed they collected. On the other hand prawn seed collection is one of the main drivers for mangrove degradation and is a highly destructive practice with a high by-catch rate that results in the capture and discards of non-target species and exerts a heavy toll on the sustainability of marine, estuarine, and freshwater fish species. The Department of Fisheries and Aquaculture (2007) reports for every tiger prawn seed collection, the average number of other destroyed species is as follows: 318 (other prawns), 8 (fish), 60 (crabs), 1 (mollusc), 13 (unidentified), that is, total 400 of others (World Bank 2014). For this reason, shrimp farming and prawn seed collection with illegal dykes along the mudflats, thus destroying and encroaching mangroves is totally illegal and considered as an unsustainable practice as per the Coastal Aquaculture Guidelines of Government of India. It is clearly stated that a minimum of 100 m distance from the High tide line during the Spring tide has to be maintained for such activity. However, some illegal encroachments take place. In this context, it may be noted that the National Green Tribunal, Eastern Bench in its order dated 20th February 2015, has strongly urged the Government to take steps to stop such activities and demolish the dykes that have already been built in this way. The Government has formed a high powered Committee to this effect. It is understood that with policy enforcements, these stray cases will be reduced. Nevertheless, NEWS with its livelihoods and community approach is intended to bring about net positive community impacts both in the short run and on a long term basis. • Supporting communities to grow fodder grass in homesteads and planting '*Subabul'* trees along the embankments. This will provide better opportunities for animal rearing and improving quality and productivity of livestock. • Fuelwood: through introduction of smokeless *challah* (cook stoves) to reduce fuelwood consumption and dependence on mangrove. *Challah* has other benefits including reduction in indoor pollution, which subsequently improves respiratory health. • The restoration of degraded mangroves will improve conditions of fisheries resources in the Sundarbans. As research indicates, restored and properly functioning mangroves ecosystem provides huge amounts	

	of fishery resources[4]. • Through the Livelihoods Network, NEWS is receiving constant support from other organizations on income generating activities (IGAs) and alternative livelihood approaches. For instance, Naandi Foundation, which is among the most experienced NGOs in creating alternative livelihoods for marginalized people and tribes in India, visited the NEWS project in April 2015 to explore IGAs.	
e)	NPV from project activities is expected to be between 20% and up to 50% more profitable than the most profitable alternative land use activity	Not applicable
f)	NPV from project activities is expected to be at least 50% more profitable than the most profitable alternative land use activity	Not applicable
g)	**Mitigation: Project proponent is a non-profit organization** Livelihoods Fund SICAV SIF is a carbon fund, who does not market, sell or make any profit with the carbon offsets. It merely distributes them to its investors, as confirmed in a letter from the Financial Director of Livelihoods Venture provided as supporting documentation. They work together with NEWS, who is an environmental charity (NGO) registered with the government of India	-2
h)	**Mitigation: Project is protected by legally binding commitment to continue management practices that protect the credited carbon stocks over the length of the project crediting period (see project longevity).** The grouped project longevity will be greater than the crediting period. Once restored, the sites while be maintained without harvesting or thinning of the planted/naturally regenerated trees as use of mangroves timber is illegal in the Indian Sundarbans. The project area is legally designated as a protected area. Hence, there is binding commitment that provides long-term protection to the credited carbon stocks as the site is legally protected from any harvesting (removals). The land use of the project area is also clearly defined by the Land and Forest Protection Committee (Bhumi Raksha Committee) and local Panchayats - for the type of activity being undertaken in this project. NEWS elaborated a Financial and Management Plan stating the overall project longevity and shared this plan with the forest department which is the main authority concerning the protection of mangrove trees in the Sundarbans (see also section 'Project longevity')	-2
i)	Mitigation: Project is protected by legally binding commitment to continue management practices that protect the credited carbon stocks over at least 100	Not applicable

[4] Rahman, M. S., (undated). Ecology and management of Sundarban: A Rich Biodiversity of the World's Largest Mangrove Ecosystem. URL: http://marineworldheritage.unesco.org/wp-content/uploads/2012/01/India-Sundarban-Ecology-and-management-2007-english.pdf

	year.	
Total Opportunity Cost (OC) [as applicable, (a, b, c, d, e or f) + (g + h or i)] Total may not be less than 0.		**-4***

***** According to the "Errata and clarifications" dated 24 July 2014 (c.f. http://www.v-c-s.org/sites/v-c-s.org/files/Errata%20and%20Clarifications%2C%20AFOLU%20Non-Permanence%20Risk%20Tool%2C%20v3.2_0.pdf), the instructions in the final row of the Opportunity Cost table shall be read as, "Total may be less than 0."

Project Longevity

Project Longevity		
a)	Without legal agreement or requirement to continue the management practice	Not applicable
b)	**With legal agreement or requirement to continue the management practice**. The project area is legally designated as a protected area. Harvesting is prohibited. It is a legal requirement to protect and maintain the planted/naturally regenerated trees. The land use is also legally defined by the Land and Forest Protection Committee (Bhumi Raksha Committee) and local Panchayats. Together with the continued presence of NEWS, and its collaboration with the local and regional governments, protection and management of the site can be guaranteed. Beyond this, the management and financial plan of the indian Sundervans Mangrove Restoration Project (document provided as supporting documentation) guaranteed the continuity of the project at least the entire project life, since project identification until 50 year after project start (2010-2060). This plan has been shared with the Forest Department representing the legal authority for enforcing the legal protection of mangroves in the Indian Sundarbans. The plan states that 'the implementation period of the project (2010-2016) is described in detail in the contracts between Livelihoods and NEWS (it includes 5 years of tree planting, then the counting process starts in 2013). This management plan has an application period of 50 years since the starting date of the project (2010-2060), which describes: after the first monitoring campaign, a first period of ten years (2015-2024) is covered by a contractual agreement signed between Livelihoods and NEWS to support capacity buildings of farmers, surveillance and progressive gain of autonomy; the next 20 years (2025-2044) are covered by the same agreement which will be renewed every ten years, at least 2 times. The final period (2045-2060) is regarded as the community self-efficiency phase where the additional income from activities developed with the communities. Communities have a clear interest in the protection and maintenance of the plantations even beyond 50 years due to the revenue generation. Nevertheless, this period might also be covered by further contractual agreements, based on the carbon credits generated during that period'.	0
Total Project Longevity (PL)		**5**

May not be less than zero	

Internal Risk	
Total Internal Risk (PM + FV + OC + PL) Total may not be less than zero.	**(-4)+0+(-4)+5** **Total = 0**

2 EXTERNAL RISKS

Land Tenure and Resource Access/Impacts		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Ownership and resource access/use rights are held by same entity(s)	Not applicable
b)	**Ownership and resource access/use rights are held by different entity(s) (eg, land is government owned and the project proponent holds a lease or concession)** As described in section 1.12.1 of the Project Description, NEWS selected suitable planting areas which are owned by the government, and land use is defined by the Land and Forest Protection Committee (Bhumi Raksha Committee) and local Panchayats. The communities have also embraced the mangrove restoration project. They have recognized the potential benefits generated out of such plantations, including use mangroves as a bio-shield, increased biodiversity, to protect embankments, increased productive use e.g. fishing, and increased new income generating options. They have agreed that the rights on the carbon credits generated by this restoration are exclusively allocated to the project proponent.	2
c)	**In more than 5% of the project area, there exist disputes over land tenure or ownership.** Due to the careful selection process of the project areas (as described in the Project Description section 1.12.1), access/use rights are clearly defined. Disputes over land tenure or ownership do not exist.	Not applicable
d)	**There exist disputes over access/use rights (or overlapping rights).** Due to the careful selection process of the project areas (as described in the Project Description section 1.12.1), land tenure/ownership is clearly defined. Disputes over access/use rights (or overlapping rights) do not exist.	Not applicable
e)	**WRC projects unable to demonstrate that potential upstream and sea impacts that could undermine issued credits in the next 10 years are**	Not applicable

irrelevant or expected to be insignificant, or that there is a plan in place for effectively mitigating such impacts.

As explained in the PD of this project, this is not a project claiming for GHG emission reductions and is not a typical WRC project as described in section 4.2.19. (is not a RWE_a project restoring or managing water table depth, nor a REW_b project avoiding peat fires, and nor a CIW project).

As a mangrove ARR and restoration project in the Sundarbans scattered over a large area on many mudflats and river banks (average size is 12 ha), there is a continuous connectivity with adjacent areas. Naturally, the dynamic hydrology of the world's largest river delta is always changing the characters and conditions of mudflats leading to the erosion and accretion patterns. The Ganges-Brahmaputra-Megha system is the second largest hydrological system after the Amazon covering 1.75 Mio km^2 with 644 Mio people and a surface run-off of 1.350 billion m^3.

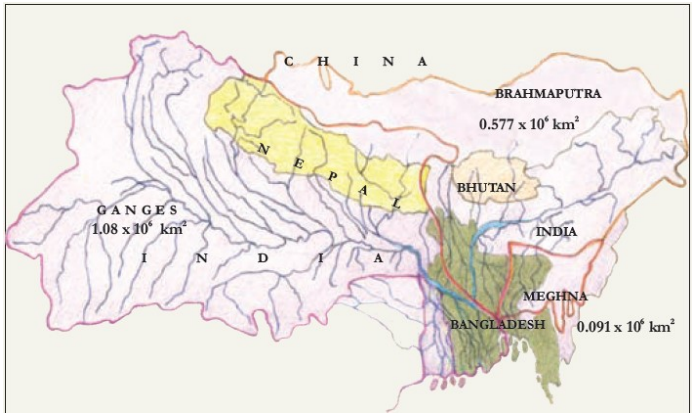


Figure The Ganges-Brahmaputra-Megha system

As a result of large-scale hydrological changes the Indian Sundarbans has lost large areas due to erosion as well as new areas have emerged. As a result of up-stream anthropogenic impacts, salinity is increasing due to reduction in the critical minimal supply of fresh water such as the Farakka barrage, tectonic eastward tilt, delinking of creeks, pollution of main rivers with perennial fresh water sources due to industrial garbage dumping, sewage, as well as the impact of climate change. These baseline anthropogenic impacts heavily influenced the hydrology negatively within the Sundarbans and play an important role in the continuous degradation of the natural mangrove ecosystems.

Against this background, NEWS has developed a robust and scientific based procedure to identify low risk plantation areas, see further information on this approach in section 'geological risks', and in the PD (section 2.2 under VCS AFOLU eligibility requirements) as well as the supporting documentation. As a result, the project areas of NEWS are located not in the high risk zones of

	erosion as can be seen in the maps below under geological risk. Nevertheless, this risk of erosion has been considered and quantified below under natural risks. As a result of the general large scale hydrological changes the only hypothetical impact would be the decrease in stocks in carbon pools due to an increase of tree mortality, for instance if erosion at a particular NEWS sites causes loss of planted mangrove biomass. The wide distribution of NEWS plantation parcels is mitigating a significant loss and significant increase on GHG emissions in relation to those expected in the baseline.	
f)	**Mitigation: Project area is protected by legally binding commitment (e.g., a conservation easement or protected area) to continue management practices that protect carbon stocks over the length of the project crediting period.** As afore-mentioned, the project area is designated as a protected area. Once restored, the trees will not be harvested or removed as they are legally protected from such actions.	-2
g)	Mitigation: Where disputes over land tenure, ownership or access/use rights exist, documented evidence is provided that projects have implemented activities to resolve the disputes or clarify overlapping claims	Not applicable
Total Land Tenure (LT) [as applicable, ((a or b) + c + d + e + f + g)] Total may not be less than zero.		**0**

Community Engagement		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	**Less than 50 percent of households living within the project area who are reliant on the project area, have been consulted.** NEWS conducted wide consultations involving mobilizing community members via the village governing institutions (*Panchayats*). These consultations involved all villages in and around the project area and are organized through the *Panchayats*. When selecting sites/plots for the project, a systematic process of consultation is also undertaken in the area. As a result, households are willingly participating in the project activities, e.g., in collection of seeds, nursery raising, plantation and livelihood activities.	Not applicable
b)	**Less than 20 percent of households living within 20 km of the project boundary outside the project area, and who are reliant on the project area, have been consulted** The consultations described in a) above included villages, which are both within	Not applicable

	and around the project area.	
c)	**Mitigation: The project generates net positive impacts on the social and economic well- being of the local communities who derive livelihoods from the project area** The project generates net positive impacts on social and economic well-being of the local communities. This is achieved through provision of alternatives and solutions to the exploitations of the mangrove forest and allied resources, which are mostly illegal under current legal framework. In addition a due diligence review of the project undertaken by Dr Jack Ruitenbeek (Consultant to IUCN), Somenath Bhattacharyya (Senior Wetlands Advisor, Institute of Environmental Studies and Wetland Management, Kolkata), and Dr Lalit Banerjee (Mangrove Wetland Specialist, Joint Director (retired) Botanical Survey of India) concluded that project activities will contribute positively to wetland restoration through mangrove afforestation in a multi-species environment…socio-economic benefits are positive to direct beneficiaries…long-term economic benefits include protection of embankments, enhancement to alternative livelihoods, and a direct economic stimulus in areas where subsistence farming has recently been compromised by increased salinity of agricultural soils. Further the review stated that 'the project would qualify for 9 of 9 required criteria and 2 of 3 optional "Gold Level" criteria under the Climate, Community and Biodiversity Alliance Standard. The full due diligence document is available as supporting documentation.	-5
Total Community Engagement (CE) [where applicable, (a + b + c)] Total may be less than zero.		**-5**

Political Risk		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Governance score of less than -0.79	Not applicable
b)	Governance score of -0.79 to less than -0.32	Not applicable
c)	**Governance score of -0.32 to less than 0.19** The governance score has been calculated based on the Worldwide Governance Indicators database. The score for the last five years (2009-2013) is -0.318. **WGI indicator** / **India - Mean (2009-2013) score (-2.5 to +2.5)** Control of Corruption: -0.54 Government Effectiveness: -0.07	2

	Political Stability and Absence of Violence/Terrorism	-1.26		
	Regulatory Quality	-0.39		
	Rule of Law	-0.07		
	Voice and Accountability	0.42		
	Total	**-0.318**		
d)	Governance score of 0.19 to less than 0.82			Not applicable
e)	Governance score of 0.82 or higher			Not applicable
f)	**Mitigation: Country implementing REDD+ Readiness or other activities such as:** **e) The country has an established DNA under the CDM and has at least one registered CDM A/R project.** India has an established Designated National Authority under the CDM and has at least 14 registered CDM Afforestation/Reforestation project[5]. This project has received a Letter of Approval from the DNA.			-2
Total Political (PC) [as applicable ((a, b, c, d or e) + f)] Total may not be less than zero.				**0**

External Risk	
Total External Risk (LT + CE + PC) Total may not be less than zero.	**0+(-5)+0 =-5** **Total = 0**

3 NATURAL RISKS

Fire (F)	
Significance	According to the Fire Information for Resource Management Systems of the International Association of Wildland Fire (IAWF), the project area has not experienced any large scale fires for over 20 years (1995-2015). The IAWF Fire Information for Resource Management Systems maps of fires are based on datasets provided by the U.S. National Aeronautics and Space Administration (NASA)[6]. Therefore, fire risk in the area is rated as insignificant.

[5] URL: https://cdm.unfccc.int/Projects/projsearch.html

[6] URL: http://www.iawfonline.org/

Likelihood	According to the State Action Plan on Climate Change for West Bengal[7] fire is not considered as risk to the Sundarbans.
Score (LS)	Not applicable
Mitigation	Fires occurrences are monitored in the project; if they occur, they will be managed using patrol guards and communities involvement.

Pest and Disease Outbreaks (PD)	
Significance	NEWS performs as part of their M&E system regular risk assessments for each plantation area; where risks of several factors such as fishing, grazing, felling, prawn seed collection insect attack, wave action and sand deposition are rated. Exemplarily, 93% of the plantation areas were rated as either no insect attack or very insignificant insect attack for the years 2014 and 2015.
Likelihood	Real outbreaks of pests and diseases that affect mangroves are uncommon in the project area and unlikely to affect significant shares of the project areas due to the scattered nature of the project sites. Nevertheless, a likelihood of less than 10 years is conservatively assumed.
Score (LS)	5
Mitigation	The project is restoring the site using mixed multi-species approach. The species used are also native, therefore, well adapted to the site conditions. Both aspects drastically reduce the likelihood and extent of impact of large-scale pest and disease outbreaks. In addition the project has a disease and pest management plan to deal with any potential pests and diseases risks as well as periodically monitors any pest and disease outbreaks as part of the NEWS plantation risk M&E system M = 0.5

Extreme Weather (W)	
Significance	As summarized in the recently published World Bank report 'Building Resilience for Sustainable Development of the Sundarbans' (2014)[8], of all of the natural hazards, cyclones are the most severe and routine occurrences striking the Sundarbans. While cyclones forming in the Bay of Bengal constitute only 5–6 percent of the global total number of cyclones, they are the deadliest of all the cyclones, accounting for roughly 80–90 percent of global loss of human life and property.3 The Sundarbans is in the most cyclone-prone region in India, having

[7] http://www.moef.nic.in/downloads/public-information/West-Bengal-SAPCC.pdf

[8] http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2014/09/02/000470435_20140902103107/Rendered/PDF/880610REVISED00ns000Strategy0Report.pdf

	experienced 90 cyclonic storms between 1891 and 1994, of which 35 were classified as "severe." Between 1970 and 1996, 41 cyclones were formed in the Bay of Bengal, and six of them had severe impacts in the Sundarbans region. This is further evidenced in the State Action Plan on Climate Change for West Bengal[9]. However, mangrove forests are considered as the most important bio-shield against catastrophic cyclone events; a cyclone that lands on the 'Sundarbans causes less damage compared to the likely damage caused the cyclone of equal magnitude lands on the central and eastern part of the coast because of the mangrove forest[10]. Mangroves can lessen the damage caused by cyclones and other storms. Therefore, mangrove restoration activities are considered important climate change adaption and natural risk (cyclone as well as erosion and waves) mitigation actions as described in the State Action Plan on Climate Change for West Bengal and the World Bank report. Further, mangrove systems themselves are inherently adaptable and are, thus, intrinsically not necessarily at risk (World Bank Report 2014, page 131). They can play a role in coastal defense and disaster risk reduction per kilometer of mangrove width. Conservation and restoration of mangroves can contribute to a risk reduction strategy against storm surge inundation and damage. Therefore the significance can be considered quite low for this project activity. Mangrove trees planted in the project are native trees and, therefore, adapted to extreme weather experienced in the area. Mangrove can reduce storm surge water levels by slowing the flow of water and reducing surface waves. NEWS has been present in the region for several years and has experienced that after tropical storms, some mangrove zones were damaged, but most of mangroves showed even better growth performance after cyclones or high wave events due to higher nutrient deposition. Generally, according to Saenger (2008)[11], less than 1% of the trees are damaged during the storms in mangrove plantations with 3-5 m tall, and most of these had recovered within 6 months. NEWS always assessed as part of the intensive site selection procedure not only sites with erosion risk but also the survival probability after extreme weather events. Therefore mangrove damage in this project is considered conservatively as insignificant.

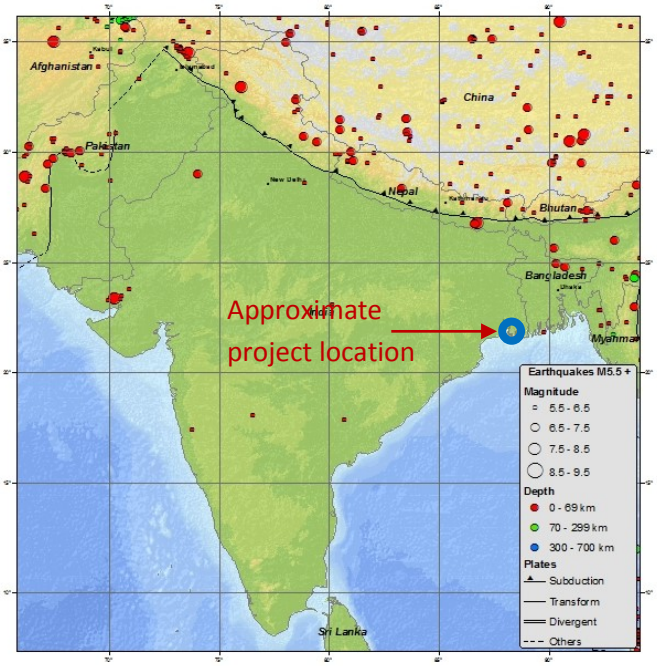
[9] http://www.moef.nic.in/downloads/public-information/West-Bengal-SAPCC.pdf

[10] Marchand (2008) Mangrove restoration in Vietnam. Deltares

[11] Saenger, P.(2002) Mangrove ecology, silviculture and conservation. Kluwer Academic Publishers

Page 219:
https://books.google.de/books?id=FDXCLuG9ZCcC&pg=PA219&lpg=PA219&dq=mangrove+damage+storm+events&source=bl&ots=nOvrkA5Px2&sig=kEtKaXV-VnUDSikUaiPap250Ua8&hl=de&sa=X&ei=xHU_VaPtNKfiywOco4GwDA&ved=0CCcQ6AEwAA#v=onepage&q=mangrove%20damage%20storm%20events&f=false

Likelihood	The likelihood of cyclone is less than every 10 years according to West Bengal State Action Plan on Climate Change.
Score (LS)	2
Mitigation	Not applicable

Geological Risk (G)	
Significance	Two Geological risks are identified and rated: 1. Earthquakes 2. Erosion of project areas Earthquakes: Earthquakes occur in the region (see likelihood below) but their significance is low with regard to damaging mangroves and causing no significant losses of carbon stocks. Therefore significance category 'insignificant' is chosen. See map below:  Figure Seismicity Map 1900 to 2012 (USGS) showing low earthquake activity and magnitude in the region of this proejct activity Erosion: As already outlined above, erosion may be one of the most important natural risks for the NEWS mangrove plantation and restoration areas. As a result of large-scale hydrological changes, the Indian Sundarbans has lost large areas due to erosion as well as new areas have emerged (see map above under external risks). Mangroves themselves will not prevent the erosion and undercutting that is threatening many of the embankments in the Sundarbans, however, restored mangrove habitat in the newly unprotected lands will contribute to long-term system stability (World Bank 2014 see reference above under

	extreme weather). Therefore, the significance of carbon losses for this project is rated conservatively as 'major', however, this loss of carbon in the range of 25% to 50% of carbon stocks is unlikely given the scattered nature of NEWS plantation plots and the location of the majority of the project areas which are not in the erosion prone areas.
Likelihood	Earthquakes: As can be seen in the map above only one earthquake occurred in the region in the timeframe of 1900 to 2012 with a magnitude of 5.5 to 6.6. Therefore the risk of earthquake is not applicable to this project – LS = 0 Erosion: Since erosion is a continuous process occurring in particular erosion prone sites throughout the Sundarbans, it is very difficult to identify a general likelihood for the NEWS project areas which are scattered. For conservative reasons 'less than every 10 years' is selected.
Score (LS)	20
Mitigation	NEWS invests a lot of effort in the scientific understanding of hydrological environment, to ensure the identification of sustainable and persistent mangrove restoration areas. A criteria based site-selection procedure has been developed by NEWS in collaboration with mangrove experts (IUCN and local scientists). The main documents of reference include due diligence review (DDR) undertaken for the Livelihoods Fund, IUCN and Ramsar Secretariat and the "Report of the Field Survey to Sundarbans during 17th – 19th May, 2011 under Danone Project" (both available on request). In summary project sites are selected based on the following criteria: • Type of substrate: The substrate is analyzed to know if it is prepare to support mangrove species. It should be mud, sandy and / or muck. • Evidence of stability or accretion, either from near shore bathymetry showing shallow slope, or through appearance of pioneering species • Evidence of pioneer grasses or other species on plot or in adjacent areas • Current species present: This is to select the future species to plant. If the relevant species for the project are not present in the region, it may be possible that the biophysical conditions of the site don't allow the survival of the plantation. • Suitable salinity conditions (normal range of 20–30 ppt.) • Daily tidal influences consistent with regional norms (approximately 4–6 meters). Tidal height: Tidal height is an important biophysical control affecting plantation success. Tidal height is an important biophysical control affecting plantation success. • Well protected areas: The selected areas should be well protected from strong waves like coves, lagoons, bays, open areas along rivers, gaps

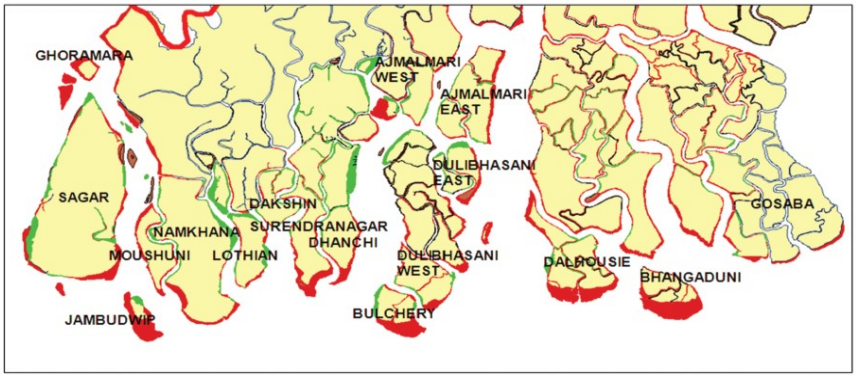
within natural stands, stable mudflat with barrier islands or barnacle free areas.

- Historical / Traditional users of the area: All users of the area should be identified and allowed an opportunity to join plantation programme and share the benefits of the Community Based Forest Management Agreement (CBFMA)

- Adequate local community participation to engage in a planting and 20 year maintenance/ monitoring scheme involving around 2500 saplings per hectare, generally with first 2–3 rows from the low tide level along the river bank with the species of Avicennia and middle to the inner sides of the mudflat by Rhizophora and other viviparous species

In particular with regard to erosion and accretion dynamics NEWS studied for each site the hydrology of the rivers and allied sites, bathymetry, soil and water qualities to understand the erosion accretion pattern over a twenty year time, since 1990. Accordingly maps were generated and in consultation with the Institute of Environmental Studies and Wetland Management (IESWM), an autonomous body under Department of Environment, Government of West Bengal the same was prepared. The bathymetry and sediment load played a crucial factor in the determination process. Exemplary maps of the site identification and assessment using sample collection and satellite based land use analysis are provided in the Annex.

Consequently NEWS has selected in particular sites outside of erosion prone areas as demonstrated in the two maps below. The first map shows erosion prone areas occurring over the period of 40 years (1969 – 2009) (WWF 2011)[12]. In contrast to this the locations of the NEWS project areas are marked in red on the second map (Google Earth).



12 http://awsassets.wwfindia.org/downloads/sundarbans_future_imperfect__climate_adaptation_report_1.pdf

Figure Zones of erosion and accretion in the Indian Sundarbans between 1969 and 2009 (WWF 2011)

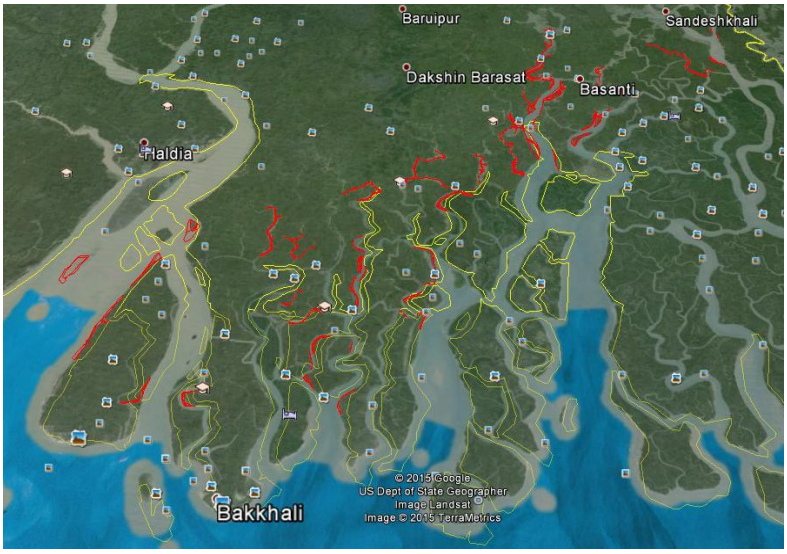


Figure NEWS project areas (in red)

The following conclusions can be drawn from this:

- Areas with a high risk for erosion are located in particlar on areas exposed directly to the sea
- NEWS project areas have been selected in particular within those areas not exposed to larges waves facing the Bay of Bengal.
- Many of the NEWS proejct areas are marked green on the map indicating areas of land accreation.
- Even for Sagar Island, an area more prone to erosion, the NEWS sites are located along those island shores which are not marked red indicating high erosion risk.

This assesment demonstrates that NEWS very carefully selected plantation areas in order to mitigate also the present risk of erosion. Considering this and the fact that well-established mangrove forests –once established and grown mature – will further stabilize the areas on a long run, a mitigation factor of 0.5 is considered.

M = 0.5

Score for each natural risk applicable to the project

(Determined by (LS × M)	
Fire (F)	0
Pest and Disease Outbreaks (PD)	2.5
Extreme Weather (W)	2.0
Geological Risk (G)	10.0
Other natural risk (ON)	0
Total Natural Risk (as applicable, F + PD + W + G + ON)	**14.5**

4 OVERALL NON-PERMANENCE RISK RATING AND BUFFER DETERMINATION

4.1 Overall Risk Rating

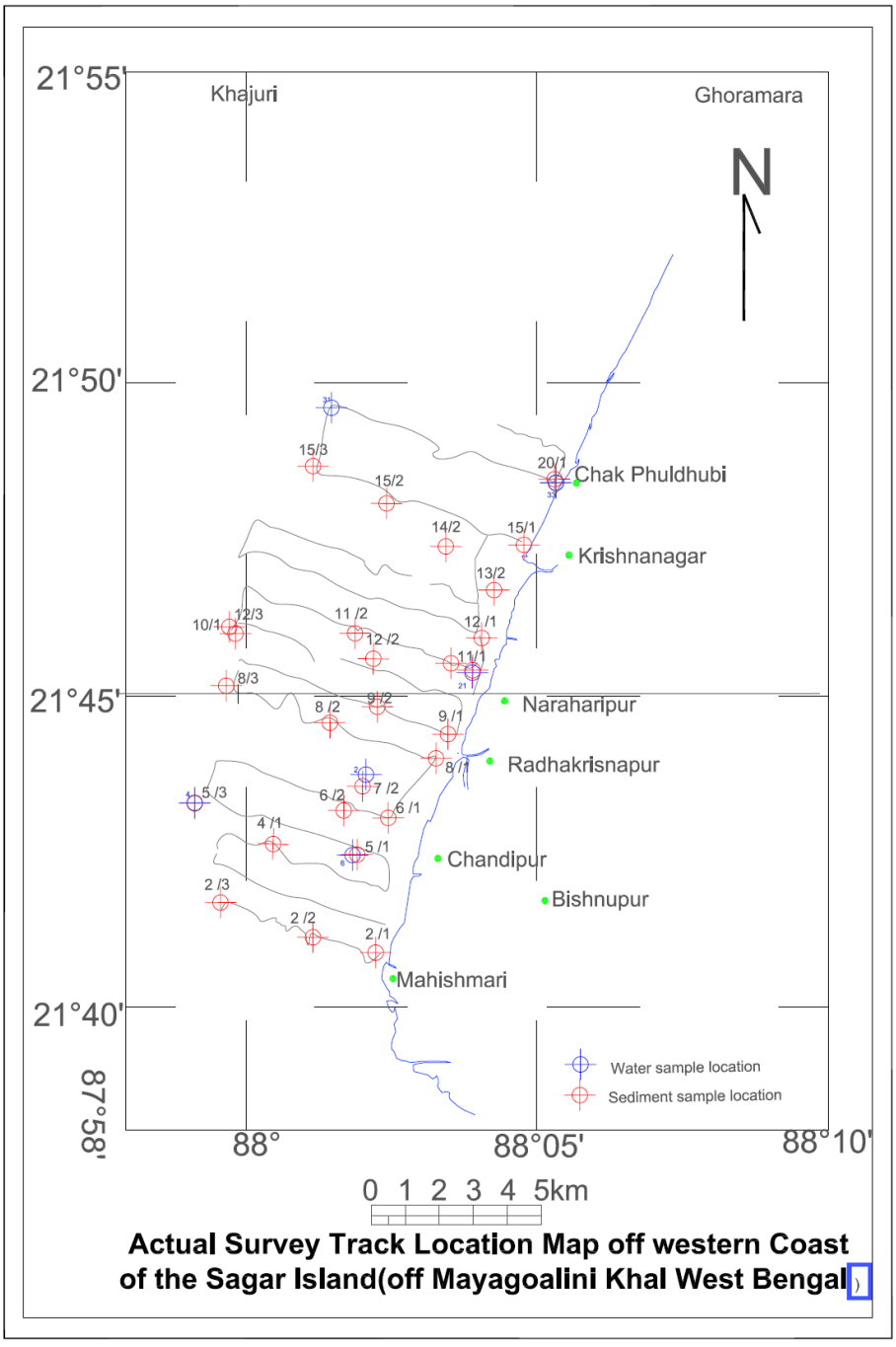
Risk Category	Rating
a) Internal Risk	0
b) External Risk	0
c) Natural Risk	14.5
Overall Risk Rating (a + b + c)	**15**

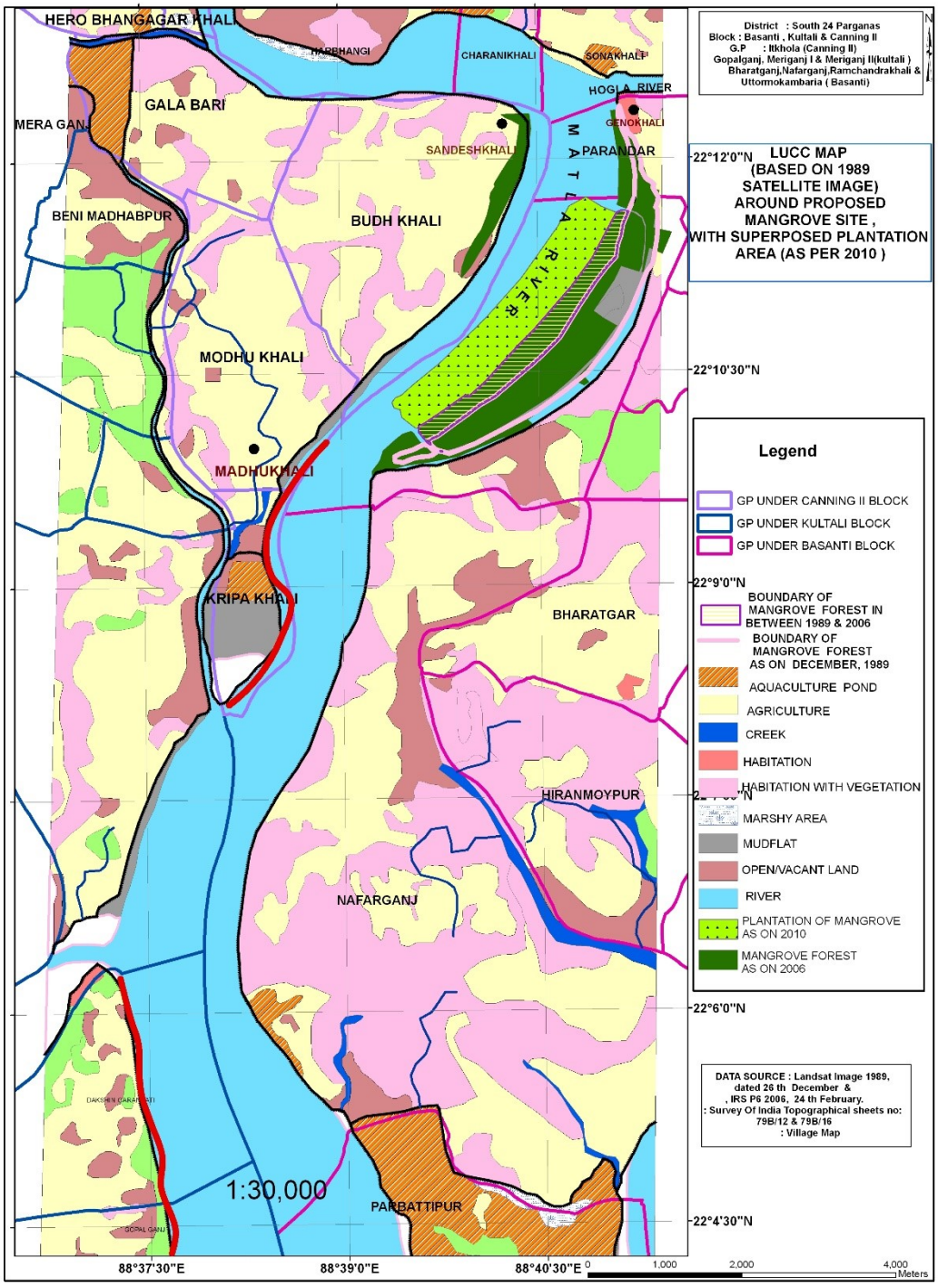
4.2 Calculation of Total VCUs

According to the Non-Permanence Risk tool, the total risk rating shall not be greater than 60. The minimum risk will be always 10. The numbers of buffer credits to be deposited in the AFOLU pooled buffer account results from converting the risk rating into a percentage and multiplying this value by the net change in the project's carbon stock. The carbon stock change for the first verification in this project is 88,331.7 t CO_2-e, therefore the number of buffer credits is 13,250 t CO_2-e (15%). The number of GHG credits eligible to be issued as VCUs for the first project instances of this monitoring period is 75,082 t CO_2-e.

Annex

Example of NEWS site assessment procedure using random sampling (Map 1) and analysis of land use surrounding NEWS plantation sites (Map 2).




HERO BHANGAGAR KHALI
HARBHANGI
CHARANIKHALI
SONAKHALI
HOGLA RIVER
GENOKHALI
GALA BARI
MERA GANJ
SANDESHKHALI
PARANDAR
BENI MADHABPUR
BUDH KHALI
MODHU KHALI
MADHUKHALI
KRIPA KHALI
BHARATGAR
HIRANMOYPUR
NAFARGANJ
PARBATTIPUR
1:30,000
88°37'30"E
88°39'0"E
88°40'30"E
22°12'0"N
22°10'30"N
22°9'0"N
22°6'0"N
22°4'30"N
0
1,000
2,000
4,000
Meters
District : South 24 Parganas
Block : Basanti , Kultali & Canning II
G.P : Itkhola (Canning II)
Gopalganj, Meriganj I & Meriganj II(kultali)
Bharatganj,Nafarganj,Ramchandrakhali &
Uttormokambaria (Basanti)
LUCC MAP
(BASED ON 1989
SATELLITE IMAGE)
AROUND PROPOSED
MANGROVE SITE ,
WITH SUPERPOSED PLANTATION
AREA (AS PER 2010)
Legend
GP UNDER CANNING II BLOCK
GP UNDER KULTALI BLOCK
GP UNDER BASANTI BLOCK
BOUNDARY OF
MANGROVE FOREST IN
BETWEEN 1989 & 2006
BOUNDARY OF
MANGROVE FOREST
AS ON DECEMBER, 1989
AQUACULTURE POND
AGRICULTURE
CREEK
HABITATION
HABITATION WITH VEGETATION
MARSHY AREA
MUDFLAT
OPEN/VACANT LAND
RIVER
PLANTATION OF MANGROVE
AS ON 2010
MANGROVE FOREST
AS ON 2006
DATA SOURCE : Landsat Image 1989,
dated 26 th December &
, IRS P6 2006, 24 th February.
: Survey Of India Topographical sheets no:
79B/12 & 79B/16
: Village Map