

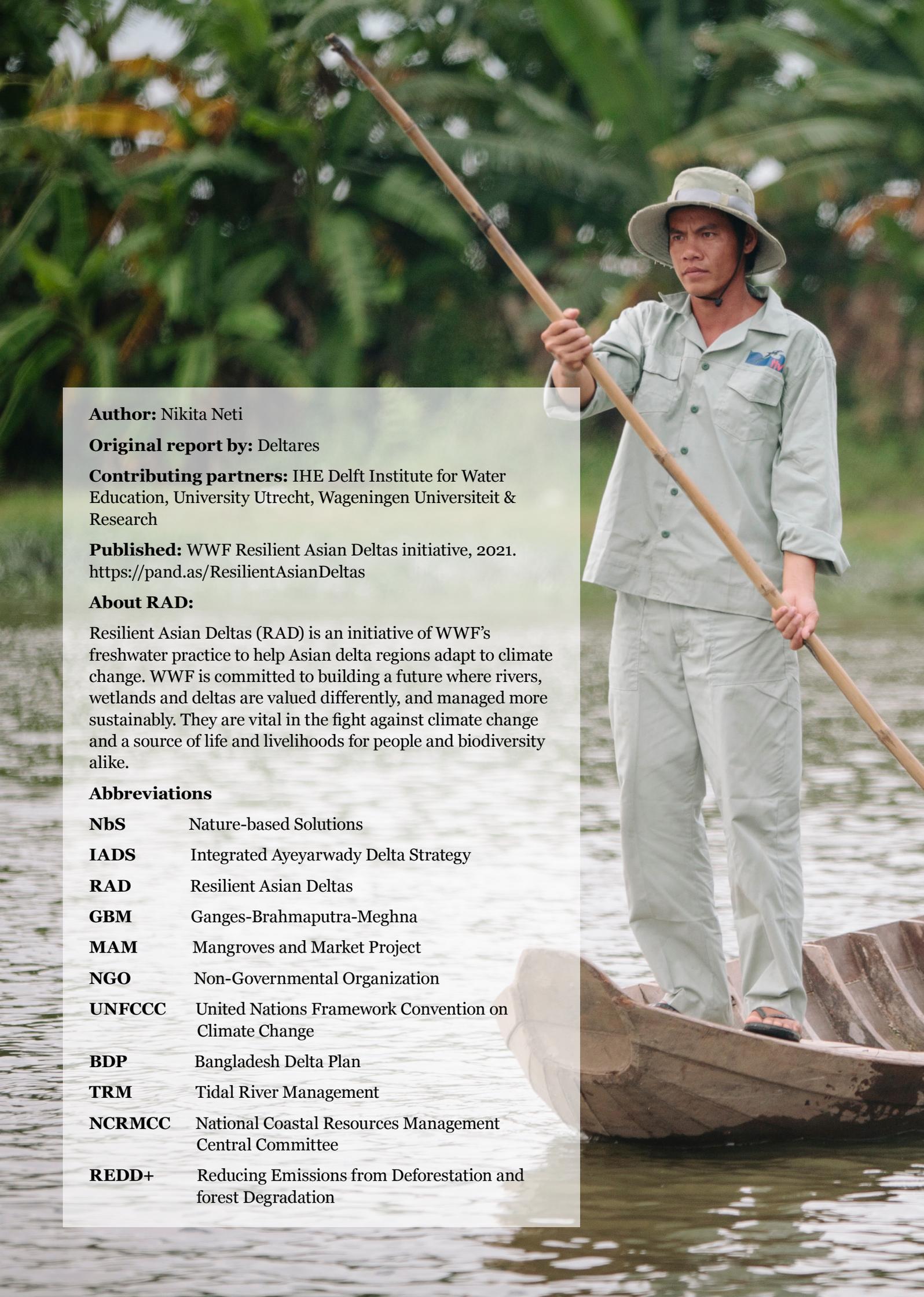


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ASSESSMENT REPORT: IMPLEMENTING AN INTEGRATED LANDSCAPE SYSTEM APPROACH FOR NATURE-BASED SOLUTIONS IN ASIAN DELTAS



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About RAD:

Resilient Asian Deltas (RAD) is an initiative of WWF's freshwater practice to help Asian delta regions adapt to climate change. WWF is committed to building a future where rivers, wetlands and deltas are valued differently, and managed more sustainably. They are vital in the fight against climate change and a source of life and livelihoods for people and biodiversity alike.

Abbreviations

NbS	Nature-based Solutions
IADS	Integrated Ayeyarwady Delta Strategy
RAD	Resilient Asian Deltas
GBM	Ganges-Brahmaputra-Meghna
MAM	Mangroves and Market Project
NGO	Non-Governmental Organization
UNFCCC	United Nations Framework Convention on Climate Change
BDP	Bangladesh Delta Plan
TRM	Tidal River Management
NCRMCC	National Coastal Resources Management Central Committee
REDD+	Reducing Emissions from Deforestation and forest Degradation

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EXECUTIVE SUMMARY

This report is a synthesis of detailed work commissioned from Deltares by WWF's Resilient Asian Deltas Initiative that explores how Asian deltas can benefit from an integrated landscape approach to frame the implementation of Nature-based Solutions (NbS) at scale.¹ NbS are essential to increasing the resilience of riverine and coastal processes, and can help delta regions scale up their adaptation efforts. They are becoming an increasingly popular solution in water management practices, and have been advocated since the late 1990s, when the concept of ecosystem services began to gain traction. Several international organisations, multilateral agencies, and financial institutions now see the potential of NbS, and are exploring ways to implement them on a larger scale. The challenge, however, is that most existing NbS are isolated and project-based, and not integrated into the larger ecosystem, diminishing the impact that they could potentially make.

This report attempts to address this by outlining a roadmap for a landscape approach to NbS in Asian deltas, which will help to build resilience by addressing all three subsystems of these ecosystems - biophysical, institutional and socio-economic. It explores how Asian deltas could benefit from an integrated system approach, and provides recommendations on how to proceed. It builds on already existing information, and ongoing initiatives in Asian deltas to demonstrate the added value of NbS, raise awareness for NbS at delta scale, and provide guidance for the selection of more cost-effective/higher impact NbS in Asian deltas.

This report also compares three Asian deltas to better illustrate how NbS can be upscaled - focusing on the Mekong, Ganges-Brahmaputra-Meghna (GBM) and Irrawaddy. It analyses the three subsystems in these deltas to provide an assessment of their current status, and lays out specific recommendations and conclusions to upscale NbS in these regions. Each delta has its own unique challenges, but they also exhibit significant similarities in the way they are affected by anthropogenic and climate induced changes. Upscaling NbS in Asian deltas will require large-scale systemic transformations in governance, financing and economic processes to ensure that biodiversity and people can adapt to - and be protected from - the worst impacts of climate change. Implementing NbS will also help ensure improved food and water security, health, and a more sustainable path for people and nature that depend on these deltas.

The report makes a strong argument for implementing NbS on a much larger spatial scale, and integrating it into a landscape approach, which addresses both upstream-downstream linkages, and channel-floodplain processes, cumulative impacts but also how different NbS can de-risk one another. It helps to identify challenges that deltas are currently facing in upscaling NbS, and offers solutions to move beyond them. It underscores the importance of adopting a system approach and paying attention to the synergies between different ecosystems, to understand how the larger ecosystem functions as a whole and how this makes it more resilient.

1 Deltares. (2021). Nature-Based Solutions for Resilient Asian Deltas.



WWF INITIATIVE FOCUSED DELTAS



INTRODUCTION: RESILIENT ASIAN DELTAS

Asian deltas are some of the most biodiverse regions in the world. They have a higher than average population growth rate, and are currently home to over 400 million people. They contain some of the world's most productive agricultural land, support significant freshwater and coastal fisheries, sustain dense rural community settlements and mega-cities, and underpin thriving economies.

However, these deltas are under threat from a myriad of factors and are sinking and shrinking at an alarming rate. Deltas are dynamic ecosystems that rely on a sufficient supply of sediment from their rivers to prevent erosion and keep them above the rising seas. Due to human activities like agriculture/aquaculture and conventional flood management infrastructure, natural exchanges between river channels and floodplains have dramatically reduced, preventing sediment from being deposited to compensate for natural compaction. Furthermore, sediment is being trapped behind hydropower dams and extracted by unsustainable sand mining activities, reducing sediment flows to the point where they can no longer sustain these deltas. The reduction of sediment flows also causes incisions in channels, which allows saltwater to further contaminate freshwater reserves, and contributes to large scale riverbank and coastal erosion. Over-extraction of groundwater for cities, industry and agriculture also contributes to the sinking as well as increasing salt water intrusion. All these activities put Asia's great deltas at risk, not to mention the societies, economies and ecosystems that depend on them.

Climate change is exacerbating the challenges faced by Asia's deltas, which are some of the regions most vulnerable to the impacts of our warming world. Climate change will raise sea levels, threatening low lying areas across the deltas, while also fuelling more frequent and extreme storms and more erratic rainfall patterns, which intensify floods, drought and erosion.

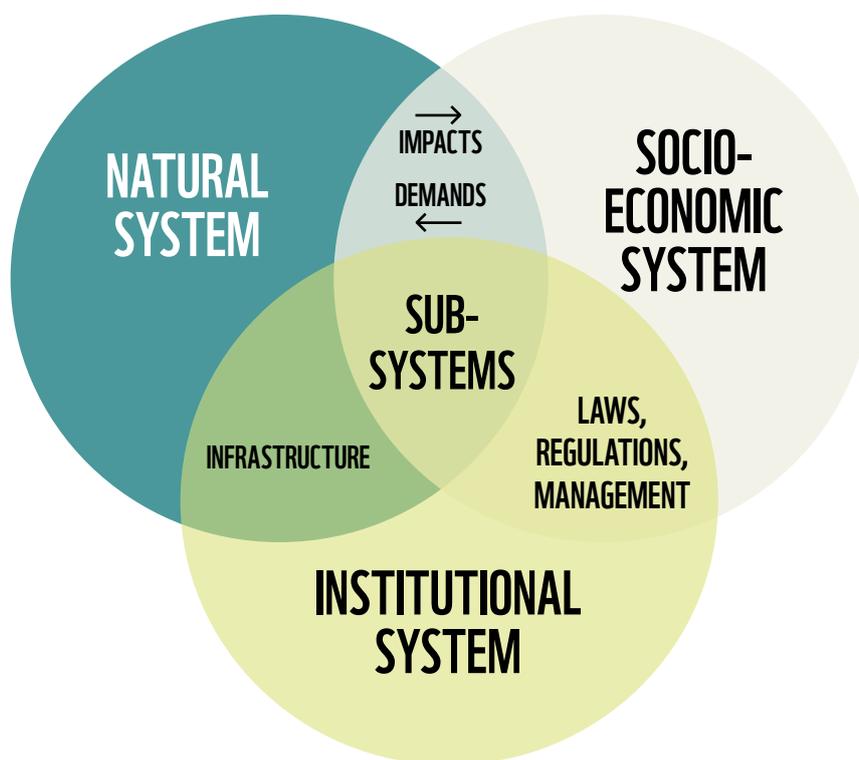
There is an urgent need for partnerships to help the people and nature of Asia's deltas adapt to climate change - such as the Resilient Asian Deltas (RAD) initiative. RAD envisions building the long term resilience of Asia's deltas through strong political support and action, large-scale financial investment in adaptation, and building with nature to protect and restore dynamic river and coastal processes.

Initiated by WWF with support from the Delta Coalition and Delta Alliance, RAD currently operates in six Asian deltas - the Indus, Ganges-Brahmaputra-Meghna, Irrawaddy, Chao Phraya, Mekong and Pearl.

IMPLEMENTING AN INTEGRATED LANDSCAPE APPROACH FOR UPSCALING NbS IN ASIAN DELTAS

An integrated landscape approach refers to governance strategies that attempt to accommodate multiple (and often conflicting) land and river-use practices. These strategies can help to consolidate the needs of people, as well as the environment, and establish more sustainable and equitable multi-functional landscapes, notably avoiding that the optimization of one sector or one area is done at the expense of other sectors and/or other areas.

To access the full benefits of NbS, implementation of these solutions in deltas should be based on a broad upstream-downstream system perspective, which caters to the lateral (channel-floodplain) processes, the vertical exchange between river and groundwater reserves, and sediment cycles. When implemented, they should address aspects of all three interacting subsystems - biophysical, institutional and socio-economic.



(source: Deltares, Jan 2021 report)¹

The traditional 'single' ecosystem focus for NbS will not yield results at the scale necessary to tackle existing and future challenges. An integrated vision for NbS implementation at delta or catchment scale is needed, encompassing river basin and delta management. Successfully addressing delta and river management requires the re-establishment of objectives, and the redesign of governance structures. Institutional collaboration is key to enable large-scale implementation of NbS.

NbS solutions can only deliver the full value of their potential when integrated in a wider landscape planning process. Therefore, upscaling of NbS will depend on the articulation of a long-term vision

¹ Deltares. (2021). Nature-Based Solutions for Resilient Asian Deltas.



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Coordinated upscaling of local NbS projects with multi-sectoral objectives requires continued mobilization of financial and human resources at different operational levels. This will hopefully result in a pipeline of interconnected NbS and supporting implementation projects. Most planning projects in Asian deltas currently lack this integrated landscape approach; linkages between different scale levels, objectives and encompassing the full portfolio of interventions are missing.

This is potentially a crucial role that WWF can play to promote the upscaling of NbS in Asian deltas.

To account for social equity, wider economic benefits, including ecosystem services and co-benefits, need to be mapped as well as direct and indirect beneficiaries, as this will help to translate the socio-economic analysis into a financing strategy.

Furthermore, developing more comprehensive financing project models, which consider non-monetary values and co-benefits, could provide attractive information for investors. These models can better showcase the breadth of returns on investment that can be generated by NbS. Returns on investment can include avoided costs (such as reduced flood damage) but, more importantly, also include actual profits, like an increase in crop yields and tourism earnings, and the value of safeguarding natural capital, such as water availability and fertile soils.

The long-term sustainability of a landscape approach will depend on the degree of commitment between actors pooling resources, seizing value opportunities, and addressing competing demands between land and water use and other socio-economic values.

Upscaling NbS not only requires investments in green assets, but also a clearly articulated and well structured landscape governance process, which will enable the NbS-focussed approach. Alongside, it is worthwhile to create enabling investments and environments that encourage and support the collaboration process between different actors. The success of landscape investments relies on the degree of governance maturity based on five key elements:

- **Establishing a multi-stakeholder platform:** Negotiations between a variety of stakeholders and managing trade-offs is essential to achieving sustainable landscapes.
- **Building a shared understanding:** In order to build future pathways together, all stakeholders need to develop a common understanding of the issues in the landscape, the conflicting interests, and the spatial interrelations.
- **Collaborative planning:** Creating an integrated spatial plan helps to guide stakeholders on how to achieve the shared landscape goals.
- **Effective implementation:** Landscape level projects are designed for the long-term and therefore need to be guided by changes in government, donor, corporate or NGO policy to ensure sustainability.
- **Monitoring for adaptive management and accountability:** A good monitoring programme is one of the strongest indicators for a project's success. It helps to keep the momentum going by showing the impact realized and to identify when things are not working as planned and changes are needed.

A structured and well articulated landscape governance process makes the value of NbS much clearer. It can de-risk the project and remove barriers to ensure more widespread adoption of NbS. It can also help identify and improve the bankability of projects, identify positive economic externalities, and determine contributions to public policies. This in turn provides more certainty to investors and increases their willingness to invest in these solutions.



THE CURRENT SCENARIO: AN OVERVIEW OF MANAGEMENT IN THE MEKONG, GANGES-BRAHMAPUTRA-MEGHNA (GBM) AND IRRAWADDY DELTAS

BIOPHYSICAL

The major deltas of the world show similarities with respect to biophysical processes because they have been created in a similar manner. Deltas are formed when large volumes of sediment found at the mouth of rivers are worked and re-worked by a combination of fluvial and coastal processes. The dynamic equilibrium of delta regions is what makes them naturally resilient.

But as human interference grows, the loss of ecosystems and biodiversity also translates into the loss of their most important ecosystem services, such as protection against harmful and uncontrolled flooding in the short-term, the health of fisheries, and production of shellfish, crustaceans, etc. Hence, using NbS to conserve natural resources and ecosystems, while making use of and planning for their services, can be a fruitful strategy.

INSTITUTIONAL

Several South-East Asian countries exhibit a significant degree of decentralized governance, which implies that decision-making is taking place at multiple levels. However, cross-cutting issues that require multi-ministry engagement are more difficult to tackle. The strong incentive for infrastructure development often results in a lack of attention and budget allocation for maintenance and regulation. In all three deltas, there is an ongoing process of developing policy, laws and action plans. Rarely do we find administrative bodies that are dedicated, and tailored, to the reality of delta management.

In the **Mekong Delta**, strategies include the Mekong Delta Plan, Resolution 120, its action plan and inter-provincial committee, and the forthcoming Integrated Master Plan for the Mekong Delta. These mention ecosystem based approaches but do not specifically address NbS. The concept of NbS is still relatively new in Viet Nam, and has not yet been mainstreamed into local practice and policy making.

The **GBM Delta** has several strategies laid out: the Bangladesh Delta Plan 2100 (BDP 2100), the National Biodiversity Strategy and Action Plan, and the Bangladesh Sunderbans Delta Vision 2050. Beyond the most well-established projects in Bangladesh, the policy for implementation of NbS is not well articulated and there is an absence of monitoring systems, which are vital for determining the long-term impact of NbS. There is also a lack of a strong legislative framework, regulatory and enforcing systems, local stewardship of the lands, and proper institutional planning.

In 2018, the first phase of the Integrated **Irrawaddy Delta** Strategy (IADS) was established. However, the objectives remain at a rather generalized level without specific targets as the Irrawaddy delta's development is at the early stages. The IADS plan includes short-term, non-regret measures, such as restoring coastal mangroves. Legislation, policy guidelines, standards and regulations are set at the national level and transferred for implementation to local bodies at various levels.

SOCIO-ECONOMIC

The long-term strategic vision of the **Mekong Delta** Plan aims at turning the area into a regional hub specializing in high-value agriculture for international and domestic markets. The national and local governments have encouraged mixed or integrated mangrove-shrimp systems, which must maintain at least 40% of their area under mangrove cover. However, funding is insufficient for country-scale implementation. There is a lack of private investments in transformative solutions, which could otherwise help accelerate the scaling up of these solutions. There is potential in creating a framework for private investments into NbS at scale.

In the **GBM delta**, economic development is an important driver with medium to severe impacts. The agriculture in the GBM delta is mainly driven by rice, aquaculture (shrimps, catfish) and related industries. With the low level of investments available, upscaling NbS is a challenge. For both practitioners and local communities, the lack of financial incentives acts as a barrier to the implementation and ongoing monitoring of NbS.

The health of rivers, wetlands and marshes represent a critical asset, contributing between US\$2-6 billion to the Myanmar economy annually. Aquaculture and fishing constitute a key source of income and food security in the **Irrawaddy delta** and host an important share of the rice production. IADS structures the economic case for ecosystem services and quantifies the estimated values of nature for several economic sectors. The rapid economic dynamics since 2010-2011 imposed new demands and pressures, such as an increase in energy consumption leading to more hydropower projects, which impact the delta ecosystem.



UPSCALING NbS IN THE 3 ASIAN DELTAS

MEKONG

The planning and implementation of mitigation and adaptation measures in Viet Nam are often highly top-down, with strong roles played by the central and local governments. However, there are increasing attempts to initiate projects that strongly promote multi-stakeholder partnerships. An example of a successful NbS project in Viet Nam is the mangrove shrimp farming project in Ca Mau entitled the Mangroves and Market Project (MAM).

The concept and implementation of NbS still needs to be further developed and mainstreamed in policy plans, regulatory frameworks and local practice. Specifically, more sustainable mangrove-aquaculture practices are needed. **Upscaling NbS in the Mekong delta will require:**

- a. Better balance of downstream-upstream activities;
- b. Re-establishing ecosystem connectivity, i.e restoring environmental flows;
- c. Negotiating with relevant stakeholders over increasing demands on energy and groundwater; and
- d. Researching and communicating the co-benefits of NbS to strengthen the case for NbS projects in the Mekong delta.
- e. Creating bankable solutions to help incentivise and strengthen investment into NbS
- f. Restructure public funding to unlock and de-risk funding opportunities for private investors

Possible objectives for NbS

The future of the lower part of the Mekong delta depends on successfully implementing a saline-based aquaculture production system, including different environmental zones to facilitate mangrove regeneration and sustainable shrimp production.

A promising alternative is placing more emphasis on the regulatory aspect of mangroves rather than the provision of ecosystem services, considering the important role of mangrove forests in regulating greenhouse gases. Mangrove restoration can be framed as CO₂ retention projects issuing carbon emission credits.



RECOMMENDATIONS:

Biophysical:

- a. Create a better balance between natural vegetation and agriculture and aquacultural areas, involving spatial planning and sustainable practices with less pollution and groundwater extraction;
- b. Possible interventions to restore mangroves along the coast - as they provide coastal storm protection and act as nurseries for nature - should accommodate sea level rise by including retreat schemes;
- c. Nourish mangroves with sediment to improve resilience and create opportunities for regeneration. This will help address coastal erosion.
- d. In more riverine areas, connecting floodplains to the river to naturally trap sediment and increase elevation will serve to some extent to counterbalance sea level rise and coastal erosion; and
- e. Address the aggravating causes of subsidence, like uncontrolled groundwater extraction. They should be given high priority as these solutions can reduce relative sea level rise, salt water intrusion and coastal erosion.

Institutional:

- a. Clearly address NbS in policy and implementation plans, solve possible discrepancies under different institutions and involve private/market oriented activities;
- b. Develop incentives to engage local communities in long-term management of restored areas; and
- c. Enhance upstream-downstream cooperation and cross-provincial linkages.

Socio-Economic:

- a. Allow controlled river floods in the wet seasons in the upper and middle delta regions, while at the same time restoring large areas where protective mangrove forests were destroyed due to intensive and extensive shrimp farming;
- b. Identify the benefits of 'good' flooding and build them into business models. Trade offs will be required to share these benefits among various beneficiaries, especially those located in vulnerable downstream areas. This is going to be a challenge, but identifying these shared external benefits will make a stronger case for NbS. Factoring these benefits in during the decision making process can help avoid a wide range of costs associated with uncontrolled flooding.
- c. For mixed or integrated mangrove-shrimp systems, maintain and enforce at least 40% of their area under mangrove cover;
- d. A promising alternative is placing more emphasis on the regulatory ability rather than the provision of ecosystem services, considering the important role of mangrove forests in regulating greenhouse gases. Even though these do not contribute a great deal to mitigation targets, there is an opportunity to link the ambitions of mangrove restoration to the United Nations Framework Convention on Climate Change (UNFCCC), the Clean Development Mechanism and the Paris Agreement; and
- e. Address the coordination of financing streams for NbS and enhance the involvement of the private sector.

GANGES-BRAHMAPUTRA-MEGHNA

The GBM delta faces a high number of risks from natural hazards and socio-economic developments, which negatively impact delta ecosystems, including the Sunderbans mangroves. **Upscaling NbS in the GBM delta will require:**

- a. Raising awareness on ecosystem importance and NbS within the government and the general population, including short-term and long-term co-benefits and trade-offs;
- b. Enhancing governance processes by establishing clear visions and strategies;
- c. Increasing stakeholder participation and consultation;
- d. Strengthening the legislative framework through establishing monitoring systems, regulations and enforcement;
- e. Sharing knowledge and ensuring inclusive community participation to scale-up NbS;
- f. Regarding application of Tidal River Management (TRM), short-term local socio-economic needs versus long-term benefits should be addressed through appropriate arrangements that are incorporated into future projects;
- g. Creating financial incentives to increase the level of investments; and
- h. Articulating policies for implementation of NbS and establishing monitoring systems, which are vital for determining the effectiveness of NbS.



Possible objectives for NbS

The concept of NbS is well established in the Sathkira district of Bangladesh and there has been a positive response to the implementation of NbS. The many rivers flowing through the district provide ample opportunities to implement various structural and non-structural NbS.

Furthermore, the Sunderbans mangrove tidal forest in the south of the delta, designated as a World Heritage site, will benefit from the use of NbS. In this era of changing climate, coastal afforestation has become an essential climate adaptation action to help protect coasts, coastal communities and their livelihoods.

RECOMMENDATIONS:

Biophysical:

- a. Develop a strategy for sediment management;
- b. Maintain the ecological balance and values (assets) of the rivers;
- c. Enhance Sunderbans conservation programmes;
- d. Increase efficiency in TRM and expand its implementation;
- e. Conduct action research for improved ecosystem services; and
- f. Implement adaptive delta management practical on the ground.

Institutional:

- a. Operationalize and integrate NbS in existing policy and implementation plans;
- b. Upscale the organization of monitoring and evaluation programs of NbS;
- c. Facilitate knowledge sharing and raise awareness on NbS;
- d. Create platforms for effective people's participation, as community action is vital for NbS. NbS have been shown to be most successful when local communities are involved in the implementation and management of NbS;
- e. Establish and institutionalize clear budgetary flows and mechanisms for local governments to seriously consider using NbS; and
- f. When applying TRM, better address the short-term needs (local) versus long-term benefits (regional, national) through appropriate arrangements.

Socio-economic:

- a. Create investment mechanisms and incentives for stakeholders at all levels to implement NbS;
- b. Encourage Public-Private Partnerships with incentives; and
- c. In Satkhira district, one of the most obvious and practical economic development solutions - in an area where people are familiar with NbS - is an expansion of the Sunderbans mangrove forests beyond the current protected area. This can be achieved through eco-tourism, sustainable farm-fishing-livestock, sustainable forestry, and maintenance/planting of new mangrove forests.





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IRRAWADDY

The middle and lower delta suffer from the degradation of their ecosystems and their services, caused by climate change and socio-economic development. The lower delta is most vulnerable to climate change because of its exposure to sea level rise, potentially more severe cyclones and changing rainfall patterns, which occur in addition to land subsidence. The mangrove forest area is degraded due to overexploitation and land-use change, leading to increased coastal erosion. **Upscaling NbS in the Irrawaddy delta would require:**

- a. Projects that assist natural regeneration, establish buffer zones along rivers, restore mangroves, and promote erosion-control methods and sustainable mangrove agricultural practices;
- b. More specific targets, visions and strategies, especially regarding conservation and restoration of delta ecosystems and NbS;
- c. Capacity building and higher institutional responsibility;
- d. Addressing land-use management and planning challenges at the institutional level;
- e. Improving enforcement and regulatory mechanisms;
- f. Redistributing responsibilities to the appropriate actors, strengthening cross-sectoral coordination and increasing meaningful engagement with local stakeholders; and
- g. Additional research and knowledge sharing to carry out economic valuation of ecosystem services as well as conduct a cost-benefit analysis.

RECOMMENDATIONS:

Biophysical:

- a. Assist natural regeneration of mangrove forests in degraded areas;
- b. Establish buffer areas along the rivers and main streams in the Irrawaddy delta;
- c. Consider using newly accreted lands, wasteland, and abandoned aquaculture ponds and farms for mangrove plantation initiatives;
- d. Use erosion control methods, such as bamboo fences, to reduce the incident wave energy and trap sediments; and
- e. Initiate integrated mangrove-shrimp farming for alternative livelihoods.

Institutional:

- a. Develop the capacity of the National Coastal Resources Management Central Committee (NCRMCC), which is the primary national level body for the policy and management of coastal areas, to implement NbS in the region;
- b. Define the institutional responsibility for coastal protection;
- c. Build institutional or regulatory settings to implement NbS. Some administrative bodies may not have legal instruments or duties/responsibilities to implement NbS although they are the main actors;
- d. Strengthen effective governance by enhancing government engagement with local stakeholders; and
- e. Ensure collaboration between different national-level committees in order to strengthen cross-sectoral coordination, including the:
 - i. National Environmental Conservation and Climate Change Central Committee;
 - ii. National Land Committee/National Land Resource Management Central Committee or National Land use Council;
 - iii. National Wetland Committee;
 - iv. Community Forestry National Working Group; and
 - v. National REDD+ Taskforce.

Socio-Economic:

- a. Consider the socio-environmental impact on the health and the role of functional habitats in the long-term sustainability of Belt and Road Initiative projects;
- b. Conduct a detailed economic valuation and cost-benefit analysis;
- c. Gather extensive data and valuation of ecosystem services to share evidence-based information with decision makers; and
- d. Ensure and enhance participation of local communities, since improved local livelihoods is a key success factor for NbS.

CONCLUSIONS: THE WAY FORWARD



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The health and resilience of Asia's great deltas have been undermined by human activities, which have drastically altered the natural flows of water, sediments and nutrients down their rivers, and drastically reduced groundwater levels. These deltas are increasingly vulnerable to the worsening impacts of climate change. Given they are home to hundreds of millions of people, vital agricultural land, productive fisheries, and thriving economies as well as rich biodiversity, urgent efforts are needed to build resilience in these deltas.

However, enhancing delta resilience involves complex governance and socio-economic challenges. Often, economic growth and reducing poverty are perceived as being more important than long-term delta resilience, which is not factored into day-to-day decision making because priorities are short-sighted, and resources are limited. It is the human and institutional challenges that need to be addressed alongside any technical or natural system intervention to enable transformation of management approaches in Asian deltas.

Implementing NbS projects on a much larger scale is the way to achieve impact at the scale needed to tackle the challenges confronting Asia's great deltas; an integrated landscape approach will help various individual NbS reinforce each other, and de-risk investments. This must be part of the vision at the delta or catchment level, which addresses both upstream-downstream and channel-floodplain processes.

Implementing a landscape approach successfully requires a high level of organizational capacity as well as financial and technical literacy. It is essential to adopt a system perspective and understand system functioning in order to identify challenges for upscaling towards a landscape approach.

With Asia's great deltas already sinking and shrinking as sea levels start to rise, the window for action to build resilience is closing rapidly. At the same time, the cost of doing nothing in a business-as-usual mode is mounting by the day. Delaying transformative action will force us to choose from a narrowing- and increasingly expensive- set of solutions to address worsening outcomes. Factoring in avoided costs will help make a stronger case for investing in NbS early.

It is time we take on this challenge pro-actively with all the resources we have at our disposal. It will require large-scale systemic transformations to achieve new ways of functioning, and re-organising our priorities to drive and deliver change on the scale that is required. A drastic upscaling of NbS across these dynamic deltas and their river systems will ensure that we build a more resilient future for people and nature.