the BLUE CARBON initiative

GLOBAL MANGROVE ALLIANCE

Best practice guidelines for mangrove restoration

Executive Summary

www.mangrovealliance.org

Best practice guidelines for mangrove restoration

The Best Practice Guidelines for Mangrove Restoration is a joint product developed by the Global Mangrove Alliance and the Blue Carbon Initiative and led by the University of Queensland, Conservation International, Wetlands International, Blue Marine Foundation and the International Blue Carbon Institute, along with dozens of mangrove scientists and user groups across the world.

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Cover image

Close up on mangrove tree in Florida keys.

Designed by:

Yoke: www.yokedesign.studio

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Executive Summary

In response to an increasing interest in the coastal resilience and climate mitigation potential of mangroves, the Global Mangrove Alliance and the Blue Carbon Initiative have launched the Best Practice Guidelines for Mangrove Restoration. The Guidelines aim to build a shared understanding of best practices, and in doing so, facilitate scaling up of cost effective, inclusive, and successful restoration.

Gazi Mangroves © Tony Ochieng

The opportunity

Healthy mangroves are havens for biodiversity and are critical for climate action.

They support the livelihoods, food security, and well-being of hundreds of millions of people, are critical for carbon storage, regulate water quality, and protect coasts. Yet 20-35 percent of our mangroves have been degraded or lost over the last 50 years. Urgent collective action is needed to restore damaged or destroyed mangroves around the world. If done properly, restoration can enhance coastal resilience, sustainable livelihoods, fisheries productivity, aquaculture, biodiversity, and carbon sequestration.

Of the 1,100,000 hectares of mangroves that have been lost since 1996, around 818,300 ha of mangroves are considered to have high "restorable" potential, while other areas are considered less easy to restore and may be irretrievably lost to urbanization, erosion, or other causes.

Urgent collective action is needed to restore damaged or destroyed mangroves around the world.

Ocean Image Bank
© Soham Bhattacharyya

Now more than ever before there is a large public and private interest in recovering lost mangrove areas and protecting existing ones. Restoring ecosystems that have been degraded or lost is a key target for terrestrial and marine ecosystems within the United Nations Sustainable Development Goals and Paris Accord. Thus, there is an increase in government driven mangrove initiatives and inclusion of mangrove restoration in global policy frameworks, which has also driven the availability of public and private finance for mangrove restoration.

1

2

Figure 1. *Out of the 17 Sustainable Development Goals, mangrove restoration projects are frequently aligned to 6 (line 1) and less often to a further 6 (line 2). Identifying how your project outcomes align with SDGs can enable easier communication of project impacts within a recognised framework.*

It is imperative to get it right

Ensuring successful mangrove restoration interventions at scale.

With such excitement for mangrove restoration, it is imperative to ensure successful mangrove restoration interventions at scale. However, while there have been many successful mangrove restoration efforts, some regions still see failure rates of up to 80%. This is primarily due to limited knowledge of best practices.

Inclusive ecological restoration approaches are essential.

Existing focus on how many thousands of trees are planted misses that without effective project design, well established best practices, long-term maintenance, monitoring, and community support, success will be limited.

However, these missteps are preventable: we urgently need to change the narrative away from single-species mass tree-planting, to inclusive ecological restoration approaches that involve local stakeholders and build on the latest scientific insights.

Common issues include unrealistic goal setting, short project planning and stakeholder engagement time, and reliance on planting in unsuitable areas, without addressing hydrology, nutrient, and sedimentation requirements. The position of mangroves in the landscape, at the margin of land and sea, also adds complexity as environmental conditions for mangrove establishment can vary on small spatial scales, and land ownership or management of the area may be unclear. Sometimes planting may even cause environmental damage when other valuable habitats such as mudflats and seagrass beds are planted over with mangrove saplings.

The Best Practice Guidelines for Mangrove Restoration brings together the latest accumulated knowledge of a growing global community of local practitioners, scientists, researchers and investors who have been engaged in ecological mangrove restoration into one comprehensive resource, compiled and edited by members of the Global Mangrove Alliance and the Blue Carbon Initiative.

Best practice guidance

The latest knowledge on best-practice mangrove restoration in one comprehensive resource

The Best Practice Guidelines for Mangrove Restoration is the most up-to-date tool to support effective project design, funding, and implementation, centered around an inclusive, community-based approach which has been shown to enhance restoration success and longevity.

The guidelines provide project managers with a step-by-step approach for every phase of the project cycle, from identifying objectives to ensuring long term sustainability of restoration benefits. They comprise holistic and practical advice and links to useful resources, gathered into one place for the first time. As such they are designed to walk the reader through proven practices that can be applied to any restoration project.

The best practices shared in the guidelines are based on lessons learned from real-world projects, swapping single-species mass tree-planting for inclusive ecological restoration approaches. Specifically, the most effective way to restore mangroves is to create the right biophysical conditions for mangroves to grow back naturally and the right socioeconomic conditions to support their long-term protection. The process of successful mangrove restoration is nuanced, complex and site-specific. Comprehensive project designs bring together community leaders, local stakeholders, project managers, and experts in restoration, data collection, and ecology, and facilitate knowledge sharing and capacity building across the project team.

Mangrove restoration efforts using these best practices will more likely result in a sizable, diverse, functional, and self-sustaining ecosystem that offers the desired benefits for nature and people. The sharing of best practices will therefore allow us to dramatically increase the rate of success and move the needle on mangrove restoration at scale.

These best practice guidelines go beyond physical restoration activities. Drawing on a wealth of experience, the guidelines also look at project design and implementation holistically from a social, financial and impact point of view. This includes additional factors that can make or break restoration projects, such as the development of specific and achievable goals and objectives, adaptive management, assessing the context of the wider landscape, site feasibility, financial analysis, and building a strategy around stakeholder needs and benefits alongside the ecological requirements for successful restoration.

The guidelines highlight existing resources, and provide pathways to decide which approaches are appropriate for a specific restoration context and specific restoration goals and objectives.

Unique to this effort, the guidance provides modules that specifically tackles issues related to various goals. For example, the first module on blue carbon addresses how to align mangrove restoration with national climate mitigation targets, or how to produce carbon credits to fund long-term project maintenance, monitoring, and community benefits. Over time, additional modules related to coastal protection, biodiversity, and fisheries will be added.

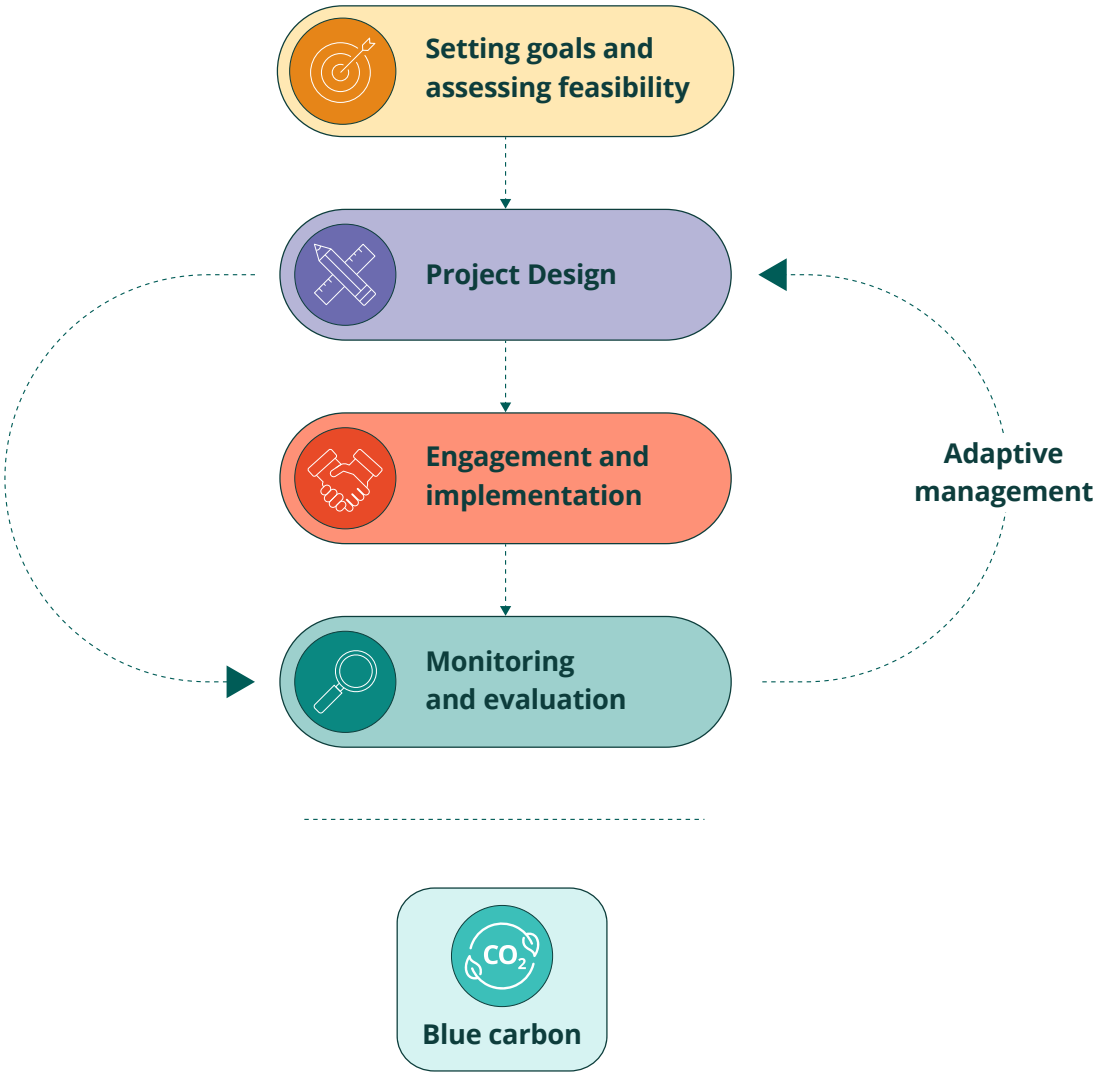

Figure 2. *Project stages for mangrove restoration. Stages are pictured linearly but at many points multiple processes may be happening at the same time. Monitoring and evaluation of progress towards project objectives informs adaptive management and revision / improvement of project design and implementation.*

Guiding Principles for success

The Guidelines apply six principles for successful mangrove restoration, which are woven throughout the Guidelines.

1. Safeguard nature and maximize biodiversity

At the bare minimum, negative impacts to nature need to be understood and avoided: no planting in valuable mudflats or seagrass beds or on top of naturally regenerating saplings. Purposefully striving for positive biodiversity impacts will in many cases be beneficial. Instead of planting monocultures, aim for restoring a mangrove with multiple species and natural zonation.

A biodiverse mangrove has greater variety in root types, tree sizes, foliage, and fruits, thus fulfilling different functions and attracting diverse (fish) fauna. This results in the provisioning of multiple goods (timber, fodder, honey, fruits, and fish) and services (enhanced coastal protection, carbon storage, water purification, fisheries enhancement).

Such mangroves are also likely to be more resilient to climate change. A sizable area is required for a mangrove system to be self-sustaining and adaptive, so operating at land and seascape scale is key.

2. Employ the best information and practices

Make use of the best available science, including lab and field-based measurements as well as traditional and local knowledge and experiences that has often been developed and refined over centuries.

Convene a multi-disciplinary and multi-sectoral team to help integrate biophysical as well as socio-economic aspects and to ensure different stakeholder perspectives are represented and addressed. System understanding at all these levels is needed to get to the root causes of mangrove loss and degradation, so that solutions can be developed that tackle these.

Given that mangroves depend on water and sediment coming from the land as well as the sea, such connections need to be understood and accommodated at the land and seascape scale for mangroves to thrive. These dynamic environments often require a “learning by doing” attitude along with adaptive management to be successful.

3. Empower people and address their needs

Local actors – and their representative institutions - need to have the capacity to meaningfully engage in project design and implementation and advocate for their needs in policy dialogues. For example, through training (e.g., coastal field schools) combined with tailored finance to enhance community capacity to contribute leadership, knowledge, experiences, and ideas. The project governance structure needs to facilitate participation and decision making as well as fair and equitable benefit sharing.

Mangroves can offer many tangible benefits to local communities, some of which can be monetised such as ecotourism, wild capture fisheries, provision of food and fodder. Some projects may also be able to monetise non-tangible mangrove services such as carbon sequestration. Restoration could aim to create a mangrove-based economy that optimizes such benefits while avoiding over-exploitation and introducing sustainable wood harvesting and alternative livelihoods that do not degrade mangroves. The safety of all people, but especially vulnerable and marginalized populations such as indigenous people or women and children, should be prioritized in all aspects.

4. Align to the broader context - operate locally and contextually

Given the position of mangroves between land and sea, there are typically several government agencies involved from local to the national level, each with different mandates and targets. Again, taking a land and seascape approach is key, which involves integrating projects within coastal zone management policies as well as into other relevant policies and plans. One government agency may strive to protect the mangrove for carbon storage and coastal protection, another may advance aquaculture for food security, and yet another may seek to develop a national highway or waterfront city along the coast. These perspectives can be aligned in a shared vision and plan that supports mangrove conservation and restoration. Further, (in-) formal land ownership and use rights are often complex, uncertain, and conflicts may need to be resolved.

Oyster farming in the mangroves
© Joeri Borst, Wetlands International

5. Design for sustainability

All projects have risks to sustainability that may occur beyond the project lifetime. Besides generic project risks (i.e., political change, long-term financing), mangrove projects also face marine specific risks, including sea level rise and land subsidence, extreme storms, changes in ocean temperatures, and other climate change scenarios which play out over a range of timescales (interannual to decadal). Risks need to be carefully mapped and understood, so that risk mitigation measures can be put in place.

Mitigation measures include creating policies sensitive to the broader context (principle 4), designing solutions that address biophysical and socio-economic root causes of loss and degradation (principle 1 and 2) and ensuring local ownership (principle 3). Again, taking a landscape, seascape, or "ridge-to-reef" approach can mitigate risks. For example, a healthy coral reef can protect a seagrass bed or mangrove forest. Likewise, a healthy upland forest and watershed can enhance the resilience of a mangrove forest downstream. Further, projects should aim to adopt timeframes of at least 20 years to ensure sustainability.

6. Mobilize high-integrity capital

Reverting the trends of loss and degradation requires transformational societal changes as well as large-scale restoration for those mangroves that are not irretrievably lost. The 2021 UNEP State of Finance for Nature report estimated funding needs at USD 15 billion for historic mangrove restoration overall until 2050, of which USD 450 million is needed to restore just half of the recent losses (since 1996) by 2030. Governments and public financing alone cannot foot the bill with the urgency needed. Private sector funding must be mobilized at scale and at speed alongside government funding.

Over the last decade, the world has begun to recognize the importance of mangroves. Conservation and restoration of mangroves is starting to drive large-scale finance aimed at supporting local to national-scale actions. However, mobilization of capital needs to avoid false benefits (green-washing) and ensure equitable access to funds. Specifically, the private sector needs to commit to reducing negative impacts within their own supply chain (GHG, biodiversity loss, etc.) in addition to financing conservation.

Mangrove living in Zhanjiang, protects a coastal population of approximately 4 million people, © Conservation International

Key messages for each step in the project cycle

Setting goals and Assessing Suitability

Mangrove restoration projects are planned, designed, implemented, and managed by people with diverse backgrounds and different scientific and socio-political agendas. As such, restoration projects are responsive to multiple stakeholders and agents who hold different values. Many mangrove restoration projects have not been successful because of a lack of community involvement, inappropriate governance structures, and a failure to align objectives and goals of external agents with those of local stakeholders.

Key considerations:

- Establishing clear goals and measurable objectives helps to communicate and set expectations with stakeholders and provides an early opportunity to integrate shared goals into project design.
- Restoration is a social enterprise and local leadership is key. Projects often fail without sufficient community and political support to sustain management in the long-term.
- Building trust, engagement, skills, empowerment, and ownership are essential for launching and maintaining mangrove restoration projects, and this takes time and commitment.
- Mangrove restoration typically fails in sites with prolonged unsuitable conditions (e.g., in seagrass beds or mudflats that are low in the intertidal zone) or otherwise unsuitable conditions where mangrove seedlings cannot survive for long.

Project Design

After identifying all relevant stakeholders, agreeing on the goals and objectives for restoration and completing the basic feasibility phase, the project moves into a design phase where everything that was learned previously is considered and activities are designed to address the specific needs of the project.

Key considerations:

- Historically low rates of success should not be linked to general uncertainty around what it takes to design a project that works but to a lack of communication around what is best practice.
- A good project design document should be co-created with the stakeholders and partners identified during the feasibility phase.
- Project managers should spend significant time prior to restoration activities ensuring local owners of the project are well informed and engaged in decision-making from the outset. Communicate the benefits of restoration with clear evidence.
- The potential to restore mangroves depends largely on the degree of degradation, its geomorphic setting, and the willingness and capacity of the landowner.
- Ensure that the restoration design corrects hydrological, hydrodynamic, sedimentation, and propagule availability issues and replicates natural reference sites. To achieve this, local ecological knowledge and/or measurements of hydrological variables in natural and restoration sites can be used.

Engagement and Implementation

After identifying and agreeing on project objectives, and completing the feasibility and design phases, the project moves into the planning and implementation phase. Reasons for mangrove degradation, as well as the external factors influencing the restoration project have been identified, and the potential success of a restoration project is deemed high enough to proceed. The most successful projects are often those where a lot of thought, consideration, and work has gone into planning and engagement before activities on the ground are undertaken.

Key considerations:

- A step-by-step implementation plan with actions broken down into explicit tasks provides the direction needed to achieve the project goals and objectives.
- Implementation plans consist of several component parts, communicating what needs to be done, when each action should be carried out, and who is responsible for each task.
- Tracking implementation progress is critical for projects to remain on track and on budget.
- Stakeholder engagement at all levels is important throughout implementation and monitoring.
- There are many potential sources of funding for mangrove restoration projects, and for large or high impact projects it may be possible to blend finance options.

Monitoring and Evaluation

This phase is about the process of monitoring mangrove restoration outcomes, evaluating them against set targets and objectives and adaptation of the implementation or management plan if needed.

Key considerations

- Monitoring is essential for validating project success, guiding adaptive management, and for reporting of outcomes to stakeholders.
- Monitoring specific indicators is essential to gauge the relative success of mangrove restoration projects.
- A major challenge is securing the resources needed to continue monitoring beyond a project's funding lifespan.

Mangrove restoration guidance for Blue carbon projects

Conservation of blue carbon ecosystems can reduce GHG emissions from degradation and destruction, while restoration can contribute to carbon removals through plant growth and soil carbon accumulation. The opportunities for avoiding emissions and increasing carbon storage make blue carbon a highly effective natural climate solution. Module 1: Blue carbon provides information on the process of producing carbon credits for sale on voluntary carbon markets, plus guidance geared towards aligning your project with national climate change mitigation targets.

Key considerations

- Measuring the climate mitigation impact of mangrove restoration projects for National Greenhouse Gas Inventories (NGHGIs), Nationally Determined Contributions (NDCs), and Reducing Emissions from Deforestation and Forest Degradation (REDD+) programs require specific monitoring and reporting procedures to be followed to ensure consistency.
- Depending on national legal and policy conditions for mangroves and carbon trading, not all mangrove restoration projects will be eligible to produce carbon credits.
- There are specific technical monitoring requirements for mangrove restoration projects designed as carbon crediting projects.
- Successfully producing carbon credits is a complex process with added administrative, technical, and monitoring costs. Smaller sized restoration sites may not be financially feasible based on projected credit income alone.
- There is the risk that carbon revenues can incentivize disbenefits. While leading standards attempt to prevent this, project managers should repeatedly evaluate the risk and adaptively manage the project if necessary.

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