Nature-based Solution protocols

Wetlands (Mangroves) Rehabilitation

Mangrove rehabilitation is a management intervention designed to restore forest cover and associated valuable ecosystem services of degraded, disturbed, or destroyed mangrove forests where self-renewal is no longer possible.

Rehabilitation creates an opportunity for stakeholders to be educated about restoring mangroves, the causes of successes and failures of restored mangrove ecosystems, as well as the value of mangroves and their restoration.

There are three types of rehabilitation principles and practices: i) planting alone (mangrove gardening), ii) hydrological restoration, and iii) excavation and fill. The underlying reason for degradation determines which principle or practice is implemented; however, in many cases, successful restoration involves a combination of all three.

Duration

Results of mangrove restoration can be seen in 3 to 5 years after planting.

Place of Implementation

- Where mangrove forest degradation is evident, and intervention is needed to avert destruction of an entire ecosystem.
- Coastal communities which rely on forests to protect their property and livelihoods from climate change impacts.

Threats Addressed

- Coastal Flooding and Water Surges
- Loss of Habitat and Ecosystem Services

Social, eco-systemic and economic benefits

- **Protects shorelines, enhances water quality and promotes biodiversity** by providing food and shelter for various fish, marine invertebrates and birds.
- **Provides cultural services**, including tourism, recreation and education.
- **Provides protection from hurricanes and storm surges**.
- **Provides direct economic goods and services** to communities, including fuel; timber for construction; fishing; textiles and leather; food; drugs and beverages; household items; agriculture; and a range of products such as pulp for paper and mangrove honey.

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Main Climate Impacts & Threats Addressed

Coastal Flooding and Water Surges

Rehabilitating degraded mangrove forests enhances the forest's ability to sequester and store carbon dioxide from the atmosphere, reducing some climate change impacts, including coastal flooding and water surges.

Loss of Habitat and Ecosystem Services

Mangrove restoration interrupts the progressive loss of habitat and critical ecosystem services.

Implementation Stages

1. Evaluate historical and current area coverage and site reconnaissance to determine the cause of degradation.
2. Install water level loggers to determine the depth, duration and frequency of tidal flooding if hydrology is suspected as the reason for degradation.
3. Decide on the rehabilitation goal and finalize the rehabilitation plan, including hydrological restoration and solid waste removal.
4. Obtain requisite permits and licences from government authorities.
5. Engage community members.
6. Implement the rehabilitation plan which may include creating channels to improve or restore hydrology and planting of seedlings if natural colonisation does not occur.
7. With the input of community members, monitor planted or self-generated seedlings to evaluate growth and success.

References

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Kathiresan, K., and B. L. Bingham, 2001. "Biology of Mangroves and mangrove ecosystems." In Advances in Marine Biology, 81-251, Academic Press.

Webber, Mona, Hilconida Calumpong, Beatrice Ferreira, Elise Granek, Sean Green, Ruwa Renison and Mario Soares, 2016. "Mangroves." In The First Global Integrated Marine Assessment: World Ocean Assessment I, edited by United Nations, 877-886.

Important Factors to Consider

- Planting seedlings without a detailed prior investigation can lead to waste and damage public trust in the process.
- Community engagement and involvement are critical to successful rehabilitation, especially in the case of heavily used, urbanized mangroves such as the Kingston Harbour.
- Mangrove seedlings should benefit from 'head-starting' or a period of hardening in a nursery or other controlled conditions.
- Seedlings should not be planted in rows or columns. Instead, they should be planted in clusters, with at least one metre of separation between clusters.
- Seedlings must be placed according to the typical mangrove zonation pattern or position to which the species are adapted.

Lessons Learned

Site reconnaissance must be done before the start of the project so that project timelines can be adequately estimated. Permit and licence acquisition is a critical step in the implementation process in Jamaica.

How To Gauge Impact

- Impact is gauged by the area rehabilitated.

Costs and inputs

Mangrove Rehabilitation	Cost in USD
Equipment and Tools	$4664.20
Labour	$6510.20
Transportation (Boat & Solid Waste Removal)	$5887.20
Administration	$4260.40
Total	**$21,302.00**