Community-Based Mangrove Restoration & Management

Woburn Bay Marine Protected Area, Grenada, West Indies

Mangrove Seed Preparation Guidelines

Prepared by:

Gregg E. Moore, Ph.D.

Assistant Research Professor
University of New Hampshire
Department of Biological Sciences
Jackson Estuarine Laboratory
Durham, NH 03824
gregg.moore@unh.edu

*This report was made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of its Cooperative Agreement Number 538-A-00-09-00100-00 (*BIODIVERSITY THREAT ABATEMENT *Program) implemented by prime recipient The Nature Conservancy and Grenada Fund for Conservation. The contents and opinions expressed herein are the responsibility of the* BIODIVERSITY THREAT ABATEMENT *PROGRAM and do not necessarily reflect the views of USAID.*

GEF SGP The GEF Small Grants Programme UNDP The Nature Conservancy Protecting nature. Preserving life. USAID FROM THE AMERICAN PEOPLE

PURPOSE

This community-based restoration project seeks to engage local NGO's, community groups, and government in the evaluation, design, implementation, monitoring and stewardship of a community-based mangrove restoration and management opportunity located within or directly adjacent to a Marine Protected Area (Woburn MPA). The successful project will result in 1) increased local appreciation and stewardship of mangrove ecosystems, 2) creation of immediate livelihood opportunities associated with the restoration and management of the mangrove, and of course 3) a reforested and ecologically functional mangrove habitat at the project site.

Fig 1. Sunset at the Woburn Bay Marine Protected Area in October 2009, prior to community-based restoration efforts.

What are Mangroves?

Mangroves are a group of salt-water tolerant trees and shrubs that grow within areas subject to tidal flooding (the "intertidal zone") of tropical coastlines around the world. Mangroves are especially adapted to the rigors of the coastal environment, including flooding, high salinity, soft sediment, and a lack of oxygen at their roots. In the Caribbean, there are generally four species, which despite all being categorized as "mangroves", are not closely related in terms of their lineage. Rather, they are a good example of "convergent evolution", whereby unrelated organisms develop similar adaptations over time to succeed in a common habitat.

Common Species

Fig 2. Clockwise from top left, *Rhizophora mangle, Avicennia germinans, Conocarpus erectus,* and *Laguncularia racemosa.*

Where Do Mangroves Grow?

Mangroves occur along low energy coastlines within areas subject to tidal flooding (the "intertidal zone"). Typically, red mangroves occur on the seaward edge in water from a few inches to a few feet deep, and are thus highly adapted to long periods of flooding and tidal surge. Black mangroves occur behind (landward) of reds in most cases, and can tolerate occasional flooding, but are less likely to occupy areas flooded for extended periods (weeks or months). White mangroves intermix somewhat with blacks but are most common landward still where they co-occur with buttonwoods. Both white mangrove and buttonwood, like all mangroves, can tolerate salt water. However, they cannot endure extended flooding. In fact, more often these mangroves occur in relatively dry habitats at the upper extreme of the intertidal zone such that they may be subject to tides only a few days a year.

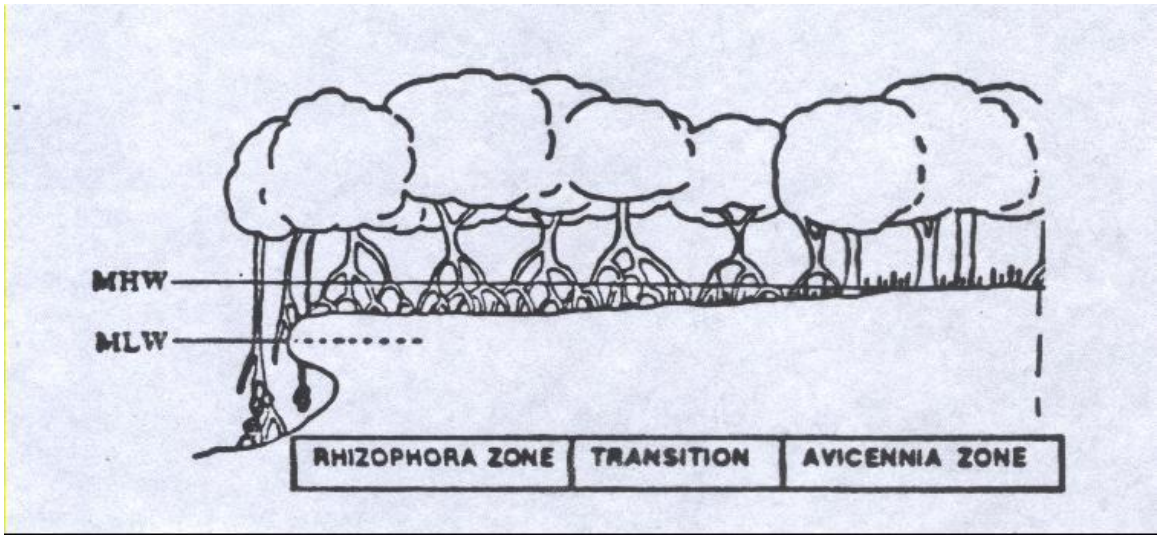

Fig 3. Common pattern of establishment and growth of Caribbean mangroves (*adapted from*: Tomlinson 1986).

Collecting Seeds ("Propagules"): Where, When and How

Mangrove seeds are technically called "propagules" because unlike most other plants' seeds, mangrove propagules germinate while still on the tree! This is an adaptation that helps then to grow rapidly upon falling to the soil below once they are ripe. However, for convenience, we will refer to them as seeds in this document.

Fig 4. Stages of development for the red mangrove, from germinating seed (bottom) to rooted seedling (top).

Red mangrove seeds can be found on the plants somewhat year round, but the majority occurs in Mid November through January in Grenada and surrounding areas. Because our planting effort is scheduled for early January 2010, we'll want to collect approximately 2-3 weeks prior to the date we set (to be announced). Collecting prior to planting allows for the critical rooting period that will make our seed stock highly successful, as explained below.

Seeding red mangroves in restoration sites is relatively simple. Many people have had success merely collecting seeds from trees and sticking them in the soil directly. While this can work, the odds are significantly increased if seeds are first pre-rooted prior to planting. Once seeds are collected, they will be brought to a central location [Margaret's House] and placed in white 5-10 gallon plastic buckets half filled with seawater in the shade. Buckets should contain no more than 40-50 propagules, so that they don't get too crowded. The seawater must be changed every 2-3 days to prevent fouling and death for seeds, thus staging this process near easy access to seawater in a must. Over a period 2-3 weeks, fine roots will develop at the bottom tip of the seeds. You will find that some do not develop roots, and others may simply brown and die all together. That's exactly why we do this preparation, to find the strongest, healthiest, most successful seeds for out restoration effort. These viable, pre-rooted seeds are now ready for careful planting and will be significantly more successful than planting un-rooted seeds directly because they can immediately take up nutrients and water to grow and establish.

Fig 5. From left to right, mature propagules, rooted propagules, one-year seedlings, and three-year shrubs.

Note: While it is possible to find and dig up young rooted seedlings in your collection area, this is discouraged. Digging them up often damages the fine roots and leads to shock or death upon transplanting elsewhere. It also impacts the area you take it from be removing a young "recruit" that will be ready to spring up should a storm damage the mangrove canopy above. Rooted seedling mangroves are the forests' insurance policy that the mangroves will sustain themselves in future generations. Please be responsible and do not dig them up**.**