

Everything Mangrove

A Complete Restoration Guide in
the Face of a Changing Climate

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Foreword

This booklet is designed to emphasize our focus on climate change as it relates to resilient areas such as mangrove forests.

In this booklet we focus on this critical habitat as we look at the plant and all its amazing features to tried methods of planting that work. We also look at ways we can live with our mangroves without destroying their natural functions.

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Our Views on Climate Change

While the effects of climate change are very clear and prevalent all around us, there are definitely things we as individuals and as groups can do to affect the outcome or to at least slow the process of negative environmental change that we ourselves are somewhat responsible for.

We have seen sea level rise, the polar ice caps melt, flooding, unstable weather and temperature which all affect us physically but instead of focusing on ourselves, we must face the bigger picture; we need to be better stewards of our home, EARTH. As responsible stewards of planet Earth, we should prioritize promotion of best practices that foster protection and conservation of the Earth's natural resources, including those considered to exhibit resilient characteristics. Most natural ecosystems have an innate resilient ability to rebound from acute disturbances. Thus, it is important to reduce chronic human impacts to allow such systems to rebound as well as aid their restoration where possible.

As a response to help affect positive change, we have carried out investigations of our natural coastal environment, identified areas of possible resilience, and have dedicated our time and efforts into strengthening them. One of these areas are Mangrove forests, and within these forests are a especially unique mangrove species – the Red Mangroves – which is a focus of our restoration activities.

Red mangroves grow all over the tropics and dominates our estuarine creeks, lagoons, coastal swamps and wetlands, our coast line and most of our cayes throughout Belize. Their mere ability to move with the shore and adapt to certain conditions make these intricate amazing plants one quite suited for preservation, restoration and strengthening.



THE RED MANGROVE PLANT



A young mangrove displaying new high roots that make this plant so strong

Mangrove flowers are small but produce delicious fragrance



Healthy mangrove forest





Red Mangroves in full bloom



A mangrove propagule (seedling).



Mangrove roots creating habitat and nursery

More Facts About Mangroves

- Mangroves live life on the edge. With one foot on land and one in the sea, these botanical amphibians occupy a zone of desiccating heat, choking mud and a salt level that would kill an ordinary plant within hours.
- Forest mangroves form are among the most productive and biologically complex ecosystem on earth.

National Geography

Mangroves have specialized root systems that perform multiple tasks including;

- 1) Filtering out nutrients from water
- 2) Blocking salt from entering the plant
- 3) Trapping and holding sediments
- 4) Anchoring and stabilizing shorelines
- 5) Providing shelter and protection for Juvenile fish species

Mangroves live in fresh or salt water areas with no problems however they grow faster where they receive more nutrients.



Red mangroves specialized leaves are waxy which allows very little moisture to escape leaves, and are also where excess salt not blocked by the root systems ends up. Leaves also contribute to the creation of land when they become trapped (thousands of pounds of leaves) after falling among the roots each year.

Even More Mangrove Facts

- Mangrove propagules (seedlings) are not fruits or seeds, they are actually compact plants ready to go.
- Propagules will start to root within 24 hrs of touching sediment as long as they are stable.
- If you were to plant a propagule lying down, after first rooting it will stand upright and open it's leaves.
- Mangroves are naturally slow growing plants some even taking over 50 years to reach heights over 10 ft tall.
- Mangroves will grow rapidly in areas where they receive lots of nutrients however they are very weak structured.
- Mangroves produce propagules all year round however, the most productive time is between September to October.
- The best time for planting mangrove propagules is between October to January.
- Mangroves are toxic.
- If properly stored propagates can be kept for over 2 months.

- After settling into soil a mangrove propagule will continue to produce only roots for about 2 weeks before opening its first leaves.
- Red mangrove is a pioneer species. Because of this, it is normally the first species to start to occupy the area; mostly in water.
- Like most plants, red mangroves can live for hundreds of years and become giants; towering sometimes over 60 ft in the air.



THE PLANTING ENVIRONMENT

When we begin to think about planting, re-planting or transplanting, one of the first things we have to consider is the environment in which we plan to do this. Each location comes with its own unique set of obstacles that will need to be accounted for. Lets consider a few different environments and look at some of the things to consider. For each location we will answer the same questions.

- 1) Is the area protected from high wave and wind action?
- 2) What type of soil is it?
- 3) Are we able to plant on land or in the water?
- 4) Does the area have a lot of boat activity?





PLANTING METHODS

Basic Planting

This method is the easiest and may be the one most commonly used. It is great for use in quiet protected areas and areas where you can plant a little above the tide line.

Method:

- 1) Make sure you have a healthy propagate, (sea pen)
- 2) Place it in the ground to its natural marker, about 2 inches.
- 3) Repeat every 6 to 8 inches.



Basic Planting Examples

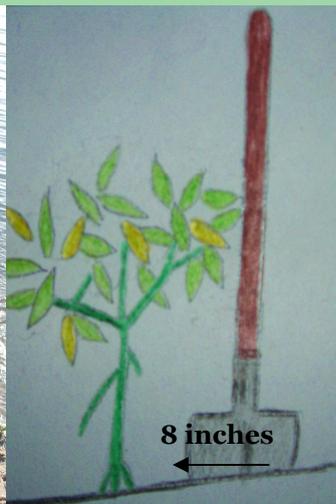


Transplanting

Transplanting is a method I prefer to use in most areas that are difficult to plant regularly with propagates. These include deeper sites, highly disturbed sites and sites with loose sediments. However, each approach changes according to condition.

Basic Method:

- 1) Properly gather transplants from the wild if you don't have any started in plant bags.
- 2) Create a hole of appropriate size
- 3) Quickly place in transplants
- 4) Cover using water washing if possible (this is basically creating a wave to pass over the hole)
- 5) Repeat every 12-18 inches a part.



Transplanting Continued

In case the plants start floating out of place:

- 1) Cut a hole (as small as possible for the plants leaves to squeeze through) in wire mesh.
- 2) Place wire down to the base of the plant.
- 3) Secure with wire anchors

Note: this is mostly used for transplanting in deeper water or for plants with more peat for soil. Peat tends to be very light and will float away.



Examples of Transplanted sights



PIPE PLANTING

This method of planting is best used for deeper, disturbed sites where the sediment is too loose or too hard to use transplanting.

Method:

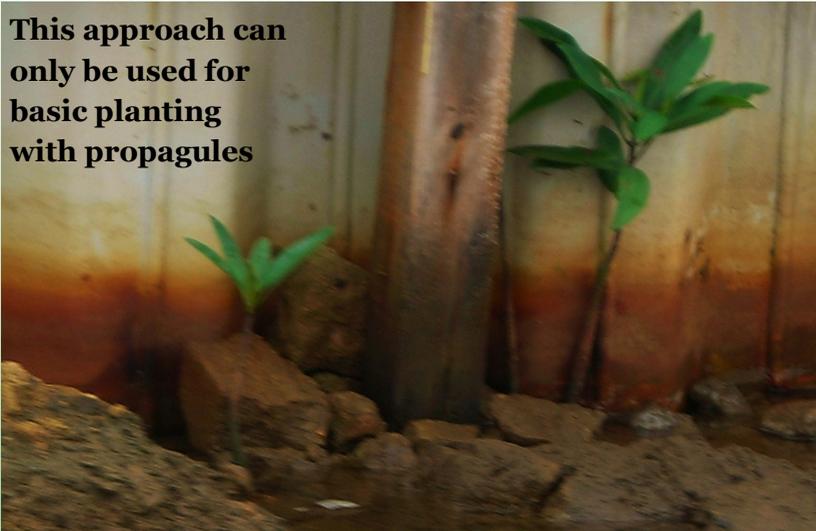
- 1) Cut PVC according to dept of water allowing for at least 4 inches above high tide line after being driven into the ground.
- 2) Place pipes wherever necessary being sure to cover the area that is most in need of help.
- 3) Using a hack saw, cut a line vertically down the center about 1 ft down.
- 4) Fill with soil.
- 5) Place propagule inside.



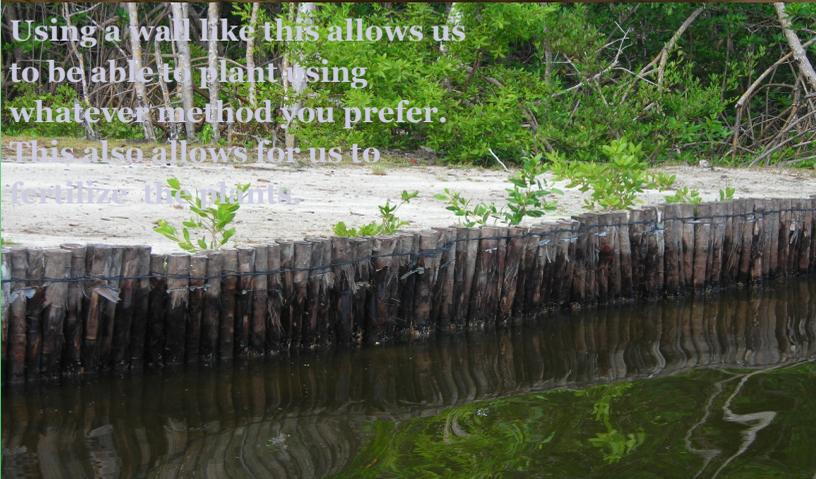
CHANGING THE ENVIRONMENT

Sometimes as hard as we try we can't seem to make any progress. This is when we may have to consider changing the environment. The two main ways I do this is by placing

This approach can only be used for basic planting with propagules



Using a wall like this allows us to be able to plant using whatever method you prefer. This also allows for us to fertilize the plants.



Living With Mangroves

Most people seem to think that there is nothing you can do with mangroves but remove them. However when removed they leave us vulnerable to erosion, high winds and waves, and we lose our fish. Instead of thinking of these as an eye sore, let's try to find all its beauty and let them work to our advantage.

Hedge Mangroves

Mangroves can be hedged as long as you are careful not to destroy its roots and you don't trim too much off the plant.



Making a View

Taller much older mangroves can be trimmed of it's lower limbs, but not roots, to create a window and allow the plant to continue its natural functions.



Putting In Docks

Docks are easily set under and between mangroves. Just simply trim out an area enough for your dock remembering not to cut the roots and build.



Final Encouragement

Always remember that without mangroves, life along the coast and socioeconomic benefits from the coast in Belize and around the world would be much different. Consider land constantly being washed away by wind and waves, extremely muddy lagoons not capable of hosting much juvenile fish, extremely muddy seas with so much pollution and our reefs being replaced by huge algae beds.

These are only a few of the things we could consider that would be different. Truly, without these magnificent plants performing the functions they do, our life in the tropics would be completely different.

We need our mangroves for without them our entire marine environment would either die or have to evolve into alternate states in order to cope with such change.

Please always consider all other options before you decide to destroy mangroves. Better yet, lets look for areas where we can strengthen this vital environment by planting a few.



WWF's mission is to stop the degradation of the planet's natural environment and build a future in which humans live in harmony with nature by:

- Conserving the world's biological diversity.
- Ensuring that the use of renewal natural resources is sustainable.
- Promoting the reduction of pollution and wasteful consumption.



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