Native Forests

Project # 001

Growing Native Rainforests in the Tropical Lowlands of Nicaragua

10 year old Madroño

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Chapter 1

About Native Forests, inc.

Native Forests, inc is a non profit dedicated to helping degraded ecosystems restore their native forest.

Our goal is to re-establish as many acres as fast as possible of native forests, recover lost knowledge about the environmental and medicinal benefits of native forests, and to share our findings through our website.

Our efforts are needed because following a clear cutting of a native forest, it takes hundreds of years for it to return, if at all. And much knowledge about the medicinal benefits of native forests has been lost.

With proper assistance we believe we can establish initial self-sustaining native forests in twenty years. Once started native forests will complete the rest of the work and going forward the forest is an incredibly resilient and abundant ecosystem (assuming you don't cut them down again).

Chapter 2

Native Forest #001: Nicaragua (tropical lowlands)

Our project to regrow a native rainforest in Nicaragua takes place in the central part of the country. A tropical lowland climate that is hot and humid year round with a strong rainy season and a 5-month dry season.

In the 1980s our area was clear cut for lumber, the land was then converted to pasture land for cattle ranching.

Chapter 3

After the Clear Cutting

When a rainforest is clear cut a cascade of negative reactions occur:

1. Rain hits bare clay soil directly, packing it into a hard surface that the sun cooks into a cement like top cover. This stops water from soaking into the root zone, increases evaporation and top soil erosion.

2. The powerful tropical sun hitting the soil directly kills the bacteria, fungus and worms living in the top 1" of soil. Without these organisims dead wood and leaves are not turned into bioavailable nutrients for the plants. Also, soil is not aerated, which is critical for nutrients and water getting to the root zone.

3. Birds and other small animals lose a safe place to live and are forced to leave. This stops birds from eating insects and turning them into manure for the soil. At the same time ants and other pests go unchecked and overwhelm the local vegetation.

4. Without trees the increased solar load on the ground increases local temperatures substantially which is unpleasant for humans and slows the growth of many trees by overheating the soil.

Chapter 4

what happens when native forests return

The problems of clear cutting are instant, brutal, and pervasive. Luckily, once a decent canopy is regrown, all of the problems reverse on their own.

An evergreen canopy is the critical element required for a native rain forest to become self-sustaining.

1) The canopy breaks the hard fall of rain. Slowing the rain protects the soil structure and allows much more water to soak into the soil. Storing water in the soil is required for the canopy trees to survive the dry season.

2) The canopy provides shade and leaves to the forest floor which create a good environment and food for soil bacteria, worms and fungus. They aerate the soil and produce nutrients for the plants and trees.

3) The canopy trees provide habitat for birds. As birds and wildlife return there is more nutrients being cycling and seed spreading. The birds and animals also put pests into a better balance.

Once we help establish a basic canopy, the favorable conditions allow the forest to produce more trees that fill in the gaps in the canopy, attract more wildlife and soak in more rain water each year. Our only job is to get the canopy started, nature does the rest.

Chapter 5

Why Our Work is Needed

Without human help a rain forest takes 300-500 years to return.

Why do rain forests take so long to grow back on their own?

In a rain forest, there is a lot of shade at ground level, so growth in the understory is limited. When a canopy tree dies and falls down, young canopy trees grow tall and skinny toward open holes in the canopy with little competition.

After a clear cutting the ground is exposed to full sun. Young canopy trees grow very slowly and so are overtaken by fast growing 'pioneer' trees, bushes and vines. Pioneer plants trade longevity for speed and require at least 3 hours of direct sun per day to grow.

A note about sunlight. It was surprising to learn how many different kinds of shade and sunlight there are! There is a sliding scale between full direct sunlight and full shade. Some trees have small leaves so some light gets through. This is called filtered sunlight. Depending on the tree there is any ratio of sunlight to shade. For example, our cacao trees will only grow in filtered sunlight. More than 1 hour of direct sun per day is very bad for their health. However, our cacao trees prefer filtered sunlight with 50% sunlight and 50% shade. More sun and their growth slows and more shade limits their ability to produce fruit. Pioneer bushes and vines need just 3 hours of direct sunlight to grow vigourously, but if they are have 50% filtered sunlight all day, they will quickly die.

The below photo shows land that was used as a cattle pasture 8 years ago and has not been touched by human action since. You can see the pioneer bush Manchon dominates the area. Its dark shade has stopped any other plants from growing, all young canopy trees have died. Manchon only grows ten feet tall and is short lived. A "manchon" forest looks like natural vegetation, but it can not establish a sustaining forest and it greatly slows one from forming.

Chapter 6

What we do

Since 2013 we have been observing the land and trying different techniques to help the native rain forest return. With our current process (developed in 2017) our efforts are on track to regrow an initial canopy in 20 years(2037).

Initially, we collected canopy tree seeds, planted them in bags and planted them in the ground, but the die rate was too high because some of the canopy trees have very sensitive roots that if damaged when transplanted will stunt the growth of the tree forever. Transplanted young trees need to be watered until they are established which is not viable at our large scale.

Our current process:

1. We comb through old cow pastures that have been untouched for a few years, which means it is covered in a thick bush of pioneer vegetation. We identify naturally growing young 'canopy' trees. They would certainly die without intervention, but once we find them buried in a bush or under vines we cut back the vines and bushes stealing their sun and forcing them to grow at unnatural angles.

2. We then return twice per year to cut back the pioneers around young canopy trees twice per year until they are about four years old.

Often times there is a pioneer tree 20 feet above a young canopy tree. In these cases we cut branches down from the pioneer tree, carefully so we don't crush any of the young canopy trees. This gives the young canopy tree enough sunlight to grow and room to grow straight.

We have many pioneer trees on our land because these trees (guasimo, coyole and iguatile) produce a fruit cows like to eat. Ranchers maintained their pastures by cutting bushes and canopy trees to give more sunlight to the cow's grass. They would spare the three pioneer trees mentioned above. Then the cows would eat their fruits and redistribute their seeds with some fertilizer and "plant" many more of the pioneer trees.

Many of the young canopy trees have different sun preferences. Through observation we have catalogued what each type prefers. For example, young mahogany like nearly full shade until they are 10 feet tall, where as many others like full sun when they are 5 feet tall, assuming we keep the vines and bushes off of them. Based on the young canopy tree we will trim the pioneer trees above as needed so they get the sun they need and can grow straight.

After about 5 years there is a point where the pioneer trees that were trimmed to give room and sunlight to the young canopy trees need to be cut down completely. This is like taking one step back to take two steps forward – meaning at this point the young canopy trees are 5-10 feet tall which provide little shade or canopy, but need full sun and space to grow so they have room to grow to their natural canopy level 80-100 feet above the ground. The land has more sun and less shade, but it is necessary because without a native evergreen canopy the forest will not sustain. We must clear out the pioneer trees so the canopy trees can grow to their natural height.

3. There are situations where the land has no young canopy trees at all. The land is covered in a thick bush of solid pioneer shrubs and trees and vines. In this case, we are forced to clear cut the land early in the wet season.

   The sun hitting the soil triggers many seeds laying dormant in the soil begin to grow. This includes many canopy trees. We come back in 6 months looking for the young canopy trees and start our process of clearing back the bushes and vines so the canopy tree can grow well.

4. From year four to seven we cut back the pioneer plants once per year. This is how great the growth rate differential is between pioneer and canopy trees. When we cut back the pioneers swamping a five year old canopy tree and come back one year later the pioneers have over grown the 5 year old tree and are taking its sun light! As slow as canopy trees are, they are not lazy – they are working hard to build incredibly hard wood that can survive in a jungle environment for hundreds of years. They are straight and strong and you can't help but notice the sense of beauty about these trees that is not present in the pioneer trees and bushes.

5. In years seven to eight the canopy becomes too high for the pioneers to over grow and there is enough canopy shade is to zap the strength of the pioneers. At this point the forest requires no more assistance from our team. Over the next 10-12 years the canopy fills in, the animals and soil organisms return, nutrient cycling increases and more water is retained in the soil.

After about 20 years from when we start there is a full canopy over the land, the rainforest made up of native trees has been establish and the animals needed to self sustain are in place. It is beautiful, full of abundance and resilient.

However, it will take decades and even centuries to mature into an 'old growth' native rain forest. Sadly, we won't see the magic of that forest – it is a gift we gladly give to the future.

Note: In late 2020, we experimented with running cattle on the land we are bringing back to rain forest with great success. For years five to seven, when we are manually cutting back pioneer bushes, vines and trees there is sufficient sun to grow food for cows. In our experiment the cows ate many of the vines as they were looking for grass to eat. They trampled the pioneer bushes. And their feet chipped the soil and broke up the compacted clay while dropping manure all over. Most importantly, the cows never ate any of the leaves on the young canopy trees. Going forward we will be running cattle on the land we are restoring. Around 7 years into our work, we estimate there will no longer be enough grass to support cattle, but in the mean time, their help is amazing!

Chapter 6

"the best time to plant a tree is forty years ago, the second best time is today"
– Benjamin Franklin

Like our forests, we hope the organization 'Native Forests' is able to self-sustain and multiply so we can create more native forests throughout the world and let them grow so people not yet born can benefit and enjoy them and learn from them.

Thank you for taking the time to read this book – if you ever get the chance stop by with this book and see if you can find the 15 major trees below that make up our rain forest!