

Agroforestry Project in Costa Rica: Food, Fuels & Income to Sustain Local Communities

from Remineralize the Earth and Ocean Arks International

Forest edge in Guanacaste Province, Costa Rica

For over forty years the unique dryland tropical forests of Guanacaste Province in Costa Rica have been clear-cut for timber and planted to exotic grasses in order to expand cattle production. In recent years the land has been exhausted in many places and cattle production is down. Erosion and exposed soils support a diminished flora. Atmospheric carbon sequestration by the plants is at an all time low.

The great exception is the nearby Guanacaste National Park. Under the gifted leadership of Professor Daniel Janzen, fires have been suppressed, and cattle grazing has been reduced or eliminated. Over the last twenty years a new forest has begun to appear and the flora and fauna that encourage the forest's biodiversity have also begun to return. Despite progress in reforestation efforts, the rate of reemergence of the forest is constrained by poor soils.

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UPDATE: September 2007

UPDATE: March 2008

Remineralize the Earth is initiating its first international project in conjunction with John Todd and Ocean Arks International.

Dr. John Todd is an internationally-recognized biologist and a visionary leader in the field of ecological design who was named a "Hero of the Earth" by Time magazine in 1999 and one of the 20th Century's top thirty-five inventors by the Lemelson-MIT Program for Invention and Innovation. He holds four patents and is the inventor of Living Machines, or ecological engines, for the treatment of wastes, production of foods, generation of fuels and the restoration of damaged aquatic environments. John recently wrote us: "First off, I believe that remineralization is the basis of restoring soil fertility. Secondly, that Costa Rica's volcanic rock ground up have enormous

potential. Thirdly that we have to increase organic matter in the soils and add clay-based humic materials to finish off the mix."

We would like to create a successful model for projects that can be initiated in other countries worldwide. Below is a description and photographs of the project.

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John Todd

The addition of rock minerals to the soil is a key strategy for rapid restoration of degraded tropical forests. This project will demonstrate the potential for soil remineralization to rapidly create fertile soils in climates with pronounced wet and dry seasons.

One-year-old Pochote tree in
Guanacaste Province, Costa Rica

We

will compare the growth and health of trees and shrubs planted with and without rock powders. The rock powders will be of volcanic origin and are quarried near the area where the project will take place. We will demonstrate the potential of remineralization on three different groups of trees and shrubs, including native hardwoods of commercial value, fruits and oil-producing trees.

Candidate species include the Guanacaste tree, *Enterlobium cyclocarpium*, *Cocobola*, *Dalbergia retursa*, Ron Ron, *Astronium graveolens*, Guapinol, *Hymenea couri*, *Cenizara*, *Samanea samen*, Cortez Amarillo, *Tabebuia guayacon* and the Ceiba tree, *Ceiba pintandra*, and would contribute commercial products that would help sustain the regional economy.

The species we intend to plant include citrus, avocado (native to the region) and Tamarindo, *Dialium guianense*, producing food for local consumption.

We

plan to focus on the *Jatropha*, a small tree well known for its oil production and its soil building properties. It yields around 1,590 kilograms/hectare/year (3,500 lbs/ha/yr) of oil highly suitable as a biodiesel fuel, to be used as a local source of energy. This particular species promises to be cutting-edge in its ability to both produce fuel and enhance soil fertility, distinguishing it from other many other commonly used sources of biofuel which are highly unsustainable.

View from hillside, Guanacaste Province, Costa Rica

It

would be innovative and promising to show that a biodiesel fuel can be produced that simultaneously builds soils and sequesters carbon. There is great concern about the production of unsustainably produced biodiesel fuels that utilize land that would otherwise be available for agriculture. We look forward to demonstrating the potential to rebuild and regenerate soils and produce energy and food at the same time. This would be a breakthrough development that could lead to larger scale sustainable practices in the future and good news for Lester Brown and the World Watch Institute and others who advocate strategies that will shift us into environmentally successful and responsible policies, as well as good news for peak oil experts such as Richard Heinberg.

The

project will encompass a two hectare (5 acres) plot of land. One hectare will be the control plot without the addition of rock dust. The other plot will be remineralized. The optimal density would involve 1,600 trees per hectare (2.5 meter spacing).

The rate of application of the rock minerals will be 340 kilograms/hectare (750 lbs/h). The material will be applied on an annual basis for a period of five years. All trees in both the test plot and control plot will be given compost in the planting hole at the time of planting. The control area will not receive rock minerals. The trees will not be irrigated during the dry season, unless they are severely stressed.

The test plots will be located 15 kilometers from the town of Bagaces to the east of the Pan American highway in hilly country well below the cloud forests.

Dr. John Todd of Ocean Arks International will be the project's scientific coordinator. William Turley will be the onsite director of the project. He lives full-time in Guanacaste. William Turley is an original member of the New Alchemy Institute and a long time champion of renewable energy technologies. Local Costa Rican residents will provide the majority of the planting and maintenance.

We will continue to update you on our progress.

Compare larger root growth and plant density with rock dust on the left (Click for larger image)

Transplanting seedlings from nursery.

UPDATE: September 2007

Recently, William Turley transplanted some of the "oil" *Jatropha* tree seedlings out of the nursery to the research plot where our project is taking place in Costa Rica. The remineralized group has a larger root mass and also somewhat greater leaf density. The mineralized seedlings are on the left. To quote John Todd, "They look fantastic."

After three months we will receive another photographic comparison. Once planted the situation could change dramatically as far as growth.

We look forward to updating you on the progress of this research project.

UPDATE: March 2008

- Comparing the growth and health of trees and shrubs planted with and without rock powders
- Rock powders of volcanic origin quarried near the project
- Both mineralized and non-mineralized planting soils were mixed with compost and aged cow manure. Current planting mix used 750 lbs rock dust per acre.
- We are now preparing our next planting mix with +/- 6 lbs of rock dust per tree, which at 1,000 trees/acre (2 meter spacing) equals 3 tons/acre.

Compare height with remineralized Jatropha tree on the image on the left

Healthy jatropha seeds

Take a look at these seeds, they have already matured! So our first crop took less than 9 months. We will replant these 15 seeds and keep track of them. The other tree in the same row that had one fruit is flowering again. This is a mineralized row!

Project manager William Turley