

MIT Biochar Study

for Community Forestry Organization
significant potential to use thinnings

March 13, 2010

Washington DC—MBA students from MIT Sloan School of Business traveled to Panama to study revenue potential of forest thinnings in Planting Empowerment (PE) tree plantations. After analyzing uses for smaller trees, they recommend biochar as the most promising option.

A sustainably managed tree plantation can take ten years to yield commercial timber. Part of plantation maintenance is periodic culling of smaller trees, allowing healthier ones space to grow. Usually, thinnings have little commercial value—left to rot, or as firewood.

MIT Sloan Entrepreneurs in International Development Club (SEID) students Lily Russell, Justin Butler and Adam Rein studied commercial uses for thinnings. They decided biochar has the most potential due to its multiple uses and low initial production costs.

"Looking at PE wood fiber uses, we considered industrial fuel, paper, pellets, furniture, biomass power, and others. Producing biochar and fertilizer (with biochar added) are best for PE's model, market opportunities and technical feasibility" said Lily Russell. She added, "To spend time with the PE team and community members gave us perspective into social and environmental impact of the PE business model, and the need for this initiative."

Biochar is charcoal that can be used for cooking fuel, heat source, carbon capture, or fertilizer additive. Indigenous Amazon tribes added biochar to soil to create *terra preta* (black earth). Biochar improves soil by increasing moisture and nutrient retention. Most interesting, it increases organic fertilizer effectiveness. Panama fertilizer producers indicate strong market potential for biochar.

"Some people hesitate to invest due to how long it takes to produce returns" said PE co-founder Damion Croston, adding "Biochar can generate earlier income from plantations, but ahas several end-uses. The MIT team showed out how to capitalize on biochar in our operations."

PE begins to thin plantations in 2011, and build a small, mobile biochar unit to process thinnings. Their goal is to work through each stage of the process—from felling trees to finished fertilizer.

New Zealand

Charcoalab:

Teaching Children

about biochar, soil and climate

Native Natters, issue 3 2007

Naturally Native, native plant pros

Over 10,000 school children took part in an environmental awareness project. In pots donated by Naturally Native, school children joined an international project to help them learn long-term benefits of using charcoal for soil and plant health.

Naomi Luckett, Mount Maunganui mother and Charcoalab member, leads the project in New Zealand. 20 schools took part in the first round, with another 30 joining in the near future. She told us the project's aims:

"Charcoalab is fantastic for kids to learn about climate change, the carbon cycle, sustainability and biochar. It gives them opportunity to contribute to global research on how to reduce greenhouse gas emissions."

The project is very simple, but very effective. Local schools get a kit with six pots, planting mix and corn seed. Three pots are filled with soil from the school grounds, and three are filled with a mix of biochar and soil. Corn seeds are planted in all six pots and over a five week period, the pots are monitored and assessed.

Kids take soil pH readings, measure plant growth and post their results to a website. Thus, they can compare their results with schools all over the world.

Naomi explained, "It's a great kinesthetic experiment where kids get involved. When seeds germinate, they see very clearly the differences between

pots planted with biochar mix and those with just soil."

"Naturally Native has been kind to donate pots—over 1000 so far, and are keen to continue their support. My aim is for 250,000 school children to take participate by end of 2008."

Biochar is very important because it has a remarkable ability to hold nutrients in soil and retain moisture. And biochar boosts cation exchange capacity and aggregate formation (both critical for healthy soils) and also increases soil pH. These properties, along with its shelf life in soil, may explain the high productivity of soils enriched with charcoal.

The New Zealand Ministry of Agriculture and Forestry (MAF) are also onboard with Biochar and committed NZ\$3.25 million research funding as part of the national climate change policy. Encouraged by this announcement, Naomi said, "As more information about biochar gets in the news and research forum, I hope this project gets major funding too!"

To find out more about the project:

www.bionecho.org/charcoalab

International Biochar Initiative

IBI is a non-profit organization of researchers, businesses, policy makers, farmers, gardeners, developers and others committed to sustainable biochar production and use. IBI brings together stakeholders in working groups to produce sustainability standards, classification and evaluation systems for biochar production and use.

Through IBI's hard work, more people recognize biochar is a powerful, simple tool to fight global warming.

IBI was formed July 2006 at the Philadelphia World Soil Science Congress. Representatives from academia, business, investment banks, NGOs, federal agencies, and policy worldwide acknowledged common interest to promote research, development, demonstration, deployment (RDD&D) and commercialization of promising biochar technology.

IBI focuses on quality, sustainability and standards in emerging biochar industry. IBI encourages good industry practices to ensure public confidence that biochar research, marketing and production adhere to high ethical standards, and products are safe to use.

www.biochar-international.org



Naomi supervising

WorldStove:

Transforming Haiti and the World

Kelpie Wilson, Journalist, Biochar Advocate
Huffington Post, April 29, 2010

WorldStove founder Nathaniel Mulcahy has just completed two months of work in Haiti, setting up a pilot project that will provide biochar-producing stoves and jobs for the Haitian people. The project was featured in an Earth Day press release from the UN Special Envoy to Haiti (former President Clinton) as an example of "building back better" by incorporating environmental sustainability in the recovery effort.

Before WorldStove, Mulcahy was an award-winning industrial designer creating consumer products for large corporations like Emerson Appliances. Eight years ago, while lying in bed recovering from a life-threatening accident, he realized that he needed to focus his energies on innovative designs to improve the quality of life for people who were less fortunate. The result was his invention of the fuel efficient, low emissions LuciaStove, named after the canine companion who saved his life.

The breakthrough that set LuciaStove apart from similar gasifier stoves was Mulcahy's patented design with venturi holes to create negative pressure while a flame cap based on Fibonacci spiral geometry prevents oxygen from entering the pyrolysis chamber. The combination delivers better air control for cleaner combustion of gases produced from biomass it uses as fuel. It also produces biochar.

Mulcahy says people are often surprised such a sophisticated design is used for such a simple product, a cook stove for developing countries. Mulcahy answers, "Why should we provide developing nations with stoves that look like cast off scrap? Style or elegance of design usually only involves added thought, not added cost."

Mulcahy considers it a matter of respect not only to offer a clean, efficient stove to the world's poor, but to make sure that the stove is adapted to people's needs and not the other way around. WorldStove pilot projects in several African countries, Indonesia, and the Philippines encountered all manner of local conditions that required changes in

stove setup or manufacturing techniques.

The adaptability of the Lucia stove faced its greatest test in Haiti this winter where Mulcahy carried out a WorldStove Pilot Program in the short space of two months. He not only redesigned the stove to be produced with available tools and materials, but he completed a camp survey. Since the quake, more children were forced to take responsibility for cooking. This made safety a top priority, so Mulcahy developed a Haitian pot stand with heat-shield and windscreen to adjust to the wide variety of pots used in Haiti and protect children from burns.

Local versions of LuciaStove must be tuned to work with available fuels. Peanut shells need different conditions than rice hulls, for instance. Mulcahy found that Haiti has many waste products that can be made into fuel pellets, or used directly, including sugar cane waste, rice hulls, coffee hulls, bamboo, sawdust, coconut shells, mango pits, palm fronds, and waste paper.

One of the best moments of Mulcahy's two months in Haiti was the day he first tuned a locally-built stove to run on the available pellets. That night he was able to cook a plateful of rice, beans and meat sauce for 21 people with only three handfuls of pellets.

Another prize moment occurred when Mulcahy showed up late to a village

artisan's shop only to find the artisan already engaging a crowd of people demonstrating the stove and explaining how the biochar would help restore their soils. The metal workers began to add decorations of trees and birds to the stoves, telling Mulcahy that the pictures represent what will happen if people use the stoves to make biochar—trees and birds will come back to Haiti.

Almost a third of Haiti's land has lost so much topsoil that it is not possible to grow food crops. As a result, Haiti can no longer feed itself and people have fled to the cities where they were more vulnerable during the earthquake. Biochar can be a critical factor not only in restoring topsoil to Haiti but in revitalizing the rural economy and repopulating the countryside.

In the next phase of the Haiti project, WorldStove will work with UN Environmental Programme (UNEP), World Food Programme (WFP) and Haitian Government to build stove-manufacturing hubs and create thousands of jobs to make pellets and distribute biochar in rural areas. Preliminary agreements are in place with 48 agricultural cooperatives to provide crop waste for pellet production. Farmers will receive a proportionate amount of biochar in return to build their soils and increase production.

Mulcahy invites anyone interested to learn more about next steps in Haiti to visit the WorldStove website:

www.worldstove.com

For updates, sign up for World Stove Twitter feeds:

@WorldStove

Kelpie Wilson a writer, engineer working on sustainability issues, and IBI communications editor, is working to promote sustainable biochar as a powerfully simple tool to fight global warming and boost food security. Her novel, *Primal Tears*, is an eco-thriller about a human-bonobo hybrid girl. She explores biochar and other green ideas at:

www.greenyourhead.com

Kelpie was environmental editor and columnist for *Truthout* 2004-08. Her varied work includes journalism, renewable energy R&D, and advocacy to protect Pacific Northwest ancient forests.

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Nathaniel Mulcahy showing designs that metal workers added to the stove wind screens. The metal workers say that trees and birds will return to Haiti when soil is rebuilt with biochar.
Photo: World Stove