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Progressing from Terra Preta de Índios to the Whole World

The Million Tons Bamboo Biochar Project

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Introduction

Bamboo and rattan are integral to the lives of up to 1.5 billion people, roughly a quarter of the present world population. For many of them, life is a constant struggle against poverty and deprivation. With its unique growing capacity and its remarkable versatility, bamboo can provide a sustainable way out of poverty for these communities. Moreover, bamboo is increasingly recognized today on the international scene as an efficient strategy for environmental conservation, rehabilitation of degraded land and long-term carbon sequestration. This is being taken forward by INBAR[1], an intergovernmental organization dedicated to improving the social, economic, and environmental benefits of bamboo and rattan through a global network of partners from the government, private, and not-for-profit sectors in over 50 countries.

Bamboo Charcoal as Biochar

One of INBAR's main achievements over the past 10 years is the establishment of commercially viable community-based bamboo charcoal production units in several countries such as India, the Philippines, Mozambique, Ghana and Ethiopia using simple, inexpensive batch drum kilns and throughput modified thermal gasifier. Building on this success, INBAR, along with the European Union and partners, announced in 2009 the launch of a Bamboo Firewood and Charcoal Programme in Ethiopia and Ghana. This project is the first concerted effort to focus on bamboo firewood and charcoal as a mainstream alternative to timber charcoal in the region.

Besides its use as alternative cooking fuel, INBAR now plans to explore the use of bamboo charcoal as biochar for agricultural soil amendment and carbon sequestration. By improving the soil fertility, biochar could significantly help the target rural communities fight soil degradation and hunger, still one of the main issues in countries such as Ethiopia, whose Global Hunger Index was ranked « Extremely Alarming » in 2009.

At the same time, with its potential to be a long-term carbon sink, biochar could represent an effective solution to reduce the levels of CO_2 in the atmosphere and thus mitigate climate change on a global scale. Bamboo is a rapidly growing woody plant that can produce up to 100 tons or more of biomass/ha annually. The carbon needed during this process comes mainly from atmospheric CO_2, making biomass in itself able to sequester a considerable amount of carbon. However, this sink is organic and subject to degradation, while a long-term carbon sequestration method is required to mitigate effectively climate change.

A Million Tons Bamboo Biochar per Year

It is therefore proposed to undertake large-scale intensive production of bamboo biomass and convert it into charcoal which is inorganic and can be stored and its stocks verified easily. Conversion efficiencies of 40% can be achieved relatively inexpensively (higher efficiencies need higher initial investment) and in a carbon-neutral way, ensuring a net sequestration of carbon by application of biochar in the soil.

Starting from converted oil drums used as charcoal kilns, modified thermal gasifiers have been developed that can continuously produce 100kg of charcoal per hour or around 2.5 tons in 24h. Based on such units, it has been proposed to set up a million tons/year charcoal project, with the bamboo grown and harvested by poor rural communities, thereby generating rural employment and income, and reducing poverty, while sequestering carbon at the same time. Importantly, this will actually contribute to reduction of atmospheric carbon.

A million tons of charcoal would need 2.5 million tons of biomass a year. This would need 25,000 ha to be grown with bamboo intensively. There would be not only substantial rural employment generation, but this would result in greening on a mass-scale, with considerable environmental benefits. Bamboo is known to enhance the quality of soil, increase water capture and recharge, reduce soil erosion etc.,

all impacts that would durably and on a large scale generate other economic and non-economic benefits to the communities and their environment. Alternatively, nearly 1200 MW of renewable power could be produced from this biomass, and generate in addition a substantial amount of carbon credits.

Conclusion and Upcoming Work

Complementing the above is a strong integrated programme to take forward biochar in participation with the community. A project of CIBART[2] with INBAR on Bamboo Livelihoods Business Enterprise Project for Primitive Tribal Groups of South Gujarat in India has established partnerships with government, rural communities, social enterprises and the private sector to integrate into rural livelihoods development the production from well-maintained and sustainable bamboo resources of bamboo charcoal for domestic fuel, and of bamboo biochar for agriculture purposes and carbon sequestration.

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