Bamboo solutions for the world

Bamboo is a wonder plant by all accounts. Its many uses include erosion control, watershed protection, soil remediation, and environmental greening. It is also the fastest growing timber plant on earth, with many applications as a wood substitute. It is this plant, which forms the central feature of the world, a project that aims to tap the social and ecological potential of the world through a five-year program involving the following activities:

- Establishment of a bamboo nursery with a diverse collection of species.
- Field planting of bamboo in selected areas.
- The implementation of a Training Program for the local community (including the cultivation, maintenance, harvesting and utilisation of bamboo).
- The development of a community-based business for ornamental plants, bamboo handicrafts and housing.

The project needs a three-acre parcel for the nursery and initial infrastructure. 'Bambustique' will carry out the implementation of the action plan, a registered foundation with homeowners as board members. They try to raise basic funds for the first 5-year program - including the nursery, a model bamboo house, a preservation facility, training courses, and workshops.

Increased awareness of bamboo's immense potential will create livelihood opportunities and contribute to the well-being and quality of life. In addition, the cultivation and use of bamboo as a timber substitute will reduce the pressure on hardwood forests. Very successful bamboo housing projects in Colombia, Ecuador, and Costa Rica have shown that China and Asia are not the only regions, which can benefit from bamboo, but that Latin America and the Caribbean are also in a position to take advantage of this remarkable natural resource.

About Bamboo

Traditionally thought of as the poor man's timber, bamboo has in recent years emerged as a much sought after timber for industrial applications and environmental enhancement. Bamboo is the fastest growing timber plant on earth. It is a multipurpose plant with numerous uses. In particular bamboo is useful for combating erosion and for rapidly greening barren land areas.
Key Features of Bamboo

- Bamboos grow more rapidly than trees and start to yield within four to five years of planting.
- Bamboos can be selectively harvested annually and non-destructively.
- The establishment of a bamboo plantation requires a minimal capital investment and builds upon the inherent plant-cultivation skills of local farmers and foresters.
- Bamboos are excellent for restoring degraded lands and protecting against soil erosion.
- Bamboos may easily be intercropped with vegetables.
- The whole bamboo plant is beneficial for rural livelihood. The poles (technically referred to as ‘culms’) are useful as a construction material; the young shoots are edible; the leaves make good animal fodder; and branches are useful for making handicrafts.

Executive Summary

This proposal involves establishing a community based bamboo program, with a nursery and pilot project to be set up. The project will be executed by Bambustique a registered foundation under the stewardship of Gert van Delft of the Netherlands. Oprins Plant NV will provide technical assistance.

The aim of the project is to promote bamboo cultivation and develop community based bamboo industries that are sustainable and which will provide a means of income generation for local people.

The project will be developed over a period of 5 years in the following stages:

1. Local Nursery: Establishment of a nursery with a diverse collection of bamboo species, including a model house and preservation plant.
2. Pilot Plantation: Establishment of bamboo stands in selected areas (including marginal lands and eroded areas.)
3. Training Program for the local community (including bamboo cultivation, maintenance, harvesting and utilization)

Project Framework

The project is designed as an integrated system developed in 4 stages for promoting sustainable bamboo agro forestry and industry in . Bambustique intends to establish the basic component of a system, which should be developed by and for the local communities.
Stage 1 of the project involves the introduction of a bamboo nursery to develop the cultivation of bamboo planting material for local plantations.

Stage 2 consists in developing a pilot bamboo plantation, which aims to serve as a model for other plantations. The plantation is intended both for environmental enhancement (e.g. erosion control) as well as for raw material production. Bamboo poles and shoots will therefore be selectively harvested such that the production can be maintained at a high level year after year.

Stage 3 is an outreach phase wherein local people are trained and equipped with skills to maximize the productivity of the plantation and utilize raw materials in an economical way. The transfer of know-how generated through the training program aims to provide skills leading to job creation, productivity and income.

Stage 4 involves the gradual development of a community-based business involving the production of bamboo products and the expansion of the bamboo plantation base.

It is expected that as the community based bamboo program develops and provides economic rewards, there will be an increased role for nursery plant production (Stage 1), plantation development (Stage 2), improved know-how (Stage 3), and production efficiency and competitiveness (Stage 4). The various stages therefore provide basic components of a bamboo program that should evolve and strengthen itself through community action and participation. Each of the stages of the project is discussed below.

Stage 1
DEVELOPMENT OF A BAMBOO NURSERY
General Plan

The local nursery will include propagation facilities and equipment, as well as technical advisers. Oprins Plant NV will supply a collection of tropical bamboo species plants. These plants will serve as the mother stock for the plants to be propagated locally. The bamboo nursery aims to be a cooperative venture between Bambustique and the community members. The objective is that members of the community should be:
- directly involved in running the nursery,
- direct financial beneficiaries of the activities.

Local community members will be supervised by Bambustique and will be provided with training and technical assistance to ensure the professional management of the nursery.

Components

The nursery project has 3 general components, namely: (1) propagation material; (2) land with model house; and (3) nursery infrastructure.

1. Propagation Material: will consist of a collection of various species of tissue cultured bamboos. The plants are clones of elite mother plants. In other words the plants will generally have superior characteristics to randomly selected propagation material. The young plants are well rooted and are vigorous growers.

2. Land: at least 3 acres of land will be suitable for a large scale nursery production. Ideally the land should be leveled, with a water source or irrigation facilities nearby. A bamboo house with modern breakthrough technologies will be build which serves as the domicile of the Bambustique Foundation. A preservation plant (high roof) will be build to treat harvested culms against insect attacks.

3. Infrastructure includes the following elements:
   - a shaded area for young plants
   - a potting area
   - storage area (for tools and fertilizer)
   - soil mixing area
   - an open stocking area (preferably with a ground cover cloth)

An economical solution using local materials will be implemented for the nursery construction.
Production System

The production system to be applied has been tried and tested by Oprins Plant in bamboo projects in South East Asia, Africa, and South America. The system involves several stages:
1. Acclimatization of tissue culture propagules
2. Potting of plants
3. Shade house maintenance and watering
4. Hardening of Plants

Marketing and Distribution System

A marketing brochure/leaflet will be developed whereby the bamboo farming are explained. The brochure will cover such topics as cultivation, management and sustainable harvesting, and preservation. Plants from the nursery will initially be distributed to other places. As demand for bamboo plants increases, "satellite nurseries" can be set up for the hardening and stocking of plants.

Stage 2
ESTABLISHMENT OF A PILOT PLANTATION

General Plan

Pilot plantations of totalling 5 ha will be planted in selected areas, including marginal and eroded areas. These pilot plantations aim to serve as a demonstration project that can be replicated in other regions. The plantation aims to promote the sustainable use of bamboo as a wood substitute. At the same time the plantation will:
- bring degraded and unproductive land into productivity and provide a source of income generation for poor rural people.
- broaden the cultivation skills of local farmers through creative agro forestry and introduction of permaculture systems.

The plantation will be sustainable managed. During the first three years, suitable areas of the plantation can be intercropped with vegetable crops, hardwood tree species or palm trees. After four to six years, bamboo can be selectively harvested every year. With proper management, the plantation can be productive indefinitely.

Bamboo from the plantation will provide:
- a source of timber and fiber that can be locally processed and sold
- a source of food (bamboo shoots) that can be consumed or marketed locally and export to the US.
Activities

The main activities involved in establishing the pilot plantation are:

- Land selection
- Selection of suitable species
- Land clearing and preparation
- Planting and applying fertilizers
- Maintenance and harvesting

Good land selection will be important to show both the economic and ecological potential of bamboo. Bamboo generally grows best in porous soil with good drainage and relatively high moisture content. To combat erosion bamboo can be planted with very good results on slopes, around lakes or ponds, or along rivers and streams.

A variety of high yielding species will be planted, each of which will be selected for its material qualities and suitability for various applications (i.e. wood, crafts, fiber, shoots). Some species that are targeted for this project include:

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<th>Species</th>
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<tr>
<td>Bambusa balcooa</td>
<td>Schyzotachyum</td>
<td>Guadua angustifolia</td>
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<td>Bambusa bamboos</td>
<td>Bambusa dolichocladal</td>
<td>Guadua chacoensis</td>
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<td>Bambusa multiplex</td>
<td>Bambusa tuldoides</td>
<td>Gigantocloa albostriata</td>
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<td>Bambusa oldhamii</td>
<td>Dendrocalamus asper</td>
<td>Gigantocloa textilis</td>
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<td>Bambusa ventricosa</td>
<td>Dendrocalamus giganteus</td>
<td>Gigantocloa apus</td>
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<tr>
<td>Bambusa vulgaris</td>
<td>Dendrocalamus strictus</td>
<td>Pseudosasa Japonica</td>
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<td>Bambusa vulgaris var. striata</td>
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Maintenance activities mainly involve weeding and tending. As with all agricultural crops, it is particularly important that the newly planted bamboos are protected from grazing animals.

Inter-cropping in newly established bamboo stands increases the productivity and economic returns from the land. Crops used for intercropping should not be heavy consumers of soil nutrients, as they will retard the growth of the bamboo. Many crops are however very suitable in combination with bamboo, including beans, maize, cassava and green manure crops. Inter-cropping with bamboo is usually limited to a period of 2 years, because once the bamboo canopy has developed, vegetation will be deprived of sunlight.

Management

The management of the pilot plantation will involve a monitoring program to check on the growth and performance of the bamboo in the planted area.

Monitoring activities will be carried out 4 times a year to record selected parameters including the growth (height and diameter of culms) and shoot production.
Program

General Plan

The training program involves the development of a training scheme and the eventual establishment of a Bamboo Training and Information Center. Practical training for local community members will be organized with the aim of transferring the latest know-how concerning bamboo preservation and utilization. The training will be provided by Bambustique with the assistance of international experts who will be invited.

Topics to be covered in the training program include:

- Bamboo for environmental enhancement and erosion prevention
- Bamboo Harvesting and Grove Maintenance
- Preservation methods
- Water purification system for domestic water waste.
- Processing techniques
- Building techniques
- Quality control
- Marketing

Activities

1. **Workshops**: Training will be organized in the form of workshops guided by experts. Bambustique will organize at least one workshop per year. The precise content and planning of workshops will depend on the availability of experts, who will be asked to participate on an honorary basis.

2. **Training Center**: The establishment of a bamboo training and information center will be planned. Cash donations and contributions in the form of publications, tools, machinery, and equipment will be sought from sponsors for this purpose.

Stage 4

**DEVELOPMENT OF A COMMUNITY BASED BAMBOO INDUSTRY**

The development of bamboo resources will be complemented with the development of community based industries that can serve the local market. The general concept is to support the development a sustainable local industry that is competitive and which can provide jobs and income to bamboo farmers and their families.

Several options are available including the following:

- Bamboo housing and construction
- Cottage industries (e.g. involving handicraft production)
- Furniture production
- Charcoal production
- Household products including mats, toothpicks and sunshades.
- Bamboo shoot production.

These options will be studied with the view towards local and regional demand and marketability. The development of a bamboo industry is expected to be a long-term process coinciding with increased skillfulness in bamboo production and marketing. The business is expected to develop as follows:

- Harvest and sale of bamboo shoots
- Harvest and sale of poles for horticulture and agriculture (e.g. props for banana plants, building material, etc)
- Small scale cottage industries (basketry and handicrafts)
- Sale of processed poles (i.e. poles that have undergone a preservation process)
- Production of furniture and household items (e.g. blinds and mats)
- Housing and building

An essential requirement of this development process is to maintain a balance between industry and the environment. In concrete terms this means that bamboo resources (plantations) should be developed to meet the raw material requirements of local producers.

**Project Timetable**
Expected returns

The bamboo program is expected to generate profits for the Foundation and community through various activities, specifically:

- The sale of bamboo plants from the nursery
- The sale of bamboo poles and shoots from the plantation
- The sale of finished bamboo products

Returns for the Nursery

It is expected that bamboo plants can be sold from the nursery at a price of 0.80 USD to plantation developers. The gross profit margin for the nursery will be between 40% - 50% depending on the volume of plants produced and sold. Assuming that a total of 50 ha of bamboo are planted using plants from the nursery, a gross profit from the nursery can range from 6400 - 8000 USD.

Returns from Plantations

It is estimated that the total cost of developing a bamboo plantation is between USD 500 - USD 750 per ha. Costs will vary according to the land preparation that is needed. This amount includes the cost of planting material, which will be between USD 300 - 400, depending on the planting density used.

1 ha of bamboo with 400 clumps will provide a harvest of approximately 2000 poles per year from the fifth year onward. While the selling price of
2000 poles per year from the fifth year onward. While the selling price of poles needs to be determined, in Latin America the price ranges from USD 1.00 USD 10 per pole. This means that revenue from sales of 1 ha can range from between USD 2000 and up per year. Usually the cost of establishing the plantation is recovered after the second harvest period. Harvesting however can be maintained annually with minimal investments for the landowner/farmer.

**Returns from Bamboo Product Production**

When the bamboo plantation is integrated with a production system, the value added of the bamboo is multiplied significantly. In simple terms, a handicraft item produced using a pole worth 1 dollar can be sold for 10 dollars. Actual returns will vary from product to product. When the market for bamboo products is well developed, a bamboo plantation of one ha can provide a very good means of livelihood for an entire family.
The economics of bamboo plantations has been tested and proven throughout the tropics. It however needs to be tested in order to show that bamboo agro forestry can provide local communities an alternative form of income generation that is beneficial to the local environment.

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