SHORT NOTE

Bamboo for soil stabilisation and other usage in Nepal

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Top-soil washing by rainwater and riverbank cutting by flood during monsoon is common in Nepal. This pathetic depletion of soil from the country could be minimised by planting bamboo whose rhizomes and roots have good soil-holding capability. Bamboo grows fast and can be used as fuel-wood and fodder, which have great economic value, and a wide-spread usefulness.

According to Wilson (1988), between 30 and 75 tons of soil are washed away annually from each hectare of deforested land, depleting 249 million cubic meters of soil per year. With its steep slopes and rushing rivers, Nepal is one of the most erosion-prone nations (National Research Council, 1993). The valuable top soil of Nepal could be protected through planting bamboo along the banks of every river or stream from Mechi in the east to the Mahakali in the west.

There are altogether 47 genera and 1,250 species of bamboo (Ueda, 1960, all of them grow very fast. The best growth of four feet in twenty-four hours was recorded by late Dr. Koichiro Ueda of Japan in 1960. A single bamboo clump can produce up to 15 kilometers of usable pole (up to 30 cm in diameter) in its lifetime. Bamboo is the most universally useful plant known to mankind and approximately 2.5 billion people, mostly the poor in developing countries, depend on it for a wide range of uses and livelihoods (Anon. 1997). Bamboo and rattan represent an annual commercial value of over US$14 billion globally (Anon. 1997). The rhizomes and roots grow about 12 feet a year and remain fertile for up to ten years. They build a massive underground network and hold and stabilise the soil very well. The biomass of bamboo increases "10 to 30%" annually as compared to "2 to 5%" for trees (Farrelly, 1984). Mature culms (stems) are used in Nepal in 220 ways (Poudyal, 1998). The leaves are fed to cattle, and the young shoots of some species are delicacies to people. Thus, bamboo, without doubt, is an economic plant. Bamboo has been associated with the Nepalese people from birth to death. "Bamboo generates more oxygen than a similar-size grove of trees. Some experts assert that even a small stand of bamboo, because of its rapid production of oxygen, may reduce the temperature of a garden by as much as ten degrees" (Alexander, 1996).

Selected bamboo species of Nepal

Kalo Nigalo (*Phyllostachys nigra*): Black bamboo, 2 cm to 4 cm in diameter and 3 m to 4 m tall. Its height does not create shade-problem to the crop. Its black culms are incorporated with rattan furniture.

Kat Bans (*Phyllostachys* spp.): Four to seven cm in diameter and six m to seven m tall. The uniformly thick, strong, straight culms of this species should be promoted into furniture, especially for leg and other straight frames. The young shoots are edible.

Tite Nigalo (*Drepanostachyum intermedia*): It is two to four cm in diameter and three m four m tall. This species is widely incorporated in basketry and furniture, and is depleting very fast in Kathmandu Valley. The young shoots are edible.

Taru Bans (*Bambusa tulda*): Seven to 10 cm in diameter and 15 to 20 m tall, Taru Bans is widely used as scaffolding in house construction.

Bhalu Bans (*Dendrocalamus giganteus*), Choya/Ban Bans (*Dendrocalamus hamiltonii*), Latthi Bans (*Dendrocalamus strictus*), Mal Bans (*Bambusa nutans*) could be planted in the warmer regions.

On the other hand, a participatory bamboo plantation programme could be launched along the river banks with minimal costs involved.

Immediate benefits of bamboo

Bamboo expands vigorously and its rhizomes form massive underground network, holding the soil as powerfully as they can. Bamboo absorbs a substantial amount of moisture. Hence, the flood water of a river "spills" into the bamboo clump (cluster of stems) rather than into a farm. Since the bamboo culm (stem) has more water in it, there will be a greater volume of oxygen being produced

from the leaves as well as from the green culms during photosynthesis. And a greater volume of carbon dioxide will be consumed in this process. Thus, bamboo is the best plant to purify the polluted air of the valley. Also it will consume enough carbon dioxide to lower the temperature of its surroundings, thus reducing the green-house effect.

The total length of the rivers and stream banks in Kathmandu Valley is about 135 kilometers. At least 405,000 cubic meters of stone would be required to make about three meter tall and one meter wide embankment. The cost of construction materials, their transportation, and labor-costs would be tremendously high. The rivers, in due course, could excavate under the structure, and the embankment could even collapse at places, and the river would claim its bank again.

Utilisation of bamboo thus produced along the riverside could be done through basketry works for which appropriate training should be given to a group of interested people. If the basketry and constructional needs of bamboo are fulfilled then the excess bamboo will become a valuable raw material for pulp and paper industry. In fact, bamboo has already proven itself as a money plant in some South-East Asian countries.

The fodder is very nutritious for the lactating cow/buffalo and help produce more milk. With these scenario, below are listed some of their immediate benefits:

Benefits

- Help stabilise river-banks, and erosion-prone fields
- Help increase crop production
- Employment generation
- Help minimise in-migration
- Income generation from sale of bamboo, fruits, dairy products
- Availability of fodder for livestock
- Availability of fuelwood, and help reduce fuel-wood harvesting from forests
- Help rehabilitate wildlife by improved habitat
- Provide habitat for pollinators like bees, butterflies, birds, insects
- Production of more oxygen and consumption of carbon dioxide
- Increment in property value and beautification
- Minimisation of the Greenhouse effect.

Should this lofty idea be implement as planned, many farmers of Nepal could derive economic benefit. In the mean time, the valuable soil would be protected too. Therefore, dissemination of information on the bamboo and related species should be promoted as much as possible in Nepal.

Acknowledgement

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References

Anon. 1997. INBAR (International Network for Bamboo and Rattan) Booklet. New Delhi: International Development Research Centre, 20 pp.

Alexander, J. 1996. Bamboo In: MET HOME, Nov./Dec. 108, 110, and 112 pages.

Farrelly, D. 1984. **The Book of Bamboo** San Francisco: Sierra Club Books, 332 pp.

National Research Council. 1993. **Vetiver Grass: A Thin Green Line Against Erosion.** Washington, D.C.: National Academy Press, 171 pp.

Poudyal, Punya. 1998. End Use of Bamboo in Nepal, *American Bamboo Society Newsletter*, 19(3): 12-17.

Ueda, K.1960. Studies on physiology of bamboo with reference on practical application. Tokyo, Prime Minister's Office, 167p.

Wilson, E. O. (Ed.) and Frances M. Peter (Associate Ed.). 1988. **Biodiversity** Washington, D.C., National Academy Press, 386 p.