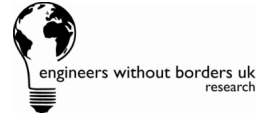


**engINDia & EWB-UK Research**

Project Proposal: Bamboo as a Permanent Structural Component

Full description of Problem:

Many people cannot afford concrete and steel houses and the use of bamboo as a structural replacement for steel has been highlighted as having the potential to lower the price of a new house.

However, the properties of bamboo vary. It would be beneficial to identify the ideal species of bamboo for use as a building material, how to cultivate it in Pabal or India in general and most importantly, a method for assessing the strength of the bamboo. Also, an investigation into the lifespan of the bamboo and any methods of expanding it if necessary would be of interest; a lifespan approaching 50 years is desired.

How the local community will use the proposed solution:

Bamboo could be utilised as a low-cost building material, and, if the conditions are appropriate, the plant could be grown locally.

Estimate of the economic benefit anticipated and plans for training of the local community:

A small project at Vigyan Ashram calculated that the cost of a simple reinforced concrete home with a corrugated metal roof for a family was around Rs. 21,000. If a comparably sized home was constructed predominately from bamboo it would only cost Rs. 8,000. The bamboo house did not have a lifespan comparable to that of the concrete construction in this case. If a successful system promoting bamboo as a viable building material is developed there would be less dependence on more expensive steel but land and resource use would be required for bamboo cultivation.

Full description of the local situation:

Weather information for Pabal, such as temperature, humidity and rainfall can be found in the engINDia Final Report. This also contains information on the geography of the region and its geology.

The poorest people in Pabal and its surrounding area earn approximately Rs. 2000. per month. The wealth of the citizens varies greatly as local businessmen and the educated can be quite affluent; for example the local homeopathic doctor earns Rs. 30,000. per month. End cost and simplicity should be at the forefront of any solution.

Industrial chemicals and fertilisers are easily available from Pune, a city 30km from Pabal. A chemical treatment used at Vigyan Ashram to extend the life of bamboo in the region of 10-15 years is a mixture of sodium dichromate, copper sulphate and boric acid in 400kg, 300kg, and 100kg quantities respectively in 10,000 litres of non-distilled water. There are health concerns over the use of sodium dichromate as it is a carcinogen; inhalation, ingestion or skin absorption are harmful, and may be fatal. Interestingly many people were unaware of this.

Full description of relevant infrastructure available locally:

Vigyan Ashram, an NGO operating just outside Pabal, will act as a test centre for any worthwhile solutions. It has a small but proficient workshop geared towards assembly and is also home to Fab Lab, a project set up by the Centre for Bits and Atoms at MIT (U.S.). Fab Lab provides hi-tech equipment in developing areas to promote technical know-how and development. For a list of the tools available at Vigyan Ashram please refer to the engINDia Final Report.

Useful background reading or resources:

See engINDia Website: <http://www.engindia.net/resources.htm>

Organisation Contact Details

Name of Organisation engINDia

Contact engindia@mit.edu

Web site www.engindia.net

Background information engINDia exists to promote appropriate and sustainable engineering solutions in developing areas. Currently the program focuses on Pabal, Maharashtra, a rural village in India located 80 miles east of Mumbai. Pabal is home to Vigyan Ashram (see details below), an educational institution that focuses on rural technologies. The existence of Vigyan Ashram and Pabal's proximity to Mumbai made it the perfect starting point for engINDia.

engINDia is a partnership between 6 students from the University of Cambridge, Massachusetts Institute of Technology (MIT) and the Indian Institute of Technology Bombay (IITB). An expedition was conducted during the summer of 2005 to the

area of Pabal, Maharashtra. There, the engINdia team worked with Vigyan Ashram and the local community to gain an understanding and appreciation of the development issues faced by rural India which could be tackled through engineering.

Name of Organisation Vigyan Ashram

Web site <http://vigyanashram.com/>

Background information Vigyan Ashram is an educational institution situated just outside Pabal, Maharashtra, about five hours east of Mumbai. The focus of the institution is on rural education and enabling the rural population of Pabal and the surrounding areas to learn about technology and start their own businesses. The facility includes classrooms, labs, workshops, and living quarters for students. There is also a Fab Lab installed at the site (for more information, see <http://fab.cba.mit.edu/>). VA is striving to become an internet service provider for the area and to that end many of the organization's activities are becoming focused on internet-related projects, such as internet kiosks for rural farmers. A few people at VA speak English, but some knowledge of Marathi or an interpreter will be needed in order to carry out work in the area.