Bamboo Construction for Development

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World Bamboo Congress, Antwerp, Belgium, April 2012
1. INBAR and the Global Bamboo Construction Programme
2. Why Bamboo for Construction & Development
3. Example of INBAR Construction Initiatives:
   – Engineered bamboo: Beijing, China
   – Bamboo for flood resilient homes: Guayaquil, Ecuador
   – Bamboo and Adobe: Zhemgang District, Bhutan
   – Pre-shaping Bamboo: Utthan, India
4. Conclusions
To Improve the well-being of the producers and users of bamboo and rattan within the context of a sustainable bamboo and rattan resource base
INBAR in Figures

• INBAR established in 1997 in China as a global intergovernmental organization
• Regional offices in
  • India
  • Ghana
  • Ethiopia
  • Ecuador
• Budget 2011 5.6 mln USD
• 60 Staff – 40 at HQ
The World of Bamboo & INBAR member countries

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Global Bamboo Construction Programme

- Consolidate, coordinate and support strategic and adaptive research and development
- Disseminate knowledge on how bamboo-based construction can be applied to poverty reduction and more resilient homes and communities
- Support the development of markets for bamboo-based construction

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Bamboo is as strong as mild steel in tension and as strong as cement in compression.

Bamboo matures in 3-6 years.

It takes 60 days for bamboo to grow 60 feet.

Earthquake resistant properties e.g. Costa Rica (7.6 Richter Scale)
Appropriate treatment is essential

Untreated bamboo

Cheap, fast, effective: buy it today, use it today. Biodegrades: lasts for 1-3 years depending on exposure.

Treated bamboo

Has a 20-30yrs life expectancy if correctly harvested, handled and treated, and sheltered from weather in use. Hence offers a greatly increased contribution to community resources.

Source: Humanitarian Bamboo, 2009
Appropriate Treatment
Appropriate Joinery and Craftsmanship

- Joints often weakest part of bamboo structure
- Joints require specialized skill
- Very labour intensive process
- Few tools dedicated to bamboo
Local Perceptions of Bamboo
Supportive policy is often lacking

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<td>2 ISO standards; National building codes approved in Peru &amp; Columbia; Technical Guidelines – Bihar, India</td>
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Initiative 1: Engineered Bamboo
Engineered Bamboo – Beijing, Teahouse

- Typical 2 x 4 USA structure
- Prefab. & installed onsite in days
- Earthquake resistant to Chinese Intensity Level 8
- Meets Chinese national standards for indoor air quality
- Fire retardant for over 1 hour
- approx. US$225-250/m²
- Draft building code for engineered bamboo under development
Technology Adaptation & Transfer

• CFC project establishing production capacity 3000m³ 12mm-thick/year bamboo ply in Ethiopia & Nepal

• Engineered bamboo adapted for emergency shelter in Sichuan, China

Top: Maseno, Kenya, ABTT Ltd., Changsha, China

Bottom: Sichuan, China, International Centre for Bamboo and Rattan (ICBR), China
Initiative 2: Guayaquil, Ecuador
Local Pre-fab Factory
Initiative 2: Guayaquil, Ecuador

- 300,000 existing poor quality bamboo homes
- Introducing improved designs, preservation & engineered panels
- Lifespan improved from 5 to 20 years
- New 32m² unit at US$4000 - US$1135 for typical units
Initiative 3: Bamboo and Adobe, Bhutan

- House uses 23.5m³ less wood than equivalent timber framed house
- 140US$/m²; half the price of a equivalent concrete home
- Adapted local carpentry skills
- Funded by CFC
- Will contribute to Bhutan’s 60% forest cover constitution pledge

Zhemgang District, Bhutan
Social Forestry Division, Department of Forest & Park Services,
Ministry of Agriculture & Forests
Initiative 4: Pre-Shaping, Utthan, India

- Bamboo pre-shaped with wooden formers
- *Bambusa vulgaris*, *B. bambos*, *Dendrocalamus strictus* & *D. asper*
- May radically decrease complexity of working with bamboo for rural communities
- Next step: non-destructive testing kits for strength grading
Conclusions

1. Bamboo construction technologies well demonstrated & proven
2. Growing interest in bamboo construction from research community
3. Adapting improved bamboo designs into existing architectural practices crucial for acceptance and uptake
4. Urgent need to develop strength grading methods for round culm bamboo + building codes for engineered bamboo
5. Bamboo in construction offers opportunities for local employment and income generation

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Thank You!

Find out more at:

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