KEEP BAMBOO STRONG

Bamboo-Internationally

Ar. Neelam Manjunath

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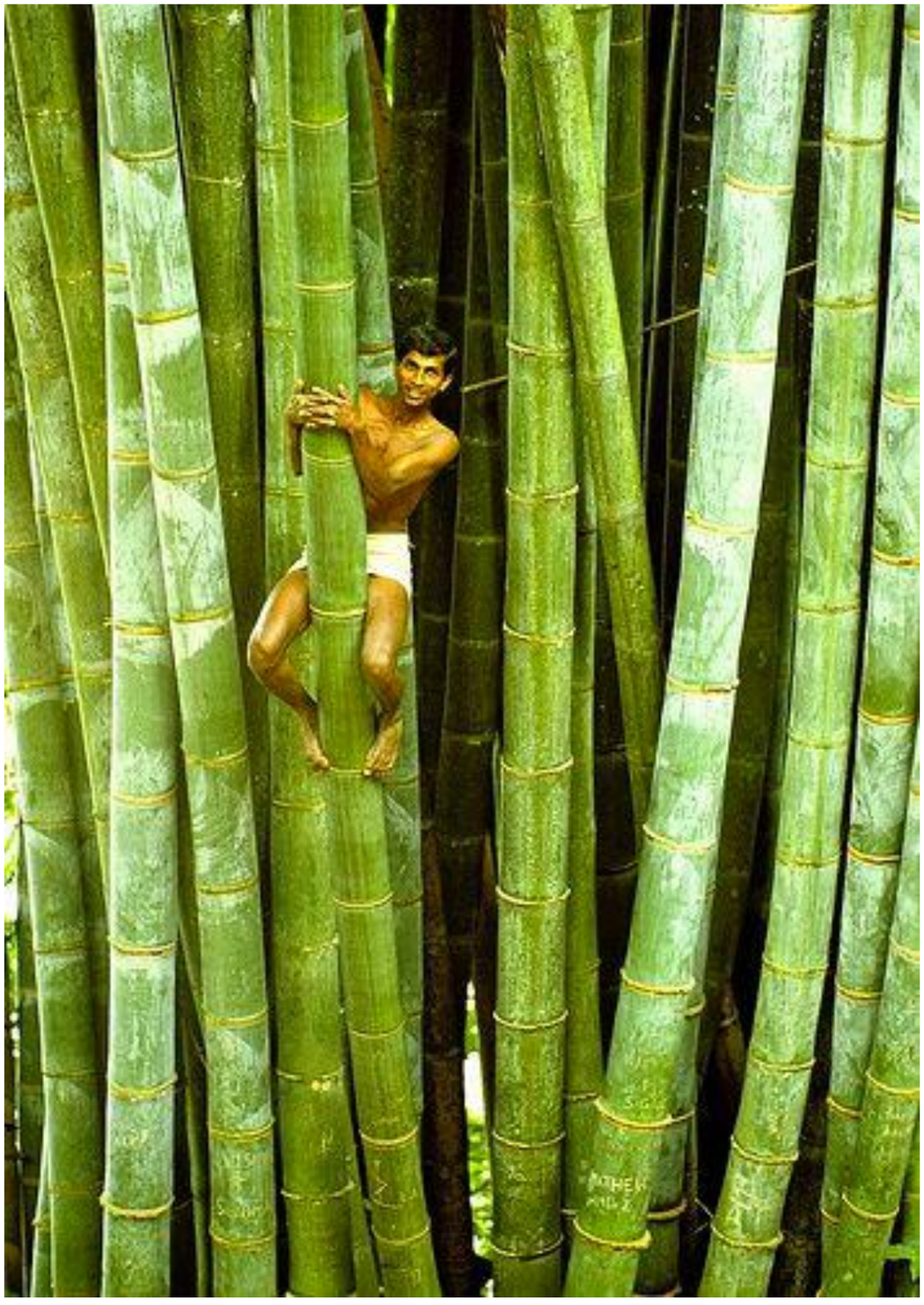
CEO, Founder and Managing Trustee,
Center for Green Building Materials and Technology, Bangalore, India
Member, National Governing Council, Bamboo Society of India
Chairman, Karnataka Chapter, Bamboo Society of India
World Bamboo Ambassador, WBO
Key Expert, Bamboo Construction Task Force, INBAR



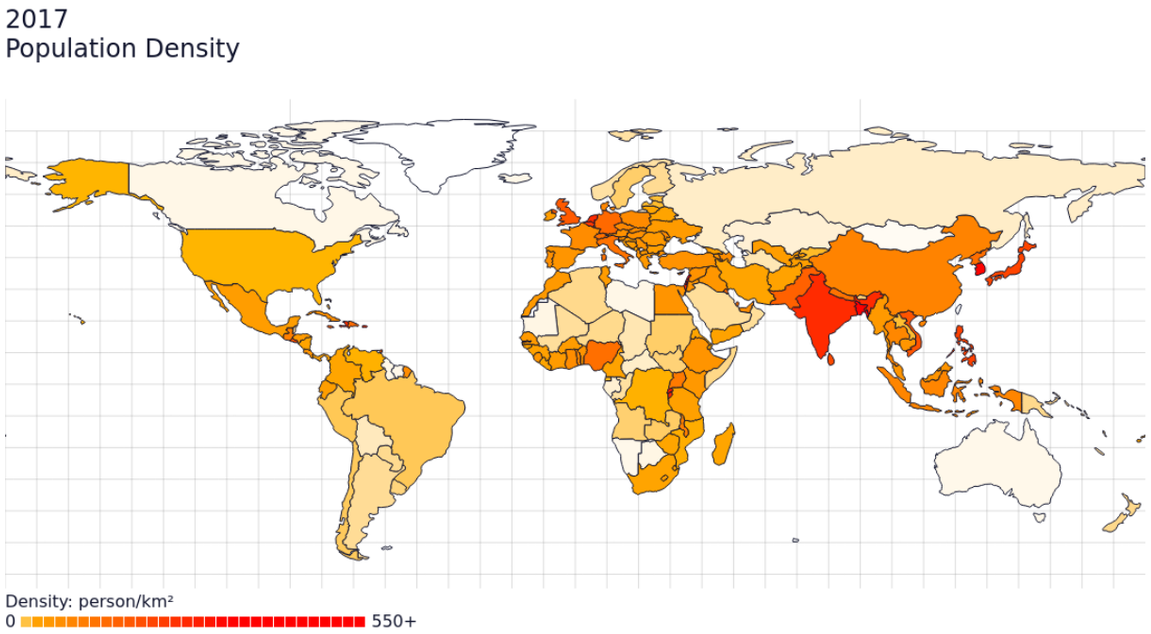
Context

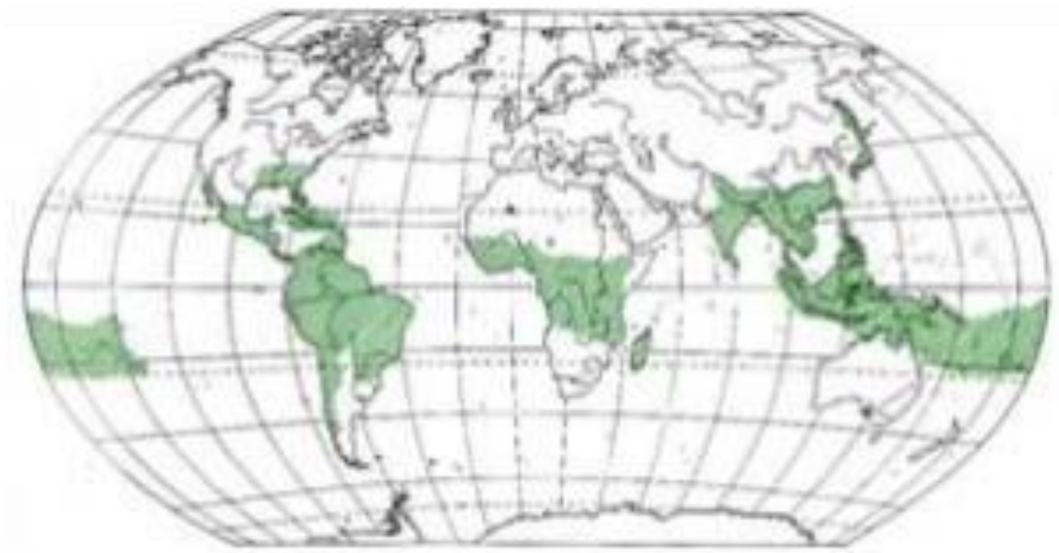
Bamboo has been used for construction since time immemorial. A large population of the world even today lives in houses which use bamboo as a major material of construction. Though, a majority of them do it more out of compulsion rather than by choice. Due to this, most of the traditional technologies of construction with Bamboo has got lost.

With the renewed interest in local and natural materials such as mud, Bamboo, etc. as eco-friendly materials for mitigation of global warming, Bamboo has come out as one of the most promising and viable material for the building sector.

But most of the research on Bamboo as a building material remains in the lab and does not reach the field. The institutions and organisations have no interface with the building fraternity. Several civil society organisations are trying to bring change but are plagued with severe dearth of human and financial resources .

Bamboo for Sustainable Development





There are over 1200 species of bamboo in 70 genera found across the world with its distribution closely resembling the population density distribution (figure 1) and the frequency of occurrence of natural disasters. The global bamboo belt reaches approximately 1000 miles above and below the equator.Bamboo holds the potential to solve the problems of safe, economical and eco friendly buildings and infrastructure, respecting the triple bottom line of Sustainable development in large areas of the world. It could be the vehicle of integrated development for millions below the poverty line, thereby being an agent of equity of resources to the masses on this planet.

V - UN-SDGs and Bamboo

The 17 Sustainable Development Goals (SDGs) global goals set by the United Nations are interrelated though each has its own targets to achieve. The SDGs cover a broad range of social and economic development issues also known as "Transforming our World: the 2030 Agenda for Sustainable Development" or 2030 Agenda in short. The SDG goals apply to all countries both "developed" and "developing" nations. [(1)]Through the actions as outlined in the tables above , Bamboo can have a major role to play in achieving several of the SDGs. For discussion in this paper, in relation to the Building and related sectors we have addressed actions related to the following goals as part of the Action Plan:

GOAL 7: Affordable and Clean Energy—Energy from Bamboo by gasification ,ethanol, charcoal etc is a bio energy fuel that is affordable, nonpolluting and uses waste from the bamboo sector.
GOAL 8: Decent Work and Economic Growth- Livelihood options from the bamboo sector will ensure inclusive and sustainable economic growth and productive and decent work and life for a big section of the society.
GOAL 9: Industry, Innovation and Infrastructure-Manufacturing is a major source of employment. In 2016, the least developed countries had less "manufacturing value added per capita". With high value bamboo based industries, we could try to change this scenario.
GOAL 10: Reduced Inequalities—Bamboo based economy could be one solution to reduce this gap with the less developed countries HDI going up.
GOAL 11: Sustainable Cities and Communities—The target for 2030 is to ensure access to safe and affordable housing. Construction with Bamboo with other local and eco friendly materials could provide localised solutions easy to implement and achievable.
GOAL 12: Responsible Consumption and Production— Using local and eco-friendly materials like bamboo , their production methods and waste management will help achieve this goal.
GOAL 13: Climate Action—Economic development and climate are inextricably linked, hence effort has to be made to minimize their negative impacts on the environment. Bamboo can play a major role here in industries like building , infrastructure, energy etc
GOAL 15: Life on Land—Bamboo and bamboo based products like ply, wood, boards, charcoal etc., could help preserve forests as it is a resource friendly material.
GOAL 16: Peace, Justice and Strong Institutions— Bamboo based industries can provide economic stability to the most marginalised sections of the society, thereby ensuring peace and justice.
GOAL 17: Partnerships for the Goals—Countries and organizations should cooperate instead of compete. Developing multi-stakeholder partnerships, Public-private partnerships that involve civil societies to share knowledge, expertise, technology and financial support is critical to overall success of any action plan.

Our efforts

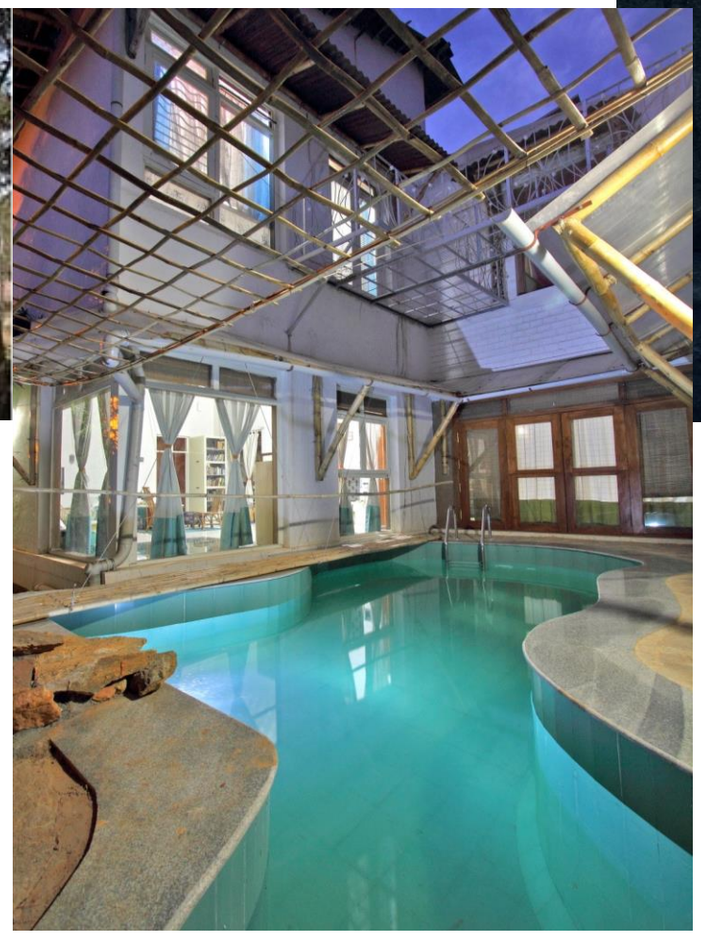
I - CGBMT and Manasaram Architects - Building with Bamboo , workshops, courses, advocacy and R & D

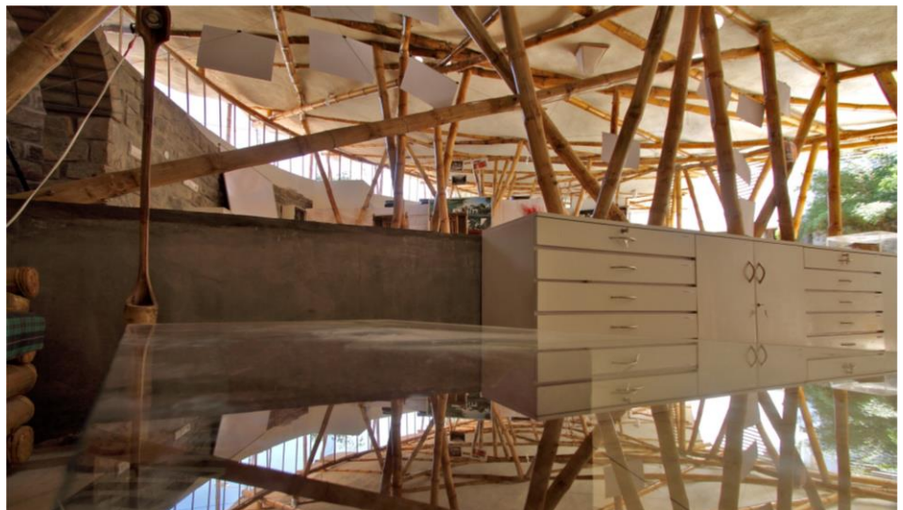
Manasaram Architects is an architecture firm based out of **Bangalore, India**, working in field of sustainable architecture and development for over 30 years and using bamboo extensively in their projects for more than two decades. They have done variety of public and private projects including housing, residences, schools and institutions, hospitals, resorts, community centres, infrastructure projects etc.

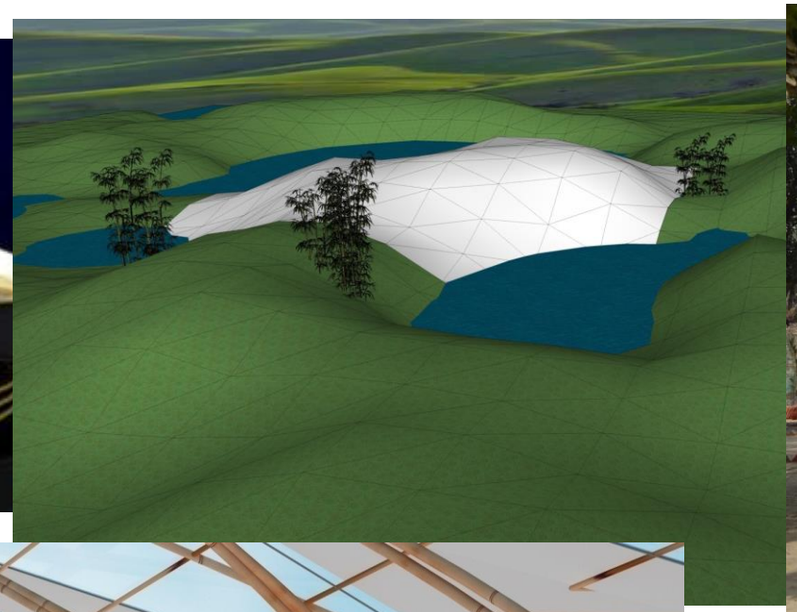
CGBMT, Center for Green Building Materials and Technology, Bangalore, India, is a trust established in 2004, working in the field of Eco-education for all sectors of the society with seminars, conferences, workshops, courses in Bamboo and Sustainable Development, R & D etc since its inception. It is running structured courses on Bamboo Application Technology along with Dayalbagh University, Agra, India and several other resource organisations since 2011. The courses start from 8th grade in vocation format and are to be taken to the doctorate level.

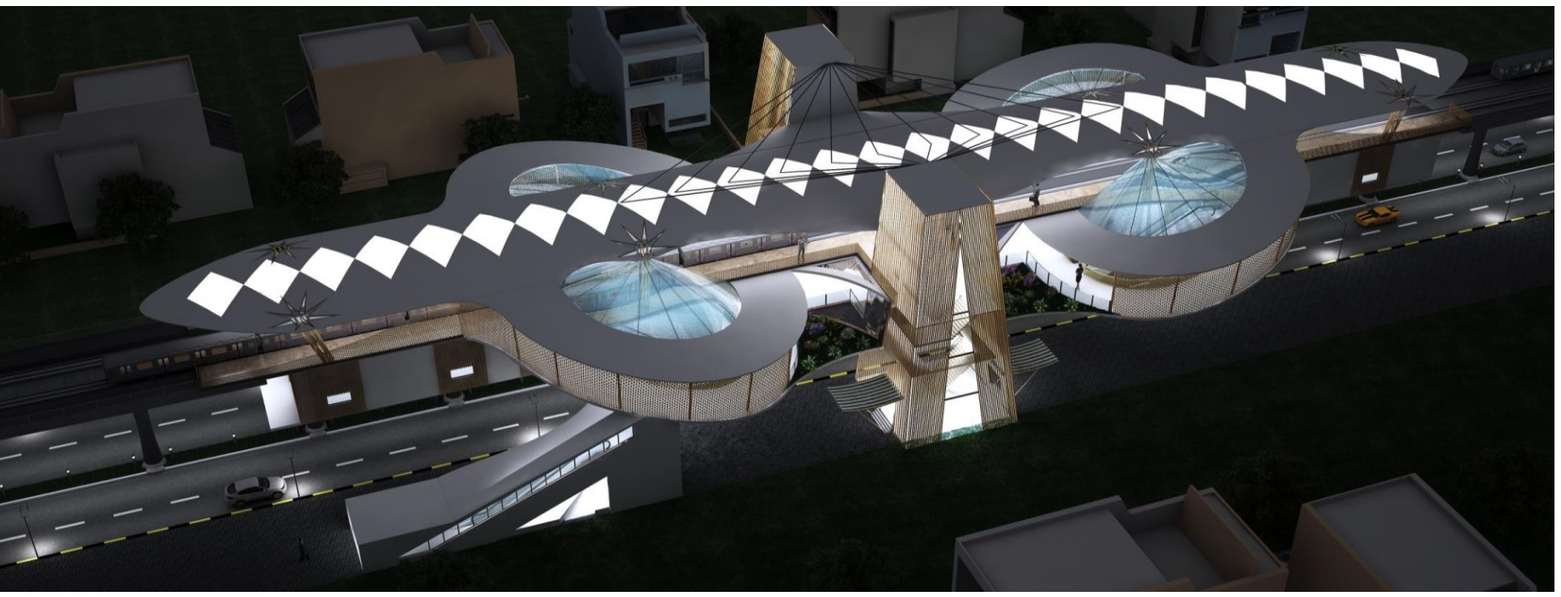
The two organisations together with the support of **WBO, the World Bamboo Organisation,** have initiated this project of **"Mainstreaming Bamboo in the construction sector globally" . Ar Ruben Boas from Portugal from CGBMT was our Research Asst and Archdaily our Media Partner.**

Some of our key projects









World Bamboo Congress 2004, New Delhi, began my International journey with Bamboo

Met Dr N D Tiwari, IFS(Retd), Susan Lucas, Linda Garland, Simon Velez and many more

The Lunardi Prefab House, Bracciano, Italy 2004

World Sustainable Building Conference,2005, Tokyo

Presented paper on Bamboo for Buildings

World Bamboo Congress 2008, Bangkok, Thailand

Presented paper on Bamboo
in my Building projects

World Sustainable Building Conference,2009, Melbourne, Australia

Presented paper on Bamboo for Buildings

Architecture Festival Awards, 2009, Barcelona

House of 5 Elements

at GSD, Harvard
University Club, 2010

Bamboo Symphony , My office,
World Architecture Festival Awards,
2010, Barcelona, Spain

World Sustainable Building Conference,2011, Helsinki, Finland

Presented paper on Bamboo for Housing

Lafarge Innovation Awards, 2013
for Bamboo Symphony

World Bamboo Congress 2012,Belgium

Presented paper on Skilling for the Bamboo Sector

Visit to Manasaram, CGBMT by Swedish delegation, 2013

International Workshop at Mulhouse,

France for ENSAD, Paris, Hyperworkx,2014

Cocoon, 2014

Aarhus School, Denmark and CARE college ,Trichy
Material: Bamboo and Areca palm plates

Hungarian House of Music, Budapest, 2014, International Design Competition

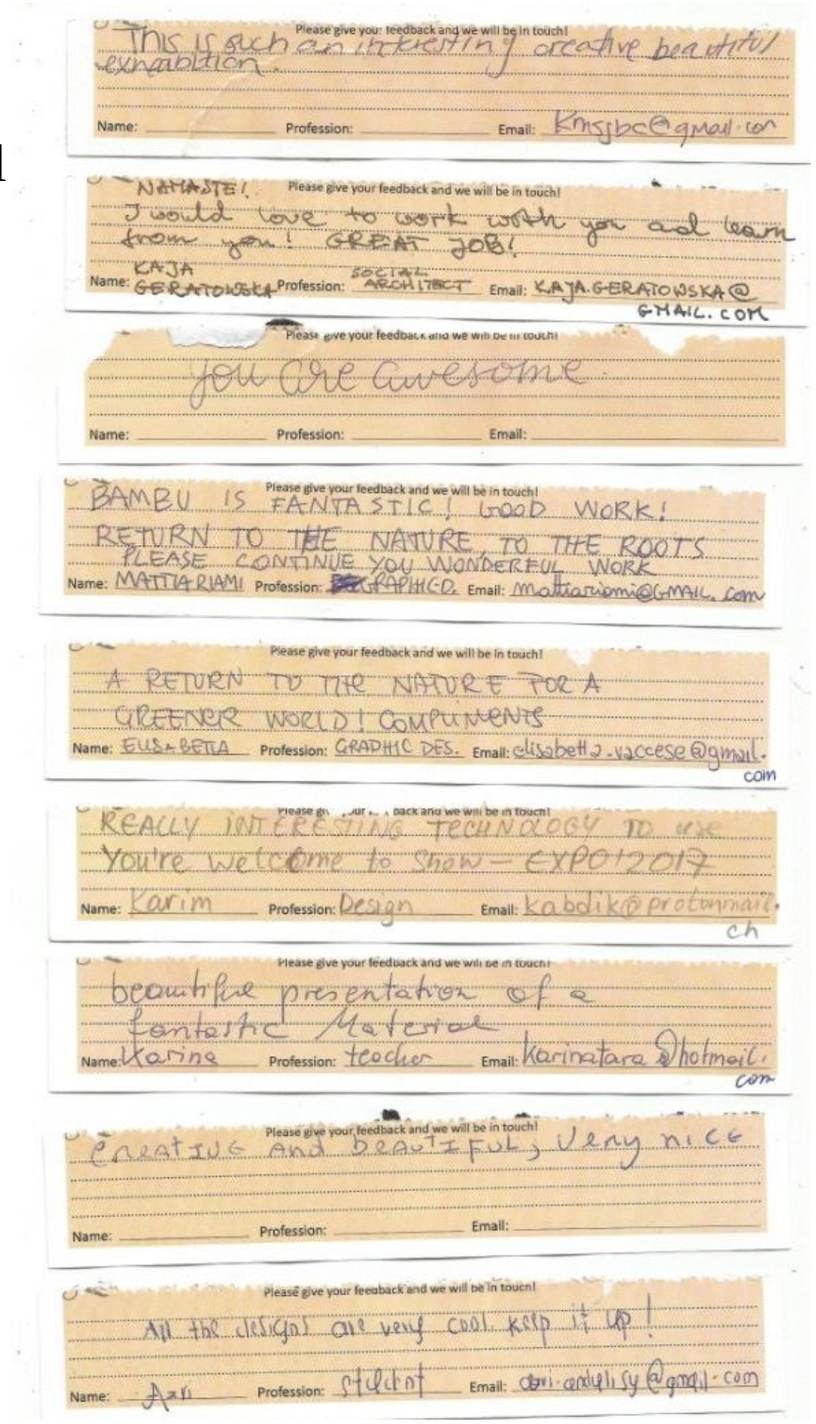
World Bamboo Congress 2015, Damyang, South Korea

Presented paper on
-Mainstreaming Bamboo in the building Sector
-Structured courses on Bamboo

@ Green Village, Bali, 2015

II - “Symphony of the Bamboos”- Venice Biennale 2016

In 2016, they participated in the prestigious International Architecture Exhibition, the Venice Biennale 2016 at Venice, Italy to promote Bamboo in an international forum. The aim was to promote bamboo at the global scale to the topmost architecture, buildings and design fraternity and also get feedbacks from the visiting public about the usage of the material bamboo. It was also anticipated to find synergy with other interested organisations and forge collaborations with them for further R & D, dissemination of information and awareness building. The exhibition was held for 6 months from May to November, 2016. The exhibition was concluded with a one day lecture cum workshop and it was summed up as a book titled “Symphony of the Bamboos - Story of the (Bamboo?) Architect. It was launched internationally as an e-book at the end of the exhibition.



World Bamboo President's visit to , CGBMT, Bangalore, 2016

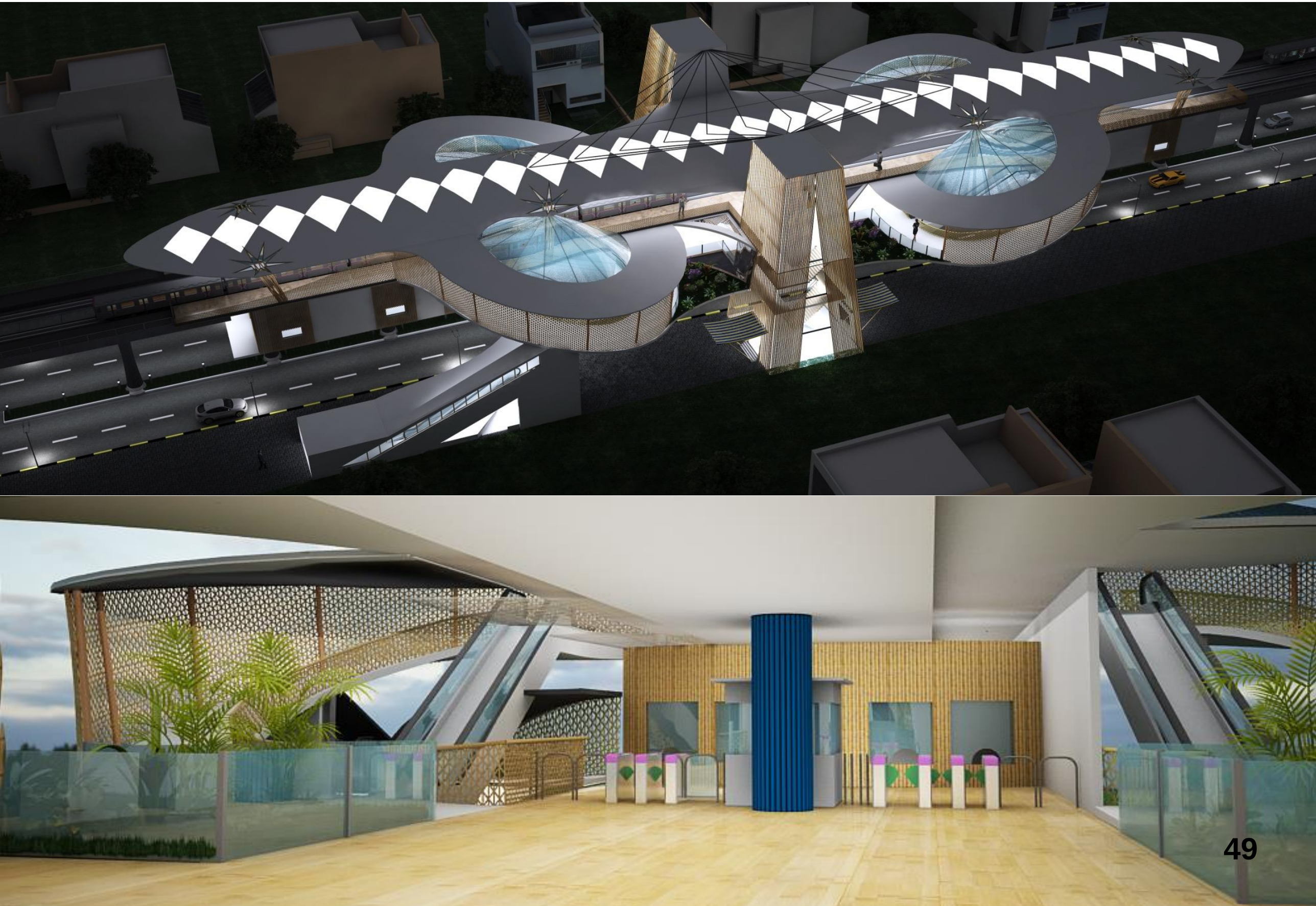
THE HINDU

NATIONAL - KERALA

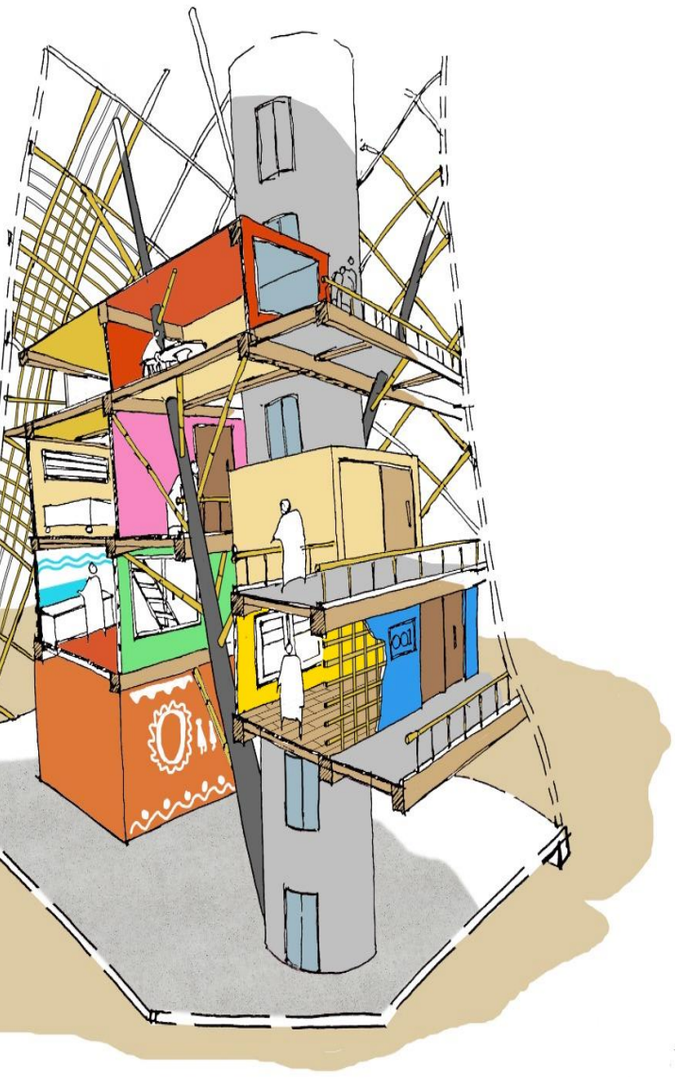
Let's build with bamboo

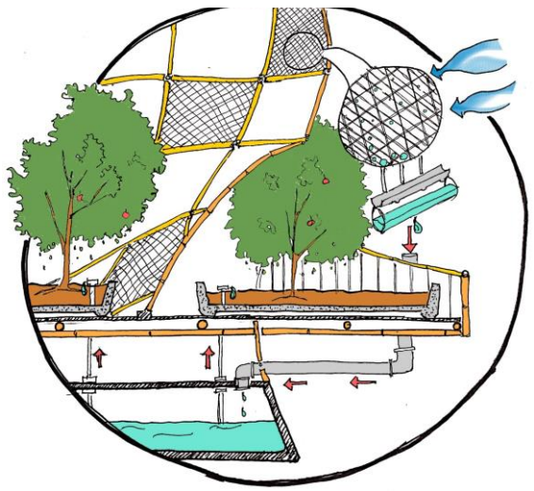
Rethinking the Future Awards, 2017 Cultural, Office Building, Housing and Transportation

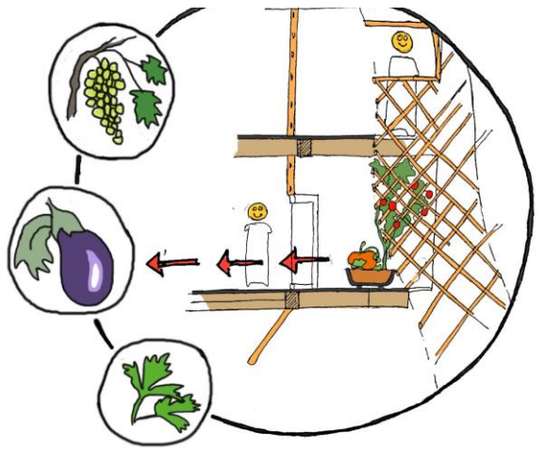
Metro Station, Bangalore, 2013



Metaslum, Bangalore







BARC, 2018, Beizing, China


IISD

Daily #3

BARC Bulletin

A publication of the International Institute for Sustainable Development

Wednesday, 27 June 2018

Global Survey, 2018, presented at World Bamboo Congress , Mexico, 2018

RESEARCH REPORT on

"Mainstreaming Bamboo as a Building Material in the Construction Sector Globally"

by:

Neelam Manjunath

Research assistance by:
Ruben Boas

CGBMT

CGBMT

WBO

Survey partner:
ArchDaily

Manasaram Architects

9th August 2018

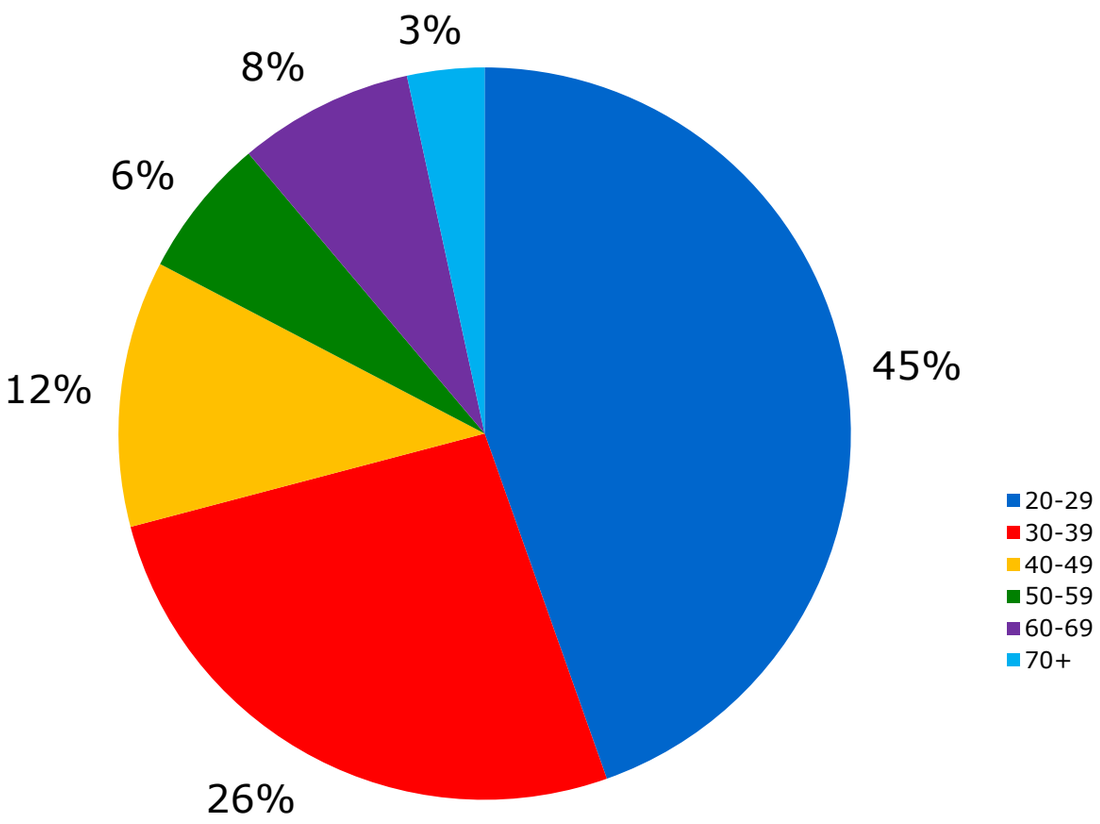
III - Global Survey for identification of issues

Formulation of Survey

The survey was conducted as a single part with 15 questions with MCQ’s and 1 question on suggestions by the participant as per their experience/perception of the material. By the time of the data collection, we got a fairly distributed participation, geographically. Nonetheless the survey will continue to circulate so as to form a balanced and comprehensive data base for further action.

Following points has been taken into assumptions and consideration:

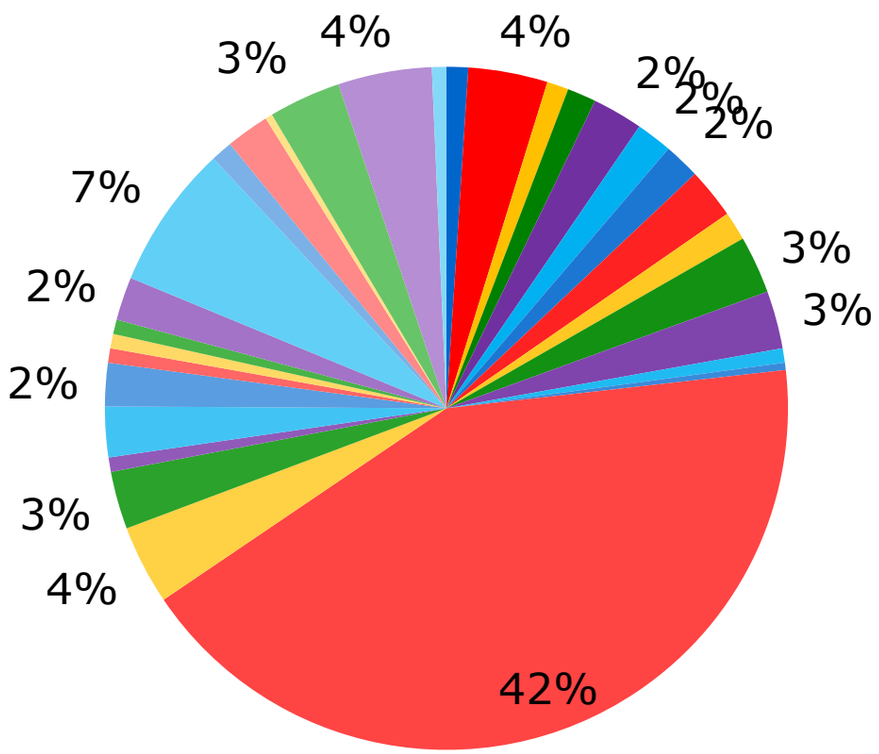
1. The survey is directed to all building professionals;
2. The options given for the questions are based on existing market conditions, industry and research;
3. We can get a fair distribution of participants globally as bamboo has caught the fancy of architects and designers across the globe despite the challenges, at least from the bamboo belt;



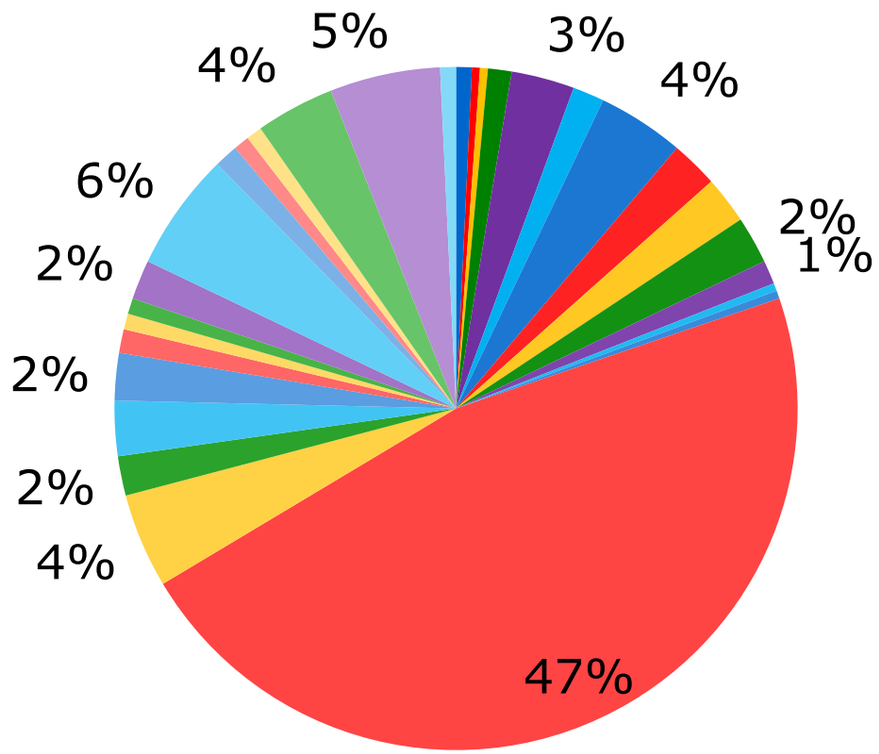
There were responses from more than 30 countries. Asia contributed with 61 % of the responses which, where bamboo is more widely used. Even though bamboo is not native from Europe, the continent showed a significant interest on the subject with 20% of the replies.

Age:
The major contributors to the survey
were the younger people aged 20 to 29 years old.

Country of Graduation:



Country of practice



Break-up by continent:

Asia – 61%

Europe – 20%

Americas – 17%

Africa – 2%

Oceania - <1%

Summary of the survey

The survey has a significant participation from India. However the fair amount of replies from other countries and continents gives us have an approximate idea of how bamboo stands globally, and what people think are the best strategies to mainstream Bamboo. Nonetheless the survey will continue to circulate so as to form a balanced and comprehensive data base for further action.

Some of the conclusions from the surveys are as follows:

- **Most of the Architects and designers want to use bamboo but find themselves handicapped due to several issues like academics, availability, execution, etc. ;**
- **Very few of the professionals cited the eco-friendly properties of bamboo for choosing it for use in their projects ;**
- **Most of the enquired, thought bamboo could be bought at the current prices if quality is assured.**
- **Most architects preferred to get off-the-shelf bamboo products and components for ready usage in their projects**
- **Most professionals think bamboo cannot be used for large, multi-storeyed buildings, complex structures, skyscrapers, infrastructure projects, long span bridges etc. They think it can be used only for small temporary type of structures, resorts cottages, etc.**
- **No architect talked about bamboo as replacement of steel as reinforcement etc. or replacing wood in furniture, flooring, door windows, etc.**
- **Support of Govt. policy was mentioned by many for building bylaws, FAR, etc. but Schedule of rates and Building codes has been mentioned specifically by a handful.**

World Bamboo Workshop 2019, Imphal, India

Presented paper on Bamboo
Society of India and my Building projects,
Invited to build the India Pavilion

INDIA PAVILION

India pavilion is an abstract depiction, emphasizing on the transitional stages of a leaf (People).
The leaf (People) even after loosing connection with the plant (nature), is playing a part in the ecosystem, trying hard to stay alive and rethink on the lost connect before it decomposes and becomes part of the Earth. Something that we as humans also should follow through the course of our lifetime and make use of every opportunity that strikes at us.
The India pavilion depicts this emotion of nature using bamboo as a skeletal material and emphasizing on cutting-edge technology like **concrete cloth** for the cover. The structure would be a **double curve cantilever for about 7m** following the principles from the same leaf. Further to finish the structure, we would have cement slurry to form a **bamboo reinforced shell structure.**


04-08/feb
DESIGN GREEN
World Bamboo Workshop
INDIA 2019
Breaking the Challenges of Bamboo for a better future
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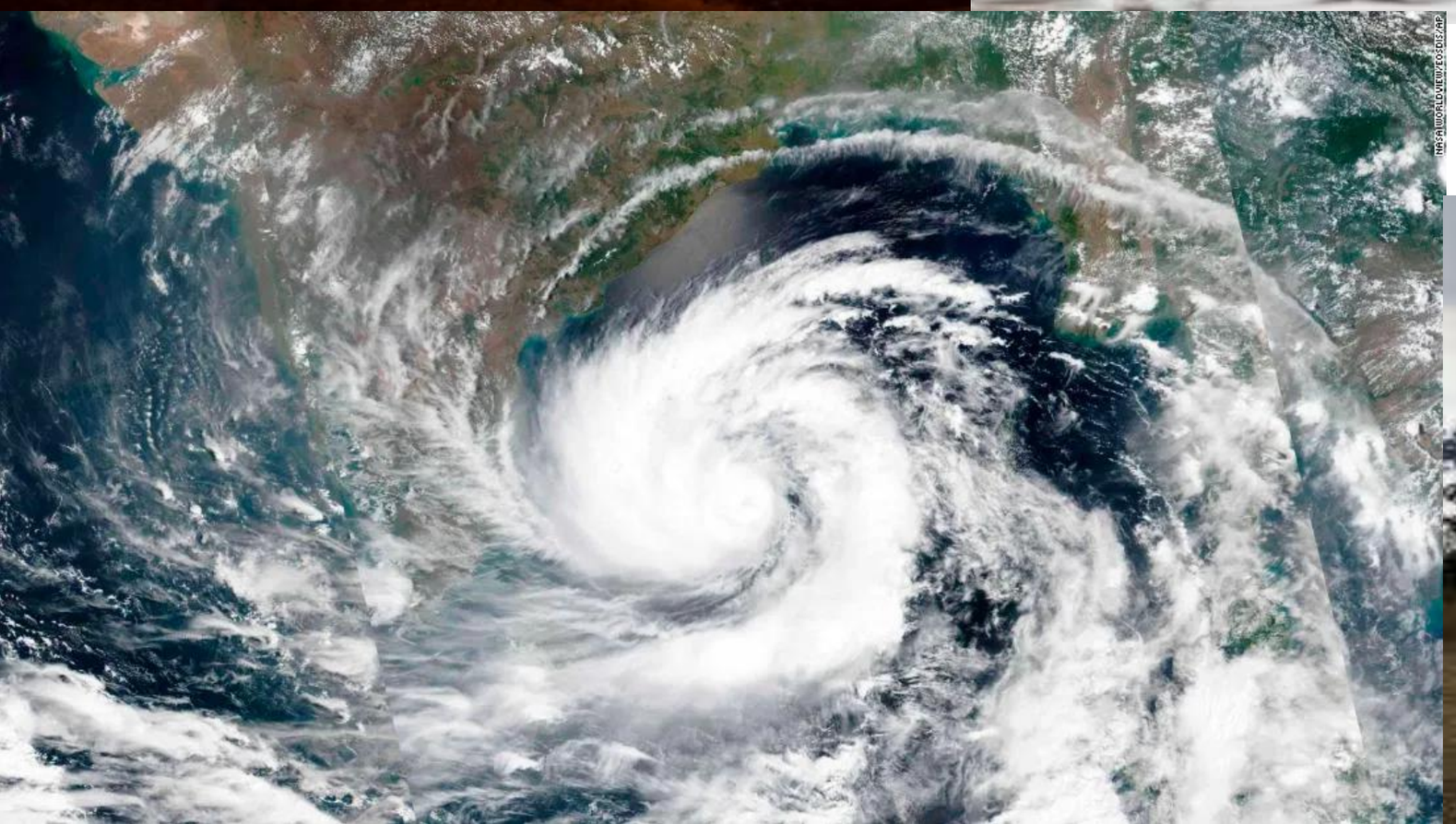
MANJUNATH

Fibra Awards, 2019, Paris

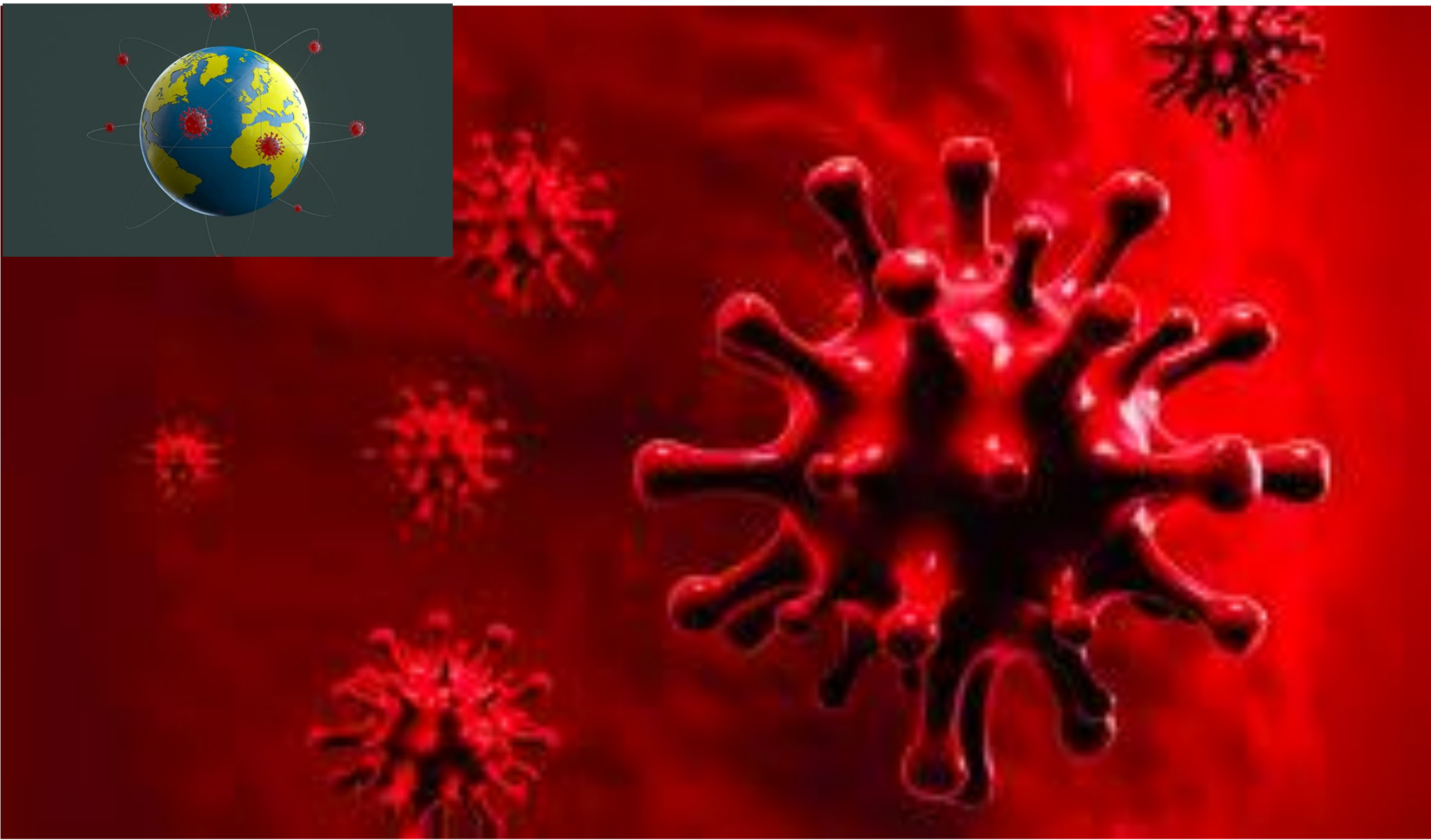
IASS, 2019, Barcelona, Spain

presentation on Traditional Systems to Synergetic Structures



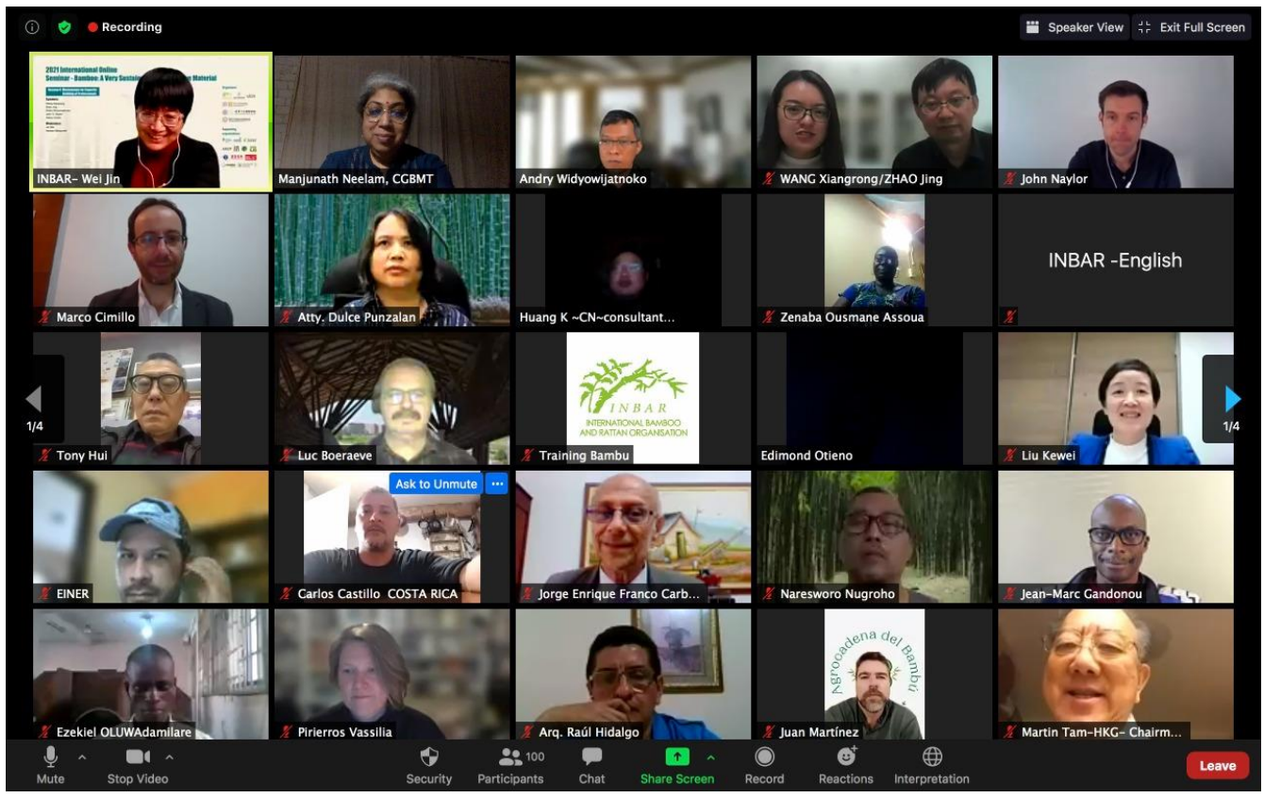
No reaction ??!!!!

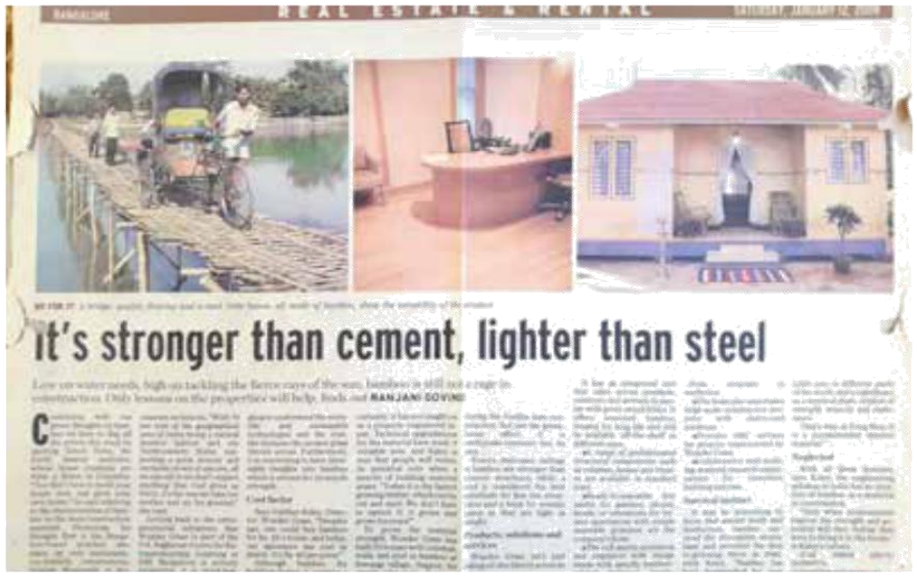
Do we require a Radical Switch?!



The year 2020…2021

Partnering with INBAR





it's stronger than cement, lighter than steel

Low on water needs, high on tackling the fierce rave of the sun, bamboo is still not a rage in construction. Only lessons on the properties will help, finds out RANJANI GOVIND

C

Habitat

Build it with bamboo

T

ENCHANTING AND SUSTAINABLE WITH NATURAL ELEMENTS

This house has been designed using bamboo instead of steel, says Nandhini Sundar

Bringing nature into the decor

Nature wins in serenity

Park to popularise alternative energy

The Rs 1.5-crore project will have a solar-hut with a photovoltaic rooftop system that demonstrates how electrical gadgets can function with solar power.

By Manjusha R
DH News Service

BANGALORE: The next time you step into the City's Indira Gandhi Musical Fountain, opposite Jawaharlal Nehru Planetarium, be prepared to be bowled over by not just the sight of dancing fountains but also for a power-packed performance from solar and non-conventional energy tapping units.

Energy Park, the first-of-its kind in Bangalore, replete with a solar-hut with a photovoltaic rooftop system, a children's pool with a solar water heater test facility, battery-operated vehicles that will take you around the park and a windmill that pumps borewell water among others is all set to take off in the next few weeks. The park will be thrown open to the public after a formal inaugural ceremony in August.

A demonstration of street lighting and garden lights with a small solar panel has been highlighted. Aero-generators (miniature versions of windmills) have been put up at various places in the park to create energy through wind.

The 1.5 crore project has been undertaken by Karnataka Renewable Energy Development Limited (KREDL), in association with the Horticultural Department. The venture has also been financially supported by the Ministries of

A solar hut with a photovoltaic rooftop at the soon-to-be inaugurated Energy Park in Bangalore

Non-conventional Energy Sources (MNES).

According to KREDL Managing Director Dr B Shivalingaiah, the park aims to disseminate information to the public about the various non-conventional forms of energy and in turn popularise it. "Through this venture we want to let the public know that one can offset the impending energy crisis by utilising non-conventional forms of energy," he said, adding that nearly 70 KVA of power will be generated each day through solar, wind and biomass units.

As for the solar-hut that has been made of bamboo, he said the photovoltaic roof system would demonstrate how a normal house with electrical gadgets like fridge, TV and computer games could function with the solar power generated.

Efforts have also been made to educate children about renewable sources of energy. The slides, drums and see-saws in the park have a panel that indicates that energy can be created through friction alone.

PROPERTY plus

Make full use of bamboo

The recent bamboo festival at the Institute of Wood Science and Technology was an eye-opener about the uses of this natural material. By NANDHINI SUNDAR

THE THING OUT A roof made up of bamboo, and a cosy place to relax in

I

Bamboo: strong and beautiful

DECCAN HERALD

NATIONAL PRIDE

Bamboo gets city architect award

DH News Service

New Delhi: Bangalore-based architect Neelam Manjunath on Wednesday received the National Award in the 'Design Ideas Competition' from Union Minister of State for Urban Employment Kumari Selja, for applying bamboo in construction.

Mrs Manjunath bagged the award for her use of bamboo that contributed to socio-economic, environmental and safety aspects at the energy park at Indira Gandhi Musical Fountain, Bangalore. The park has a solar kitchen that has a parabolic solar cooker and biogas cooking arrangement from its waste.

Green is in

City's elite join hands to rejuvenate B'lore

W

Big on bamboo

A

Mission

For this we need several organisations, institutions, professional bodies etc working in close collaboration working in mission mode to identify the challenges both at global and regional level, and develop a set of implementable action plans with timelines, resources, identifying stakeholders etc. Manasaram Architects and Centre for Green Building Materials and Technology is part of this project of “Mainstreaming Bamboo in all the relevant sectors”

Bamboo based technology can be covered under several ministries in various countries. Several other International organisations like the various arms of UN, SAARCH and BRICS, Inbar, International NGOs etc working in the field of environment, welfare programs etc. can also be collaborated with for various projects. On a Global level, through the UN, it can be covered under the following departments:

- Department of Economic and Social Affairs
- United Nations Conference on Trade and Development
- United Nations Environment Programme
- The United Nations Human Settlements Programme
- United Nations Development Programme
- The Office of the United Nations High Commissioner for Refugees
- Office of the Special Advisor on Africa
- UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States

IV - Actions to be taken

AREAS	MAIN ACTIONS TO BE TAKEN
Government policies	Redefining governmental housing strategies, including bamboo in building codes and funding for bamboo buildings are important. It is crucial to reach the higher bodies of the governments and sensitise them about the importance of bamboo to change the laws. Directives that come from the top of the hierarchy usually have a bigger impact.
Advocacy	Creating awareness among the public,designers, policy makers, artisans etc about the possibilities of bamboo will increase its acceptability throughout all professional sectors and social strata. Showcasing bamboo in key locations by prominent architects will have a big impact .
Academics	As per the survey, including Bamboo in Architecture, Civil Engineering and other related building sciences degrees is very important. This is important for countries where bamboo is a native species.
Research & Development	Make data usable, develop engineered bamboo and composites, and bamboo specific software for architects and engineers. This will allow bamboo to reach new types and scales of buildings. Also, industry specific research to solve issues would go a long way to achieve the target.
Skill Development	Providing labourers , supervisors as well as architects and engineers with knowledge and practical skills to work with bamboo will spread its use. Educational Institutions, Foundations and NGOs have an important role here.
Marketing	Proving bamboo as an affordable material and advertising it in mass media by including public figures and celebrities will be effective to spread the use of bamboo. It should be promoted as a technically sound , eco friendly and aesthetically pleasing material rather than affordable and cheap material.
Industry Development	Ensure the quality and ease of access of Bamboo by the building professionals. Have an agro-based employment scheme and create an organised supply chain with better coordination between agencies . They are indispensable to serve the construction sector ;including standardisation / certification of bamboo is required for confident utilisation by professionals and clients. In Europe etc value added products like ply, boards, flooring etc are more in demand rather than bamboo poles for constructions.
Housing & Infrastructure	Bamboo is a strong and versatile material with multiple uses that can be used in different parts of buildings and structures. Its lightweight and flexibility are qualities that will prove it successful in housing projects, both high-rises and horizontal ,much in need in developing countries. At the same time it has to be encouraged to be used for schools, public buildings, resorts, hotels and even infrastructure

COMPREHENSIVE ACTIONS TABLE			
ISSUE	LEVEL	ENTITY	ACTIONS
LEGAL & POLICIES	GLOBAL	UN – Dep. Economic / Social Affairs UNDP – United Nations Development Programme	- funding bamboo for buildings
		BAMBOO ASSOCIATIONS: - WBO ; INBAR ; etc BAMBOO SOCIETIES: - European Bamboo Society - African Bamboo Assoc.	- promote to the government the technical information and latest research in order to make the legal changes.
		INTERNATIONAL ORGANIZATIONS: BRICs; SAARC; IMF; EU; etc.	- promote bamboo regulations at an international level -facilitate funding for bamboo activities
	NATIONAL	MINISTRIES – Environment / Youth Affairs / Tribal & Rural Development / Women & Children	-create legal incentives for bamboo for its environmental advantages
		PROFESSIONAL BODIES: Architects/ Engineers, COA BAMBOO SOCIETIES: - Bamboo Society of India - Bamboo Soc. of Australia, etc.	-promote the inclusion of bamboo in building codes with support from research institutes.
	STATE/LOCAL	MUNICIPAL AUTHORITIES Departments –Town Planning / Social Housing	- support and implement the measures taken by the ministries
		Bamboo Society of India- State Chapters NGOs	- influence authorities at a local level in order to make the legal changes.

ADVOCACY	GLOBAL	UNEP – United Nations Environment Programme IPCC – UN Intergovernmental Panel on Climate Change	-spread awareness about environmental qualities of bamboo
		UNWTO – World Tourism Organization	-promote bamboo focused tourism
		BAMBOO ASSOCIATIONS: - WBO ; INBAR ; etc BAMBOO SOCIETIES: - European Bamboo Society - African Bamboo Assoc.	- promote the use of bamboo in the UN, Governments, Architects in general
	NATIONAL	MINISTRIES – Culture / Communication / Tourism / Environment National Bamboo MIssion NATIONAL BAMBOO SOCIETIES Bamboo Society of India	- promote bamboo as an important cultural added value - advertise bamboo on social media and mass communication as an affordable material for the low income classes but also as a luxury item for the wealthy.
		PROFESSIONAL BODIES – Architects / Engineers COA,	- incentivate the use of bamboo in bigger buildings by famous architects.
	STATE/LOCAL	MUNICIPAL AUTHORITIES: Departments – Town Planning	- showcase bamboo buildings in key locations - use bamboo in urban furniture and public spaces structures.
		Bamboo Society of India- State Chapters NGOs	- promote bamboo to the building industry professionals and population in general

MARKETING	GLOBAL	UNDP - United Nations Development Programme BAMBOO ASSOCIATIONS: - WBO ; INBAR ; etc INTERNATIONAL BAMBOO SOCIETIES	- promote bamboo as affordable and as a means to reduce inequality
	NATIONAL	MININSTRIES – Foreign Affairs / Communication National Bamboo MIssion NATIONAL BAMBOO SOCIETIES	- Market bamboo as valuable product and commercialize it.
	STATE/LOCAL	LOCAL INDUSTRY NGOs Bamboo Society of India- State Chapters	- Develop effective marketing promotions.

INDUSTRY DEVELOPMENT	GLOBAL	UN – Conference on Trade & Development UNIDO – UN Industrial Development Organization UNWTO BAMBOO ASSOCIATIONS: - WBO ; INBAR ; etc INTERNATIONAL BAMBOO SOCIETIES	-promote coordination between agencies / industries
		INTERNATIONAL TRADE UNIONS (International Trade Union Confederation, World Federation of Trade Unions)	-organize the global market in order to have an efficient and strong network of bamboo-related industries.
	NATIONAL	MINISTRIES - Commerce / Industry / Finance / Internal Administration National Bamboo Mission PROFESSIONAL BODIES – Architects / Engineers COA,	-promote coordination between agencies / industries - create an organized supply chain -promote value addition to bamboo
		MINISTRIES – Agriculture / Forests / Rural Development / Tourism	- organize / develop bamboo plantation and processing
		NATIONAL TRADE UNIONS	-organize the national market in order to have an efficient and strong network of bamboo-related industries. -merge several trade unions
	STATE / LOCAL	- STATE LEVEL TRADE ORGANIZATIONS - INDUSTRIES	- develop market driven industries in association with R&D Organizations - commercialise multi-purpose

HOUSING & INFRASTRUCTURE	GLOBAL	UN – Human Settlements Programme BAMBOO ASSOCIATIONS: - WBO ; INBAR ; etc INTERNATIONAL BAMBOO SOCIETIES	-promote the use of bamboo in housing programmes
		UN – High Commissioner for Refugees	- use bamboo as a disaster relief solution
		UN – Special Advisor in Africa	- use bamboo for basic housing needs
	NATIONAL	MINISTRIES – Housing / Planning / Infrastructure NATIONAL BAMBOO SOCIETIES	- redefine strategies, including bamboo
	STATE/LOCAL	ARCHITECTS NGOs	- utilize bamboo in larger scale public buildings / multi-storied housing, infra-structure, etc.

ACADEMICS	GLOBAL	- UNESCO - BAMBOO ASSOCIATIONS: - WBO ; INBAR ; etc - INTERNATIONAL BAMBOO SOCIETIES	- sensitize governments internationally for the importance of including bamboo in education - promote bamboo focused fellowships programs - heritage conservation; document traditional building techniques & processes.
		GOVERNMENTS	- promote interaction between Universities of different countries.
	NATIONAL	- MINISTRIES – Education / Culture, Urban Development - PROFESSIONAL BODIES – Architects / Engineers COA,	- include bamboo as a building material in Architecture, Civil Engineering, Interior Design and other practical courses.
		- UNIVERSITIES - TECHNICAL EDUCATION BODIES - NATIONAL BAMBOO SOCIETIES - Bamboo Society of India	- give bamboo the due importance as a building material and the required specific formation for teachers. - include industry interface as an essencial part of the programmes.
	STATE/LOCAL	UNIVERSITIES NGOs	- give bamboo the due importance as a building material and the required specific formation for teachers. - include industry interface as an essencial part of the programmes.

VI – Conclusion

As per the survey it is seen that the issues needs to be tackled from various fronts in a systemic manner, since they are inextricably linked to each other. It is undoubtedly a marathon task. The project needs collaboration from the highest authorities to the lowest bodies to make it successful. The programs will also need to vertically connect the international and national bodies and policy makers, architects, designers and other building professionals to the executing artisans on the site and the bamboo based communities to fulfill the mandate of the project in true sense of the word!

As per the Goal 17 of the SDG "Strengthen the means of implementation and revitalize the global partnership for sustainable development",

CGBMT, MANASARAM ARCHITECTS, Bamboo Society of India, World Bamboo Organisation, INBAR are committed to work with National and International organisations to take this NOVEL AND NOBLE project to implementation through further detailed Action Plans with practical timelines to Mainstream Bamboo in the building and other related sectors to address the three bottom-lines of Sustainable Development- Economic prudence, Environmental protection and Social justice globally.