'Symphony of the Bamboos'
Story of the (Bamboo!?) Architect

by
Ar. Neelam Manjanath
I am honored to be invited to write the foreword to Architect Neelam Manjunath’s landmark book. It gives me a great pleasure and pride to share my thoughts on her significant work in Nature’s gift to Mankind.

Neelam Manjunath Architect is special. Neelam is ever green. “SYMPHONY OF THE BAMBOOS - The story of Bamboo the “e book” is a must read for all those who are in one way or the other immersed in the content of LIVING SPACES. The Human being evolved and so did his domain. He transcended time in his abodes by using materials that related to that period influenced by technology and restrained by Art. From clay to brick to concrete and steel and many a fascinating element kept the innovative mind busy. But every time NATURE SMILED and with a wink and a smile waved the magic wand of Bamboo.

The wizard who does this today is “Neelam the Bamboo Architect”. Now with this new book she decimates without hindrance of the printed word the Wisdom that can be gained by the presence of Bamboo in the built environment. She has the Knowledge to ensure that value is added to the available information of this magical material.
Neelam also imbibes the subtle importance of traditional historical aspects that make LIFE a journey.

GRASS is what it is - The Noblest of Nature’s greens. And the pride of all grass is Bamboo. It is a language if learnt well will express the dream of the Designer to fulfill the aspirations of the User to a meaningful realization.

Van Gogh took the fields grass to the heights of Art, Neelam takes it to the majesty of Human Abodes.

Prof. Krishna Rao JAISIM  
www.jaisimfountainhead.in
Preface

This book chronicles the journey of an architect in search of the true meaning of her profession.

The idea of the book came when after struggling for over one and a half decade to promote climate conscious architecture, Ar. Neelam Manjunath chanced upon the unexplored humble material bamboo 17 years ago and took the onus of promoting the material through her designs in every possible way. This exploration she undertook discovering the use of bamboo as a material has put her on a different trajectory altogether.

The book brings to light the phases of her struggle and milestones showcasing the agony and the ecstasies of her experience till date through its different chapters.
I am an Architect, Planner, Activist and Theoretician. I worked with Architects of International repute before starting my private practice in Jan 1991 at New Delhi. I shifted practice to Bangalore in 1994. I have underway in the form of designing and constructions several reputed projects in India and abroad.

My Buildings have been judged to be simple and direct solutions of problems concerning the function of the building, its economics, its aesthetical value and the climate in which its stands. In my buildings I try to be sympathetic to the immediate environment in terms of climate, statement of the building forms, local and green building materials etc. I believe that a building is a living entity. It has to have a spirit and it should be felt like a living entity by the occupants; for ever changing with the seasons, from spring to summer, to rainy season and so on.
To
My Mother
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A Dedication

A person at any point in time is the outcome of all the teachings, interactions, conflicts with people, places, and situations along his journey of life. Everyone and everything contributed towards him becoming the being that he or she is. I thank everybody who has ever touched my life in becoming the person I am today.

I would like to express my humblest gratitude to Most Rev Dr. M B Lal, DSC, Ex V.C, Lucknow University for advising me to take up architecture as a profession.

I am deeply indebted to Dr. P.S. Satsangi, Director, IIT Delhi for enlightening me about the huge potential of Bamboo for the benefit of the country. They both are my spiritual gurus as well.

I thank my parents for giving me the wings to fly with education and to imbibe in me the values so necessary to be a human being and remain humane.

I thank my teachers during my schooling and college days, who believed in me and showed the right direction in my search.

I would like to thank Ar. Ravindra Bhan and Ar. Jasbir Sawhney for initiating me into different important aspects of the profession in my early years as an architect.

I would like to thank all the staff and alumni of Manasaram Architects and the consultants and my clients who have contributed to my rich journey as an architect and placed confidence in me.

I will remain indebted to Mr. N Shivsailam IAS, GOK and Dr. A K Bansal, IFS, who ushered me into the Bamboo world! They showed faith in me in handling this unexplored material for their prestigious projects.

I would like to especially thank my brother Guru Dayal Saran who has been with me throughout in my quest with Bamboo like a rock of strength.

Ar. Jaisim K Rao has been my mentor and guide ever since I moved to Bangalore in 1994. I have always run to him with my doubts and problems and he has always been ready to help. Thank you sir. Thank you also for writing such a beautiful foreword of my first book ever. I will try to live up to your expectations.

I would like to thank Ar. Anand D.K, my friend and colleague for reviewing the book and writing few lines about my work to be put in the book.

I would like to thank Shibili Ali T and Shivani Gaikwad for compiling the book and adding graphics to the book at supersonic speed to hand it ready in time.

Last but not the least, I thank my husband R. Manjunath Swamy, IRS, Ex IPS to understand my urge to fly in unknown territories and be there always lest I faltered.

I would also like to thank my children Aakanksha (aspiration) and Harsh Vardan (spreading happiness) to be patient and understanding with their flying mother!

Ar. Neelam Manjunath
Prologue...

Sitting in the office of a big time builder I was excited that since I am invited, I will be given a sizable project in which I will be able to prove the worthiness of my holistic architecture through a large residential project. “I thought you could do a bamboo cafeteria for this residential project since you are a famous Bamboo Architect”. The marketing manager said to me after running me through their project details of 400-500 apartments. “We have a young architect’s group for the other part (main) of the project since you do only Bamboo”. This is one of the several incidents which got me thinking about this “Bamboo Architect Syndrome”.

Hi, So I am ‘The Bamboo Architect”. Over seventeen years ago I adopted this material in my palette because I envisioned the homogeneous potential of the material in holistic architecture and sustainable Development. All these years I have been trying to make this material mainstream. In the process of mainstreaming Bamboo in the building sector, I got side streamed! I have come back in full circle but only project wise.

What have I done to my practice? People ask you to make pergolas, guard houses, gazebos, etc. The most generous ones offer you a cafeteria or maybe a clubhouse even. All of these years of research and dedication would mean nothing if applied only to temporary and semi-permanent structures. To penetrate the market, you need a seizable project which could showcase its versatilities since the opinion of bamboo as a material is already considered temporary. I hope to promote the very characteristics of bamboo for which it is relegated to the background and if I myself, am not in the mainstream Architecture profession, how can I mainstream bamboo!

Slowly but persistently I have been inching towards it with each project.

My participation in Venice Biennale 2016 and this book are part of my efforts to tell the world that bamboo has the potential to be used in almost all kinds of buildings in combination with other materials. And the Bamboo Architect has one extra wonder material in his/her palette to add that ecological, psychological and spiritual content in their buildings which is otherwise lacking in today’s brutalistic form driven Architecture we see all around us today.

“The Bamboo Architect” has arrived!

25th Nov 2016
Palazzo Mora
Venice
1. The Beginning

1.1 Student Days

1.2 The Practice - Climate Conscious, low energy, geology, Vastu Shastra, passive solar technology

1.3 The First Encounter with Bamboo
1.1 Student days

1.1.a College days

1.1.b Undergraduate Thesis - Braj Mandala
1.1. a College days

In high school the three of my favorite subjects were Mathematics, Art & drawing and Hindi. I didn’t understand so much the connection of Maths with art at that time. I realized that only after joining architecture that you have to be an artist and an engineer at the same time to be a successful architect.

Before joining architecture, I read a lot about different architectural movements and styles across the world and their evolution and development. I was fascinated and curious about the differences in the styles and the reason behind the differences.

To understand the meaning of Architecture or being an architect, I tried to study our roots of architecture in India through Vastu Shastra in second year by browsing whatever books were available in our library in English and Sanskrit. I tried to understand Climatology, economics, sociology, geology and their connection to designs.

Geology was another favorite subject of mine apart from Climatology and Vernacular Architecture. I was always looking for the meaning of the subject, like in geology the different types of stones and soil types which lay the foundation of Architecture. They form the basis of most of our traditional building and housing typology since the ancient days. Whether the rock cut architecture or the marvelous wonders of the world, they all have one thing in common and that is the understanding of the local material, context, place and the people. For my studio projects, I was always trying to connect these three into my designs.

At college my designs were often considered impractical and radical. As a result of which I failed both, my architectural Design as well as the Interior design in that same year, it devastated me and took me close to a year to gain my confidence back. I was inspired by books of the great architects and I was fascinated by the works of Frank Lloyd Wright, Hassan Fathy and the vast knowledge of Vaastu Shastra. The term organic architecture of FLW and Hassan Fathy’s mud buildings as well as traditional Indian architecture answered my several questions about the connection of Nature, Man and Buildings.

In 4th year for dissertation, I chose the topic of ‘Recreational Planning’. In 1986 Recreation planning was not considered as a topic to be taken seriously. But I felt that for human beings to be happy and peaceful, especially in cities, recreation spaces need to be provided in a planned manner. The dissertation discusses the importance of Recreational planning, various methods of assessing the demand and ensuring supply for a healthy urban life.

“The towns in which the new generations may gradually be strengthened and flourish may make contact with natures substitute, art, a daily experience. They must do this in the greatest variety, providing an experience for each period of life and for the varied temperaments of men. Thus in the great swathes of parkland and country which should penetrate the area of the city, there would be recreation and relaxation, direct contact for the husband, man and gardener, the touch and feel of growing things for children, contemplation and quietness for age and space for fierce activities of youth.”

____________ Maxwell Fry __________
1.1.b Undergraduate Thesis - Braj Mandala

The search for the roots in architecture led to my thesis project of designing an extension of the Mathura Museum to house the findings of the Kusan period. I called it the “Braj Mandala”.

I designed the museum holistically in context of the culture of the period. The exhibits and artifacts were studied and instead of putting them on display on pedestals. I thought of integrating them in the architecture of the Museum building for context around the exhibits. For instance, a sculpture that had to be put as an exhibit would be more relatable by the public if it is kept as part of the structure where it once belonged. Exhibits were put as a part of the building decorations etc.

Connecting the past to the present -

The layout of the museum unfolds the various aspects of life in that period through various squares to depict the commercial, religious and cultural aspects. The building gathered around squares in an informal and organic sequence from entrance square, Jain square, craftsmen square, Buddhist square, Residential square, the Temple square and the Brahmasthana. All these squares are connected by streets depicting and announcing each square.

The people or the staff in the museum were to be trained with the local language and were given the dress code of that era for everyone to get the essence and feel of that space of a particular time. So the design was a living museum. In order to enhance the design, I designed a stage with an amphitheater where the local culture could be experienced by the visitors. To demonstrate how Raas Leela as it actually happened, the whole stage setup was done as per the understanding of that era, where Raas Leela were performed in the forests complete with vegetation, water bodies etc. The layout and the heights of the buildings were also adjusted for a light and sound show to be set up for the museum which could also be used for a cultural show. The project was discussed at the ministry level and by INTACH at Delhi but could not take off the ground.

View from the Amphitheatre
1.2 The Practice - Climate Conscious, low energy, geology, vastu shashtra, passive solar technology

1.2.a HUDCO Competition
1.2.b Kenchama Farm House
1.2.c Navodaya Vidyalaya
1.2.d Sun City 5 Star Deluxe Hotel
1.2.e Landscaping Proposal for Cubbon Park
1.2.f Ashraya Housing
1.2.g Hospitals
1.2.h Lahiri’s Residence
1.2.i Channapatna Housing
1.2 The practice - Climate Conscious, low energy, geology, vastu shastra, passive solar technology

After graduating in 1987, I applied to various firms in Delhi as it was the most happening place for Architecture at that time. I joined Ar. Ravindra Bhan’s office, the first landscape architect in the whole of Asia. He also started the first landscape department at SPA, School of Planning and Architecture, New Delhi. I worked on several prestigious projects like Shakti sthala, Eco-restoration of Himalayas, Restoration of Sunderbans etc. He has a phenomenal eye for detail considering the size of the projects he deals with. After leaving his office, I joined Jasbir Sawhney and then Vistara to understand the other aspects of professional practice like CAD, finances, client meetings, site coordination before starting my own practice.

“An architect is a catalyst of change in society, setting the stage for all human activities on earth. As architects we challenge ourselves to achieve a balance between Responsible Creativity and Creative Responsibility in all our projects to arrive at holistic solutions.”

-Ar. Neelam Manjunath

I began my private Practice in 1991 at Delhi under the name Manasaram. Manasara, the celebrated saint wrote the oldest treatise on Indian Architecture Vastushastra, describing the science of design principles for buildings, from which our Studio Manasaram was born.

Vastushastra is a science of architecture that combines the five elements of nature and cosmos, ultimately balancing with man and the material. This mysterious science unifies the five elements called ‘Panch Tattvas’ - earth, fire, water, sky and space and paves a way for enlightenment, happiness and prosperity. We believe that to create a Space for human Existence transcending Time, it is desirable that the architect designs to cater to all the three faculties of Man - Physical, Psychological and Spiritual; possible by using these Panch Tattvas.

Man inherited, developed and nurtured this good earth and is nourished by it. Ecological disturbances and environmental problems are posing a grave situation for humanity. The repercussions of our destructive action will be felt for generations to come. Indeed it may take another millennium to put things right. Now is the time to change our consciousness in this regard and come up with appropriate means of utilizing our resources. We must learn to use these limited resources carefully under the guidance of “The Mother Earth Eco-system”.

This is where we architects can step in - to combine our technological and creative skills with true commitment and reverse the trend of violence against nature and our fellow beings to promote Sustainable Development and enhance our spiritual end.

We, at Manasaram are committed to fight back climate change by promoting the use of naturally abundant, easily renewable, low energy, local materials. We have close to 30 years of experience in the field of Sustainable Development. Working with natural materials in itself has been an eye opener and put us on the path back to our roots. Using what is freely available on the site, i.e., Sun, Soil, Air, Water and Space, and materials that are within our short reach are the determining factors in our designs. Creativity is a mere result of this challenge. Our designs take birth, grow and mature on the site. Through our design, we initiate the building into the ecosystem at micro and macro level. We strive towards making the building a living entity, responding and growing like any other living being, from dawn to dusk, from spring to summer, from rains to chilly winters! When this goal is met, even to a small extent, the built structure becomes a thread in the web of all life, one with nature, nature itself!
1.2.a HUDCO Competition

The first competition entry for HUDCO in 1987, immediately after graduation.

I was invited to present a paper at vigyan Bhawan titled ‘Energy Conservation Through Window Designing’ in 1992.

1.2.b Kenchama Farm House

Project: Kenchama Farm House
Location: Santhebennur, Shimoga And Karnataka
Client: Mrs. Kenchamma
Architects: Manasaram Architects
Total Area: 2000 sq. ft.

The terracotta block and traditional rural Karnataka Architecture with Jagli katte, Courtyard, open to sky toilets and traditional kitchen.

Volumes and Proportions balanced with the use of jaalis
Project: Navodaya Vidyalaya - Residential school  
Location: Gandsi, Hassan, Karnataka, India  
Client: Department of Social Welfare, Govt. of Karnataka, India  
Architects: Manasaram Architects  
Contractor: M/s. Karnik, Bangalore  
Total Area: 10,000 sq.ft.

The buildings have been placed in an organic plan to economize on site area. The plan encloses a cultural space which is used for all types of functions etc. wherein the plinth serves as the seating for the students. This school is meant for children of 6-10 years of age of economically weaker sections. These children used to refuse to come to school. Hence an environment was to be created to lure the children to attend school and also encourage the parents to send their children to the school.

The project was awarded the IIA-Shri Dharmasthala Manjunatheswara Award for Excellence in Rural Architecture in 2005.

Project: Sun City 5 Star Deluxe Hotel  
Location: Devanahalli, Bangalore And Karnataka, India  
Client: Euroamer Garuda Resorts (India) Pvt. Ltd., Bangalore  
Architects: Manasaram Architects  
Total Area: 1, 70,000 sq.ft

The Hotel has been designed as a palace on the lines of famous Mysore Palace and is a fusion of the Dravidian and Rajasthani styles with Contemporary vocabulary and services, with Large Glass domes, e-glazing for energy saving, PV systems for power generation, solar water heating systems and cutting edge BMS systems for Energy Conservation in 1999. It was to be commissioned before the New International Airport.

The 1250 rooms were divided in several thematic zones depicting the various Architectural styles of the successive rulers of this region.
Project Name: Landscaping Proposal for Cubbon Park
Client Name: Department of Horticulture, Govt. of Karnataka
Location: Bangalore, Karnataka
Year of participation: 2003
Built up area: 300 acres
Architects: Manasaram Architect

It is a 300 acre park laid by Sri John Meade in 1870 in the heart of Bangalore and has several govt. buildings including Vidhan Soudha, High Court, Vikas Soudha, Park house and the central library. Due to excessive vehicular movement through the park the biodiversity is getting adversely affected.

We took it as an urban design exercise by diverting all traffic out of the park and creating infrastructure facilities with large plaza between High Court and Vidhan Soudha.

We also introduced the concept of landscape conservation as the park has several trees being more than 200-300 years old. An urban design exercise to save and preserve the park from pollution by excess vehicular movement and pavements and landscaping areas around Vidhan Soudha, High Court and Other structures.
Project Name: Lidkar House  
Client Name: RGRHCL, Bangalore  
Location: Mysore, Karnataka  
Year of completion: 1997  
Built up area: 16.5 Acres  
Architects: Manasaram Architect

We introduced the concept of Incremental housing by providing a basic house with infrastructure facilities, to which the owner can add at his convenience. Several options were shared with the beneficiaries through Charrattee meetings. The working space with storage was also integrated in the design differently for different vocation like weavers, Leather workers etc.
1.2.h Hospitals

50 Bedded Janapareddy Hospital
Client: Sri Raj Shekhar Janapareddy
Location: Kompally, Hyderabad, Telengana
Built-up Area: 2092.14 sq.m
Project Completion: 2016

This is a recently finished Mother and Child Hospital in Hyderabad.

50 Bedded Government Hospital
Client: World Bank Aided, KFW, Bangalore
Location: Chincholi, Gulbarga
Built-up Area: 35,000 sq.ft
Project Completion: 2009

We did some Hospital projects for the World Bank and KFW Germany

1.2.i Lahiri’s Residence

Project Name: Lahiri’s Residence
Client Name: Avinash Lahiri
Location: Eagleton Golf Resorts, Bangalore
Year of completion:
Built up area: 10,000 sq. ft.
Architects: Manasaram Architect

Front view of Built Residence from the Landscaped area

Basement Floor Plan

Ground Floor Plan
Channapatna Housing

We provided the layout as per the town planning norms, incorporating continuous green spaces throughout the layout with extensive recreation facilities for all children, youth and elderly. A bus stop, milk booth etc was also provided as conveniences. 30 units of LIG, MIG and HIG housing designs with various customizing options were another novelty we provided.

Plan of East facing Unit 1

Plan of East facing Unit 2

Plan of North facing Unit 3

Housing at Channapatna

Client: Karnataka Housing Board
Location: Channapatna, Karnataka
Built up Are: 33 Acres
Project Completion: 2009
1.3 The First Encounter with Bamboo
In 1999, I was asked to design and help build a pantry and toilet block for VVIP guests at RajBhawan, Bangalore with Bamboo. The then governor V.S Rama Devi had taken fascination for the material and wanted a bamboo building in the Raj Bhawan campus next to a large complete steel and glass pavilion. The versatility of bamboo and the freedom in designing due to its properties and workability fascinated me. Our whole office was at the site for the next one and half months to finish it for inauguration on Republic Day 26th Jan 2000. I coordinated with the scientists at the plywood institute, IPIRTI in Bangalore for all technical guidance.

This building has been remodeled from a dilapidated brick building standing next to an exquisite glass house which the then governor Mrs. Ramadevi got constructed to entertain her VIP guests. There could not have been a better place and project to uplift the status of bamboo from the ‘poor man’s timber’ to a ‘glamorous material’ for the most elite class of the country – The Bureaucrats and politicians.

Bamboo Crete walls have been used with cement plaster for all the walls with openings left in the plaster to serve as windows. The project uses recycled materials up to 60% from the old buildings including the understructure of the roofing. The roofing is corrugated Bamboo mat sheets developed at IPIRTI, Bangalore. Fascia of 3mm bamboo mat board (BMB) has been put for protection against sun and lashing rain.

We braved to use the BMB sheets for the pantry counter, which has been covered on to a Ferro cement top cast on site and then a given PU coating. The pantry has been in use continuously for years with no complaint. The paintings on the two sides are the tribal paintings from Karnataka called Chitara from Shimoga. The bamboo artisans of Shimoga decorate their exquisite craft with these paintings. I was bamboo struck and the rest as they say is history...
Final Built Views of the VIP Pantry
2. The Sabbatical

2.1 Sabbatical Years - Understanding the Material “Bamboo”

2.2 Activities through CGBMT- BAT Courses, Workshops, MoU with Dayalbagh University, Bamboo Mission and SPA Bhopal

2.3 Synthesizing the vocabulary of Architecture - Introducing mud with bamboo
2.1 Sabbatical Years - Understanding the Material “Bamboo”

2.1.a IPIRTI Guest House
2.1.b Chennai Exhibition Hall
2.1.c Bamboo Pavilion
2.1.d Earth Center
2.1.e Energy Park
2.1.f Dayalbagh Security Shed
2.1.g Cafetaria at Ranal Engineering
2.1.h Bamboo Crete Wall
2.1.i On site load testing and Joinery detail with bamboo
2.1.j Construction with local material
Bamboo as a material has been used since time immemorial for buildings, structures and several other (Over 1500!) uses in daily life, due to its versatile properties and character.

But after the advent of the industrial revolution with industry produced building materials and colonization of most parts of the world, Bamboo got labeled as the “poor man’s timber”. This setback the traditional knowledge of the material and technology very adversely.

So when I started working with the material, I found that there was literally no technical data available on the material and its usage in buildings. This made each project a challenge and a nightmare at the same time.

We would counter new questions in every project from material properties, procurement, treatment, labour and even most important client dealing!

But these years proved to be crucial for me to understand the humble material Bamboo. Bamboo Crete walls, bamboo reinforced concrete and load testing for bamboo and several others were taken up by us as no engineers wanted to get their hands dirty with bamboo!
Bamboo… “It is no wonder that native craftsmen soon found such a workable material, a broad field for cultivating their genius. Because of it’s great tensile strength, it’s capacity for splitting straight, it’s hardness, it’s peculiar cross section and the ease with which it can be grown- a combination of useful traits found together in no other plant- Bamboo is one of those providential developments in nature, which like the horse, the cow, wheat and cotton, have been indirectly responsible for man’s own evolution.” (Porterfield 1933:181-3)

The giant wonder-grass Bamboo has been around for centuries, serving mankind in a multitude of functions. It had in fact become the Kalpavriksha or the wish fulfilling tree for him. He built his house with it, protected it with Bamboo forts, used it as firewood, made weapons, clothes, musical instruments, and even upon death, he was carried on it and buried with it.

Towards the 18th century, the world was being colonized and went through the Industrial Revolution. Industrialization took everything by storm. Machines replaced people, wood processing became easier and replaced Bamboo in many applications. Steel and cement were discovered. As a result this Kalpavriksha came to be labeled as – the Poor man’s timber. Fast forward to the 21st century! The world is gripped by the fear of Human civilization being wiped out by Environmental destruction! Global warming conferences, seminars, workshops, are rallying across the world, talking about the effects of Industrialization and urging the world to ‘Connect again with Nature’. In this call for return, the ‘Poor man’s timber’ is being hailed as the WONDER MATERIAL by the Global community, especially by the building sector, the largest polluter in the world.

Traditional wisdom: Bamboo plays a key role in the lives of a fifth of the world’s population even today, particularly in tropical climates where giant bamboos grow. There exists the tradition of using bamboo for construction of structures such as houses, bridges, tents, scaffolding etc. In the Indian context, we are the second largest producer of Bamboo in the world and have the best artisans. Bamboo can be a vehicle for integrated Development for our vast rural and tribal population for whom using it is a way of life from time immemorial. Bamboo based communities are considered untouchables in many parts of the world even today. Uplifting the status of Bamboo would translate to upliftment and development of the entire social strata.

Bamboo the Sustainable material- Bamboo can resolve the problem of resource equity of natural resources as it serves the triple bottom-line of Sustainable Development- Environmental security, Economic prudence and Social justice all at the same time! It can provide cost effective, safe and aesthetic housing; livelihood security, eliminate poverty and crime; lower carbon emissions, fast sequestering of carbon and liquid fuel and energy! That’s bamboo for us!

Bamboo the Engineering material- The physical structure and chemical composition of Bamboo has the properties of highly efficient materials. Its high fiber strength makes it the only replacement for steel especially in small buildings and housing sector that forms the largest chunk of construction. It can replace wood in almost all its applications and forms excellent composites with a variety of materials suitable for many applications.
A 2 bedroom house designed to suit Bangalore climate and can be used as urban housing solution. The project promotes bamboo as an acceptable and admirable material of housing even for the common man. This project was my second project with bamboo. In space design it took features from traditional Karnataka houses, like the clerestory for ventilation.

2.1.a IPIRTI Guest house

Project: 2 Bedroom Guest House
Client: Indian Plywood Industries Research and Training Institute, (IPIRTI)
Location: IPIRTI Campus, Bangalore, Karnataka
Architects: Manasaram Architects
Built up Area: 930 sq. ft.

This project was a joint collaborative project of IPIRTI, BMTPC, KARNIK, DFID - TRADA and Manasaram to introduce Bamboo in the urban housing sector.

2.1.b Chennai Exhibition Hall

Project: Chennai Exhibition Hall
Location: Forest utilization office, Chennai
Client: IPIRTI
Area: 602.8 sq.ft.
Year of Construction: 2002

It was a semi-prefabricated structure produced at IPIRTI, Bangalore and assembled and finished at Chennai. We plastered the structural Bamboo columns from outside to protect it from the saline sea breeze. The Exhibition center is constructed with 2” thick bamboo grid walls which are plastered and white-washed. The flooring is red and black oxide flooring with patterns made with broken ceramic tiles. The roof is designed with BMCS fixed on 2” Bamboo purlins, over 4” Bamboo trusses fixed with gusset and bolt joints.
2.1.c Bamboo Pavilion

The pavilion is a space frame of bamboo, which is a pavilion on the top of a 20m high mound made of debris from a 100 Crore ITC factory project to ward off Vastu problems. Since, it was filled up with earth and had been given only 2 years of settling time a light bamboo structure was considered the most appropriate solution, we landscaped a place with seating etc. to be used by the ITC staff for relaxation.

The lower end of the helix rests on the ground and the higher end rests on a composite bamboo column of MS and whole round bamboos. All the bamboo culms have been treated according to the usage they have been put to. Treated bamboo mats wrap the structure with a bamboo slivers under frame for stiffness. This has been tied to 12mm MS rods welded to the MS helix and covered by 25mm dia bamboo culms. Prof. H.N. Jagadish of IPIRTI helped with the structural details.

2.1.d Earth Center

A Center built for exploration of Nature by school children, Can be used for resorts etc. in Eco-tourism, now it is called the Discovery Village, Bangalore. A 20ft height high machan made fully of bamboo. A deck with bamboo flooring and railing was added to the client’s pre-existing house. A small 2m bamboo bridge connects the deck to the ground. A Cluster of four bamboos has been done for the two storeys Machan. Out of four one bamboo forms the structure at the first floor. Beautiful landscape and Bamboo Bridge connects to the house that serves as a facility for the Centre.
Project: State Level Energy Park
Client: KREDL, Bangalore
Location: Indira Gandhi Musical Fountain, Bangalore
Architects: Manasaram Architects
Built up Area: 17 Acres
Completion : 2004

I was taken as an architect to design this park to showcase various energy models like wind, solar, hydro etc. So, for these structures I decided to use a low energy material – Bamboo. The project covers a total area of 17 Acres, of which, 14 Acres has been dedicated to landscaping. Complete bamboo based construction has been used for all Civil structures to reduce embodied and transport energy along with recycled debris, concrete block stones, and bamboo and Neem and other plantation trees for timber.

This project has been awarded an award by HUDCO and Design Ideas Competition 2004-2005 for “Application of Bamboo in Construction”.

Seamless flooring pattern  View of gazebo  View of energy models  Built view of the bridge
2.1.f Security shed at Dayalbagh University

Client: Dayalbagh University, Agra
Location: Dayalbagh, Agra, U.P
Project Completion: 2005

We approved Dayalbagh University for starting vocational courses in Bamboo Application and technologies. We constructed a Security shed as a prototype shelter at the University campus in Agra. This project which was executed as a proof of concept to prove the performance of Bamboo as a reliable building material.

2.1.g Cafetaria at Ranal Engineering Pvt. Ltd.

Client: Ranal Engineering Pvt. Ltd.
Location: Bangalore, Karnataka
Contractor: Aditi Constructions
Built up area: 680 sq ft.
Project Completion: January 2006

This project was to convert open roof top into semi open Cafeteria with bamboo and acrylic sheet. The project was executed in such a way to not stop the breeze and the sun light. The Software Company employee did not have space for Tea and coffee and lunch. We have used treated bamboo strips and some hardware materials to fix the strips such that it should look good also and creepers can easily climb on it. The door was the combination of bamboo and acrylic sheets. This project has become so popular that it was published in India Today.
2.1.h Bamboo Crete Wall

2.1.i On site load testing and joinery detail with bamboo

2.1.j Construction with local material

Skeletal frame for Crete Wall

Process of bamboo crete wall

Fixing window under construction

Construction Process

On site debris used to construct walls

Bamboo forming structural frame tested and constructed

Foundation of compound wall by the skilled
2.2 Activities through CGBMT
While working with Bamboo and trying to integrate it into the buildings, I found
- Serious dearth of data on sustainable materials and technologies.
- Lack of awareness about sustainable buildings and
- Absolute lack of manpower at every level to execute such projects.

So, I founded The Centre for Green Building Materials and Technology in 2004 as a trust, under section 12A of the income tax act 1961, for bringing Sustainable building technologies into the mainstream building sector. Operating as a sister organization of Manasaram Architects and supported by Aditi Constructions & Aditigreenscapes, the trust was started as a response to the dearth of awareness, trained personnel and sufficient data in the field of Sustainable buildings material and technologies. Since its inception, CGBMT has worked towards the promotion of Environment friendly solutions for a Sustainable way of living through various fields of research and development.

Our Goal – To promote a sustainable way of living that is living in harmony with nature.

What we do:

CGBMT works as
- Consultants for sustainable solutions in the construction industry, furniture, handicrafts and
- Collaborate with academic institutions for resource curriculum development. We frequently conduct courses, seminars and workshops on issues relating to sustainability for various levels of participation. PG Diploma, Diploma and Modular courses are offered in Bamboo Application Technology which enable participants to develop into entrepreneurs.
- Bamboo style- products prototyping for sustainable living.

Household products designed by the CGBMT
CGBMT - Activities at a glance

Seminars and Conferences organised by CGBMT

Seminar on Introduction to Bamboo Architecture & Disaster Housing with Bamboo, June 2005

“Walk for water” National Environment Awareness Campaign 2007-2008 Organised by CGBMT

Seminar on “Bamboo for Integrated Development organised by CGBMT at IISc Bangalore, May 2011

Seminar on “Poor Man’s Timber to Green Gold” on World Bamboo Day, 2011

Felicitation at the International Bamboo Conclave organised by CGBMT with BSI and others on Feb, 2014

World Bamboo Festival, 2016, which was a collaborative event that included Exhibition, Workshops, Competitions and other events.

Participation in Seminars

Presentation on “Bamboo building-Ultimate in Sustainability” at World Sustainable Building Conference 2005, Tokyo, Japan

Presentation on “Future of Bamboo-the greenest of green building materials” at International Sustainable Building Conference, Australia, 2008

Ar. Neelam Manjunath with Bamboo Pioneer Dr. D. N Tiwari at 10th World Bamboo Congress September, 2015
BAMBOO APPLICATION TECHNOLOGY COURSES

The overall vision for this course is to use bamboo for an integral environment friendly development and generating Employment opportunities for the masses. Five batches (2011-2012, 2012-2013, 2013-2014, 2014-2015 and 2015-2016) have successfully completed the course. ITI Students, Diploma Holders, Engineers, Graduates from any discipline and even Artisans and Carpenters can join the courses at different levels to gain proficiency with this material being hailed as the GREEN GOLD!

Our modular programs are recognized by Dayalbagh University. CGBMT also has MOU with SPA Bhopal and Madhya Pradesh state bamboo mission. Now, we are planning to start certificate courses on sustainable development from the next academic year 2017.

BAT Course related activities

CGBMT Bus Shelter made on World Bamboo Day 2014 as a part of Experiencing Bamboo Workshop

Hands on Workshop on prouc Design held as a part of BAT Course, which included visit to industries, January 2015

Showing Bamboo Treatment methods in workshop conducted at CGBMT, Bangalore December, 2012

Demonstration of Bamboo structure as a part of Experiencing Bamboo workshop, 2016

Hands on Bamboo workshop conducted at CGBMT Bangalore for PG Diploma students and artisans, 2013

10 Week Condensed Modular Course In Bamboo Application Technology 60-day training program at Bangalore followed by 15 days at Bhopal
**Workshops for students and Colleges**

- Workshop at SSA school of Architecture, 2013
- 3-day workshop was conducted at the School of Planning and Architecture (SPA), Bhopal by CGBMT, 2013
- Workshop for differently abled by CGBMT, September 2014

- ‘Cocoon’- Farmer’s Pavilion’ is the Product of a 3-week Design-Build Workshop conducted in Trichy. Organised by CARE School of Architecture, Trichy and Aarhus School of Architecture, Denmark.
- Hands-on Workshop Mulhouse, 2014. A 5-day workshop was held at Motoco, Mulhouse, France.
- “Sustainable Architecture and Bamboo” workshop for students of Manipal Institute of Technology, Karnataka

**Research and Development**

- Development of Joinery & Joint Testing For 15m Bridge at Yamuna Diversity Park.
- Full scale testing for House of Five Elements’ double curve roof of 3500 sq. ft.
- Development & Testing of mix for S.M.B (Stabilized Mud Block).
“...It is no wonder that native craftsmen soon found such a workable material a broad field for cultivating their genius. Because of its great tensile strength, its capacity for splitting straight, its hardness, its peculiar cross section and the ease with which it can be grown - a combination of useful traits found together in no other plant - bamboo is one of those providential developments in nature which, like the horse, the cow, wheat and cotton, have been indirectly responsible for man's own evolution.”

(Porterfield 1933:181-3)
2.3 The Synthesis

The following chapter presents some of my projects as my attempts at synthesizing all the research and findings of the preceding years and translating them into my building designs.

2.3.1 Housing
2.3.1.a Mass housing & Disaster Relief housing
2.3.1.b House of Five Elements
2.3.1.c Prefabricated House - Lunardi’s Residence
2.3.1.d Earth House

2.3.2 Community and Institutional Buildings
2.3.2.a Bamboo Symphony
2.3.2.b C G B M T Head Quarters, Bangalore
2.3.2.c Community Parks
2.3.2.d Bamboo Centre, Dayalbagh University, Agra
2.3.2.e Guest House, Amritsar
2.3.2.f Cocoon, Trichy
2.3.2.g Bioclimatic School, Crete Islands

2.3.3 Tourism and Recreation
2.3.3.a Bamboo Museum, Palampur
2.3.3.b Bridge at Yamuna Biodiversity Park
2.3.3.c Landscaping - Gazebo at Lady Hydari Park
2.3.3.d Police Bhavan
2.3.3.e House of Hungarian Music at Budapest, Hungary

2.3.4 Infrastructure
2.3.4.a Bus Shelter
2.3.4.b Sanitation - FlexiSanShell
2.3.4.c Metro Station, Bangalore
2.3.1 Housing

Housing is a basic need for humans. Taking into account the economies of scale, our environmental concerns, and HDI (Human Development Index) which is used to measure the quality of life in countries across the world, providing this basic need is a major challenge. India is on the verge of large scale urbanization over the next few decades, and a shortage of housing due to expensive capital, high gestation period of housing projects, low affordability by Economically Weaker Section (EWS) and Lower Income Group (LIG) households are bottlenecks restricting desired growth in housing stock in India with respect to housing demand.

Our concern regards the enormous resource and energy consumption and the carbon emission by the construction industry for even the baseline of our development goals. The sector emits about 22 per cent of India’s total annual CO2 emissions. Using a minimum of 60% of bamboo as a construction material reduces emission by almost 10%! If there is a way to bring down the carbon emission, and reduce costs of construction, while at the same time making a successful attempt to raise India’s HDI, why not give this mission a fair chance to prove itself? Yes, we’re talking about tackling issues using especially Bamboo and other natural materials as mainstream elements in the construction industry.
2.3.1a Mass housing

Mass housing:

The Pradhan Mantri Awas Yojana launched by the Prime Minister Narendra Modi is a vision of Housing for all by the year 2022 with an aim of constructing more than two crore houses across the length and breadth of the nation. Current state of housing in India Requirements to achieve the vision by 2022.

- Housing shortage of about six crore units
- Prioritized rural growth resulting in uneven distribution of housing development
- Both the central and state governments are spending about three per cent of the current investments in the real estate sector.

Using bamboo in mass housing with other materials can help achieve our development goals along with our environment goals. Our prototype project at Rajmundry for EWS housing was a step in this direction.

Client: Department of forest, Government of Andhra Pradesh.
Location: Rajhmundry, Andhra Pradesh
Contractor: KARNIK, Bangalore
Total area: 23 sq meters
Completion: March 2004 - 3 months
Disaster Relief

Bamboo grows more in areas with high population and high disaster prone areas, which require economical and safe housing. Safety in built environment is a fundamental right. In the wake of earthquakes, tropical storms and hurricanes, bamboo shelters provide quick, sturdy, humanizing and cost-effective ways to house thousands of residents rendered homeless and recovering from the disaster, for both interim relief and permanent shelter. It can also help promote employment opportunities for local communities, who otherwise would be struggling to support their families in the aftermath of the disaster.

Bamboo combined with cement-based mortar can be used in residential construction in seismic regions, particularly in developing countries. Bamboo houses remain serviceable for much longer periods than other forms of housing in disaster prone areas. Bamboo is durable with a minimum life span of 30 years, it can withstand wind speeds of up to 150 kmph, is earthquake safe, waterproof, fire retardant, lightweight, cost-effective and easy to transport and erect.

Construction of a Bamboo shelter prototype for tsunami victims. A permanent housing solution for disaster management, built by the victims of the Tsunami under the training and supervision of CGBMT. Built by the victims of the Tsunami under the training and supervision of CGBMT.
As the name suggests, this house was designed to bring in the presence of the five elements of nature, Earth, Water, Fire, Air and Space into the building. Water bodies, internal courtyard, large windows, use of natural materials etc connects the inhabitants to these elements. The house is a zero energy development with closed loop systems for Building materials, Processes and Technologies just like nature. The house is an improvised example of the traditional Kannada home “Thotti Mane”, with an internal courtyard.

Awards
1. WAN House of the Year Award - 2013
At any point in the house, one is in touch with five elements of nature: water, air, earth, light, space. The house is spread along the east west direction, facing north. The spaces in this house flow and merge with each other, courtesy the open courtyard, open kitchen and dining with double height. There are five bedrooms and drawing room, around the courtyard, which helps in cross ventilation. It has three skylights – one above the courtyard, and the others above the kitchen and verandah towards east. The first floor consists of two bedrooms with terraces and balconies. The rendezvous doesn’t end here – the nature and interior spaces seamlessly merge into each other, coupled with Bangalore’s salubrious climate. The consequence is a house nesting in nature.

The house is designed on the principles of Sustainability and hence is designed with multiple green roofs to compensate its foot print by 125%.

One of the bamboo roof is a 3500 sq ft double curve roof with a span of 8.5m-10m covers the core area of the house from east to west, with verandahs on both sides and a courtyard in between. It has been designed as a lightweight roof (2” RCC slab) with minimal reinforcement supported on two curved triangular Bamboo beams simply supported on bamboo columns of varying heights following the curve of the roof. A grid matrix of 1” bamboo splits at 6” centre to centre hold the screed concrete in place. It is based on the principle that “a material can bear more loads when it is curved”.

Tarpaulin which is painted on one side is placed before concrete above the split bamboo mat, which acts as water proof member instead of plastic.
Built by unskilled labor under supervision, was developed as a beautiful, large scale sustainable residence running on minimal energy and strives to become a zero energy home. A bamboo building need not look ‘low-cost’ – imaginative design and the use of other locally available materials within the cultural context can make the building desirable rather than just acceptable.

Common living area

Interior sitting area around courtyard
Bamboo enhancing the interiors

the bamboo bridge connecting spaces

swimming pool

Courtyard
2.3.1.c Lunardi’s Residence

Name of the Project: Prefabricated Bamboo house.
Location: Rome, Italy.
Name of the Firm: Manasaram Architects, Bangalore
Client: Mr. Lino Lunardi
Contractors: M/s Aditi Constructions, Bangalore
Built up Area: 500 sq.ft
Time of execution: 4 Months
Cost of the Project: Rs.3.30 lacs
Year of Completion: December 2004

Mr. Lunardi’s Residence was the second ever Bamboo Structure of it’s kind to be erected in Rome. In a country, which recognises Bamboo only as a finishing cane, we designed the house in such a way that every component could be manufactured separately and assembled as a whole on site. The structure was shipped in July 2003 and assembled on site within 21 days including the foundation!
This house has been erected on a one acre site between a castle and a lake. It is a compact one – Bed room unit complete with living – dining, kitchen and a spacious Bath and deck. Since only 10sqm area was allowed, I designed the living cum dining area of 20sq.m as a glass house. I made an open to sky bathroom since privacy was not a problem. Now the Clients have roofed it with BIPV panels which take care of the energy demand of the house insulated. We devised a special type of insulated walling system for the cold winters. The walls have been clad with halved bamboo on the outside to give a rustic look. The glass house with Bamboo frame structure was a real challenge because the glasses can break due to wind loads and surface stresses created by shrinkages in bamboo. We used crossed and other bracings to counter these. We roofed it with poly carbonate sheets. This is probably the first Bamboo – Glass house in the World?!

The pre fabricated basic structural frame

Development into the form

Fixing of roof

Front view

Back view
2.3.1.d Earth House

Project Name: Earth House
Client Name: Gurudayal Saran
Location: Aditi GreenScapes, Bangalore
Year of completion: December 2008
Built up area: 220 sq.m
Architects: Manasaram Architect

The house is designed with Stabilized Earth Block and Bamboo Corrugated Sheets. The south slope is provided with solar panels which will generate sufficient electric energy for the house. The house designed with RWH system and DEWAT system.
2.3.2 Community and Institutional Buildings

A sense of community is vital for any society to thrive. It brings a sense of identity and pride, and is made possible through processes such as communication, inter-group relations and networking. Community buildings play a significant part in the life of many local communities in fostering the concept of people's involvement in development and democracy. These include but are not limited to education, health care, business and offices etc.

Use of eco-friendly materials and services for such buildings will enhance efficiency and health of the occupants.
Design Principle: Sustainability is embedded in the definition of Architecture itself. The presence of the PANCHMAHABHUTAS, the five elements of nature: water, air, earth, fire and space, has been implemented in a way that tangibly serves all of the three faculties of man, i.e. the psychological, physical and spiritual.

The building is an attempt to rebrand Bamboo as a desirable material and replace steel, concrete and other unsustainable materials. The design showcases the inherent strength of a single bamboo culm, taking inspiration from age-old traditional fishing platforms in India -- truly synergetic structures, harmoniously defining the spaces, and creating a feel of extreme lightness.

The office has an open plan with four split levels, all overlooking a central pond. The principal architect’s cabin sits at the bottom level, ensuring visual connectivity across all the spaces.

Awards:

1. Aga Khan Award for Architecture: Best Designed Sustainable Project Award
2. ArchiDesign Awards: Best Designed Sustainable Project Award
3. World Architecture Community Award
4. Lafarge Invention Awards: 3rd prize
5. World Architecture Festival Awards
The structure of the building is its most unique feature. It is based on the structure of the fisherman’s net, a structure in synergy, where total load is distributed to the system, i.e., to all the bamboo elements. These structures are highly efficient with minimal energy & material usage. The reason for the structural efficiency is homogeneous load distribution, which efficiently leads to global synchronization. The tensile strength of bamboo is greater than the same weight of steel and has much greater elasticity. It has been designed as a hybrid of synergetic and tensegrity systems and was physically tested before concreting the roof.

The columns in BAMBOO SYMPHONY though look haphazardly placed have definite position, size and inclinations, i.e, are structurally relvant, just like the highly evolved technological logic we find in nature!!

Appropriate amount of Bamboo fibres was mixed in concrete for better bonding and reducing surface cracks. This also reduced the weight of the slab while maintaining the effective depth and increased its structural integrity and tensile strength many times.

We allowed the roof to define its own shape as per the flow of the forces naturally, like a stretched fabric over the supports. The free-form shell roof gets its shape by the neutralization of forces within the slab, so it poses fewer complexities, with efficient use of materials. Roof was allowed to take a natural shape over the bamboo supports - no formwork used for making of lotus pond.

Material of Construction Details:-

- Bamboo -Crete walling system with precast wall panels.
- Usage of Stabilized mud blocks from the site.
- Green Shell Roof over lattice grid made of bamboo culms and supported on bamboo columns & beams.
- Bamboo Reinforced Concrete with bamboo fibers for reducing the weight of the concrete.
- Usage of Recycled materials: Fly ash, recycled wood, scraps metal, stone, and other debris.

Exploded view of the structure

Making of Lotus pond

Slender Bamboo supporting the mighty roof

Natural pattern in flooring
Conceptual Sketches showing preliminary design stage

Plan

Longitudinal elevation of Bamboo Symphony

Levels marking the hierarchy of space
Imagination becoming reality

A warm reception  A healthy environment  Element of surprise

Bamboo Symphony a great enclosing space
The sustainability institute of CGBMT will be its headquarters and will integrate all the sustainable technologies in its design and execution through research and development, and will strive to be a torch bearer in the field of sustainable development for the building sector. Materials, water management, energy management, waste management, biodiversity, and social sustainability are our departments of study for sustainable development.

**2.3.2.c Community Parks at Aditi Greenscapes**

Community Parks
Children’s activity center’s, children’s equipment, street furniture, gazebos, etc. can be made in bamboo instead of making them in steel, and concrete, plastic, aluminium, etc. thereby increasing their supply in urban, rural and tribal areas ecologically.
Gazebo at Aditi Greescapes - E5
DAYALBAGH BAMBOO CENTER

Client: Dayalbagh University
Location: Agra, Uttar Pradesh
Built – up area: 13842 sq. ft.

We have been working with Dayalbagh University, Agra for more than 10 years to start a nationwide skill development programme for the bamboo sector through their 90 plus distance education centers in India and abroad. In 2005 we constructed a bamboo structure in Dayalbagh University campus as a proof of concept for starting structured courses for the bamboo sector. Now the university has planned bamboo centres in the University campus in Agra, the National Bamboo Center, Rajaborari, Madhya Pradesh and the Guest-house at Amritsar, Punjab, India.

To go forward with bamboo: The structure-A commencement

Plan
2.3.2.2 Guest House, Amritsar

The community and university Charrette project

Project Name: Guest house for ICT, DEI campus, Amritsar
Location: Amritsar, Punjab
Built-up area: 1940 sq. ft.
Project Duration: 21st April 2015 - 9th May 2015 (18 days)

A Charrette Project with Bamboo, Mud and Waste. This is a unique project in which all the stakeholders interacted directly with each other and participated equally in both the Design and the Construction process, including the interiors. The project helped in raising awareness at the community level on the importance of Bamboo and was crucial in kick starting the Bamboo courses at the Dayalbagh University.

The Guesthouse layout was designed according to the overall master plan keeping in mind:

a) Approach to guest house
b) Prevailing wind direction
c) Maximum usage of natural light
d) No disturbance to existing trees on site

The guesthouse layout was designed according to the master plan keeping in mind:

- Approach to guest house
- Prevailing wind direction
- Maximum usage of natural light
- No disturbance to existing trees on site
A project turned into a hands on program

The output of multiple hands with a genuine intention
Cocoon, a Community Center
A farmers pavilion designed for community gatherings by Ar. Neelam Manjunath. Built as a part of a workshop conducted for C.A.R.E College students, in collaboration with Aarhus School, Denmark at Krishi Vigyan Kendra, Trichy.

For our rural and tribal areas, community buildings can be hand-built by local craftsmen, pupils and teachers working in collaboration with Architects and Designers. Local traditional building materials can be combined with new construction knowledge to produce a building that is sustainable, aesthetic and a value addition and much-needed facility for the community. We try to maintain a commitment to the people and their indigenous building methods and materials.

Multi use space that accommodates 40 persons and also acts as an exhibition area for Krishi Vigyan Kendra, Trichy. Done as a workshop with students of C.A.R.E. College, Trichy and Aarhus School of Architecture, Denmark. Photographs courtesy: C.A.R.E. College.

Cocoon is a space for teaching and exhibiting projects to visitors of Krishi Vigyan Kendra, Trichy. It is a unique project that qualifies as socially relevant because of the method in which it has been realized. Bamboo was required to be used for an unconventional form as it proved to be the most economically viable.
Envisioning the cocoon

Oval base ring for the cocoon

Use of Araca leaves as the outer skin

Bracket arms which hold the outer bamboo frame and the oval ring

Final building

Laborers working on the bamboo woven column
2.3.2.g Bioclimatic School at Crete islands, Greece

1. Category:- Competition
2. Client:- Bioclimatic European School complex in Crete, Greece
3. Location:- Crete, Greece

Designing Democratically:
Minoan civilization and Greek philosophy gave the world the meaning of democracy. Keeping the tradition through this design, we would like to conduct a series of charettes of various age groups before finalising the design. So that they relate to the school and their learning curve is enhanced.

Project Name: PDPU Cafeteria
Client Name: Pandit Deendayal Petroleum University, Gujarat.
Location: Gandhinagar, Gujarat
Year of completion: 2015
Built up area: 16564 sq. ft. Architects:

Proposed cafeteria for Pandit Deendayal Petroleum University. Improvising on the traditional use of Bamboo in Gujarat to build an iconic structure in Bamboo. Cafeteria roof structure is designed with Tuff board. Bamboo pergola covers all across the court.
2.3.3 Tourism and Recreation

The Tourism industry in India is economically important and is growing rapidly! The benefits however have not been universal, with income primarily accruing to large urban and international operators, rather than the host communities and with many of the most socially and economically disadvantaged areas being excluded altogether from the remarkable achievements of Incredible India! Does it seem unfair? On top of which it is also recognized that the trend of urbanization has led to falling income levels, lesser job opportunities in rural areas leading to an urban migration from the rural areas. At Manasaram, we attempt to make a conscious difference at developing sustainable building technologies, which can be recognized as a means to advance economic development, environmental protection and cultural preservation in the tourism industry. We believe in the importance of engaging local communities to achieve our goals of sustainable tourism.
This is the only Bamboo museum in India. To flourish sustainability, museums must value and protect natural and cultural environments and remain sensitive towards its impact on visitors. This project shows the usage of bamboo in various forms in construction and interiors.

The central dome is glazed. The roofing for the exhibition hall and the passage is Bamboo Mat Corrugated Sheet (BMCS). The flooring is of cement oxide flooring in combination of red and black. Walls are made of Bamboo Crete Walls. Inner wall is of plaster or round bamboo finish or Bamboo Mat Board. Bamboo Mat Boards in combination with glazing is used for the doors. The wood for the doors is of neem and other locally available seasoned wood.
Project Name: Bridge and Gazebo at Yamuna Bio-diversity Park, New Delhi
Client: DDA, Biodiversity Foundation and University of Delhi
Location: Biodiversity Park near Yamuna River, New Delhi
Contractor: Aditi Constructions
Structural Consultant: Tor Steel Foundation
Project Completion: 2007

The Project is located in the north of New Delhi for rejuvenating the biodiversity of the Yamuna River Basin. Delhi University has chosen bamboo as the chief building material in Yamuna Biodiversity Park.

The project consists of 15 m long and 12 m wide Bamboo Bridge, gazebo for rain shelter and public amenities block. The project attempts to create awareness about economical and sustainable bridges that can be made from Bamboo in place of steel bridges to solve the connectivity problem of villages.

The structure of the bridge is based on the ‘Arched Truss’ system and was assembled in 20 days. The bridge is 15m long and 13m wide and has a height of 3m from the finished floor level.

The starting height of the bridge with respect to the water level is 2m while the center of the bridge from the water level is 1m.
Gazebo highlights:

The gazebo covers a total area of 100 sq ft and rise to a height of 9’ from the finished floor level. Bamboo tiles, which were subjected to hot and cold treatment, have been used for roofing and were fixed with interlocking joints. No nails have been used for the roofing. The flooring is done with cement and stone.

Public toilets highlight:
This is the first public toilet constructed in Bamboo. It covers a total area of 426 sq ft. The flooring is cement flooring.

Gazebo at Lady Hydari Park

Overall view of Bridge on site
2.3.3.c Gazebo at Lady Hydari Park and Ward’s Lake Shilong

Blending in with Nature

Only by making full use of the features of the bamboo through innovation in terms of artistic forms and aesthetic consciousness can we make bamboo better serve present landscaping. We strive to portray these beautiful green gold stalks in all its integrity and poetic imagery. The Gazebo at Lady Hyderi Park is a complex structure, a hyperbolic paraboloid that accentuates every pole of bamboo as its own entity.

Rendered structure placed on site  Floor Plan Scale  Front Elevation

View of Gazebo from Lake  Close view of Gazebo
Bangalore’s lakes are being killed. But nature being resilient, given the slightest chance it bounces back, and some of Bangalore lakes are wonderful examples of this. Urban wetlands are priceless treasures. Urban wetland management unfortunately is not much of a concept in most of India. Usually, the city decides to build a big “garden” around lakes, which means manicured lawns, paved paths, lots of flowers & trees that don’t usually grow in wet lands, and a complete destruction of the wetland around lakes. This usually ends up slowly killing the lake.

In this project we decided to use large shell roofs with bamboo for understructure. The roofs were to be green roofs considering the biodiversity factors of rejuvenating the lake. I couldn’t attend the jury as I was away in Europe attending a conference. These would be some of the largest bamboo structures designed in the world at that time.

We received runner up in the architectural competition for providing architectural design concept for this project.
2.3.3.e House of Hungarian Music

THE SITE- DESIGN ISSUES- THE CONNECT

- The site has buildings of the hung to be demolished for constructing the Hungarian House of Music- Lot of debris of rubble, glass etc.
  Solution: Reuse

THE DESIGN

Organic design solution- Rising from the site issues, function of the building and the culture.
-A non-invasive design - like music. Building to embody the character of music- “Filling up the reuses” - to filling up the space in the site.
-Ecologically stepping as lightly as possible- Building not in the park of the park (Site).
-The spaces in the building built around all the site features- spaces wrap around the fully grown existing trees grouped in courts- Filling up with activities around them.
-All the visitor areas with transparent boundaries to experience the continuity of the park inside the building as well. Dissolving the boundary between the building and landscape. The building becomes a pavilion in the park- Historical context of vemres for folk music.
-Re-establish and enhance the ecology of the park through internal landscaped courts and sky parks at various levels.
2.3.4 Infrastructure

The cities of yesterday are experiencing a burst of infrastructure and building construction activity to cater to the ever-increasing population. Flyovers, roads, underpasses, airport, metro, large condominiums, etc. are being formed, creating unmanageable waste, deforestation on a massive scale, polluting our cities, disturbing the soil Strata, water table and so on. An unsustainable Exploitative Isolated approach to development.

In order to reduce the carbon footprint of infrastructure it is important that we account for the energy that is embodied in the materials that we use. Our quest has been to explore the various ways of using materials and construction systems with low embodied energy and carbon, and make recommendations on how to reduce these in infrastructure projects.
2.3.4.a Bus Shelter

Project Name: Bus Shelter
Client Name: Manasaram Architects
Location: Srirampura, Bangalore.
Year of construction: 2014
Built up area: 11.8 sq.m

Mahatma Gandhi Institute of Rural Energy and Development and CGBMT, Bangalore joined hands on World Bamboo Day 2014 for the hands on workshop of a bamboo bus shelter at Srirampura Railway Crossing, Bangalore. The workshop was well attended with more than 45 participants, out of which 16 were children of Parikrama Foundation while others included architects, students of architecture, design, and engineering. The shelter developed for Srirampura Railway Cross Bus stop was constructed as a cross-frame structure using Bamboo poles and splits. The roof was made using Bamboo mat boards and covered with Galvalume steel sheets. Architects from Manasaram Architects and Artisans from CGBMT assisted the team throughout the construction.

We have 8000 bus stops in Bangalore, but only 1000 of them have shelters! As the temperature of our Planet gradually increases and temperatures soar, daily potential commuters are hesitant to wait for public transport systems in the hot sun, or rain, exposed to the elements. The introduction of these systems require basic infrastructure which will provides protection from the elements and power supply for these new and improved systems.

We have taken our vision of providing eco-friendly bamboo bus shelters one step further by organizing a workshop of 45 participants including architects, students, artisans, and 16 street children from the Parikrama foundation, on World Bamboo Day in 2014! We came together to design, develop, and construct a cross-framed structure using bamboo poles and splits in 2 days! The roof was designed using Bamboo mat boards covered with Galvalume Steel sheets.
2.3.4.6 Sanitation-FlexiSanShell

Project Name: FlexiSanShell Project
Client Name: Manasaram Architects
Location: Srirampura, Bangalore
Year of construction: 2015
Built up area: 1.08 sq.m
Architects: Manasaram Architects

Let’s look at the smallest unit - a toilet. Swachh Bharat Mission by our PM, is focused on building individual toilets, community toilets and solid waste management in rural and urban areas across the country. The States have the flexibility of design delivery mechanisms that take into account local cultures, practices, sensibilities and demands. The incentive for building toilet has been increased to $180.

We have designed and prototyped a flexible toilet shell which can be used for quick sanitation projects for both temporary and permanent toilets. These can also be used for sanitation for expeditions and mountaineering seasonal tourism centres, religious and social events, etc. FlexiSanShell

FlexiSanShell Prototype

Assembly Details.

The product is Developed during a workshop at cgbmt by the students of Bamboo application technology-p.G Diploma course ‘14-15’ and other participants.
Can we see the links between what is, and what can be? Bangalore’s Metro System stretches across the length and breadth of Bangalore City linking its important intersections. As of May 2016, there are 31 metro stations in the network. There are 42 stations in total as a part of Phase I, which are to be completed by the end of 2016. The completed Metro Stations, built with conventional methods, require 1.3 lakh tonnes of concrete, 44,500 tonnes of steel bars, and 190 km of high-tension wires weighing 2900 tonnes. A total of 395 piers, including station piers and portals, were constructed on the stretch. To think, at such a large scale, how much damage the consumption of carbon emitting resources could do, would make us plan with caution the design of these Metro Stations.
3. The journey ahead- Search for a Systemic Model of Architecture

3.1 Participation in the Architectural Exhibition La Biennale di Venezia 2016

3.2 Harvesting the 5 Elements - Aditi Greenscapes E5

3.3 Sustainability Institute - Striving for Holistic Architecture
3.1 Participation in the Architectural Exhibition
La Biennale di Venezia 2016

The Architecture Biennale, which is being curated by Pritzker 2016 Awardee, Alejandro Aravena, is one of the most esteemed international exhibitions, bringing together masters of the profession from across the world.

We have been invited for the third time to participate in this prestigious International Architecture Exhibition in La Biennale 2012, 2014 and 2016 at Venice.

Our Aim:

We want to promote Bamboo as a mainstream material for contemporary buildings and hence decided to participate this year in Venice Biennale 2016, which we feel is a great platform to uplift the status of this material - a vehicle for Integrated Development, especially for Rural and Tribal India. India being the second largest producer of Bamboo in the world can benefit immensely by mainstreaming Bamboo in the building industry. Traditional Indian craftsmen have used Bamboo in various forms in many parts of India.

Challenges and Preparations

One of the main challenge for participating in Venice Biennale was the high cost involved. We contacted different government and non-government Organisations, Ministers etc for support, but the only support we had was the seed money from the Europian Cultural Centre and some Bamboo friends!

For raising funds we had also conducted workshops, like at Designuru and promotions were done through online websites. We also ran a crowd-funding Campaign through Indiegogo called “Bamboo for India”.

Models, Panels and videos that showcases some of the main projects of Manasaram Architects and activities of CGBMT was prepared with the active participation of staffs and interns of Manasaram architects and artisans of CGBMT. Students from various colleges also volunteered in the preparation of the exhibits.
Preparations

Some of the volunteers with Architect Neelam Manjunath

Meeting with the volunteers during preparations

Model making

Testing the specially designed Tensigrity tables for keeping models at Stall

Visit of Bamboo society of India officials at the stall mockup at CGBMT, Bangalore

Models

House of Five Elements

Bamboo Centre at Dhayalbagh

Bamboo Symphony Model
A short movie made for Venice Exhibiton “Symphony of the Bamboos” by Krishanu Chatterjee was the main screening. This 14 minutes movie gives an overall idea about the projects and activities of Manasaram and CGBMT. Other short videos include:
Bamboo based projects
Making of Bamboo Symphony
Making of House of five elements
Selected Projects of Manasaram Architects
FlexiSanShell
Experiencing Bamboo Workshops
Bamboo - The Social building material
Bamboo Application Technology Courses

Some of the panels exhibited at Venice Biennale Stall
Manasara… is the name of the ancient saint who wrote the oldest treatise on Indian Architecture Vastushastra, defining the role of an Architect.

For creating a Space for human Existence transcending Time, it is desirable that the architect designs projects to cater to all the three faculties of Man-Physical, Psychological and Spiritual; possible by using the PanchTattvas, the five elements-Earth, Water, Fire, Air and Space as elements of design.

An architect is a catalyst of change in society creating stage sets for various activities of human life to take place on this earth. As architects we challenge ourselves to achieve a balance between Responsible Creativity and Creative Responsibility in all our projects to come up with holistic solutions.

Our exhibit Symphony of the Bamboos expresses the above on three levels:

Bamboo a Metaphor-Bamboo is a natural, humble, elastic, adaptable, versatile, efficient and holistic material. At Manasaram, we take our profession as service to society- connected to people and nature at all times. We try to be adaptable, versatile and look for simple efficient solutions just like the Bamboo. Secondly, traditional buildings with bamboo are symbiotic and part of our culture. Bamboo in that way symbolizes the need of the hour for architecture profession to become Symbiotic and Social, rather than individualistic and elite. Bamboo is a metaphor for the way human existence itself should be on this earth-Humble!

Bamboo a sustainable Material- Recent research and development has shown bamboo to be extremely resource efficient and versatile material for the building sector, capable of solving major issues of sustainable development especially in developing and under developed countries. This can also resolve the problem of resource equity of natural resources. Bamboo serves the triple bottom line of Sustainable Development- Environmental security, Economic prudence and Social justice all at the same time. It can provide cost effective, safe and aesthetical housing; livelihood security, eliminate poverty and crime; low carbon emissions, fast sequestering of carbon and liquid fuel and energy! That’s bamboo for us!

Bamboo the Engineering material- Bamboo can replace many highly processed engineering materials with high energy balance in the construction sector owing to its inherent properties. The physical structure and chemical composition of Bamboo has the properties of highly efficient materials. Its high fiber strength makes it the only replacement for steel especially in small buildings and housing sector that form the largest chunk of construction. It can replace wood in almost all its applications. It forms excellent composites with a variety of materials suitable for many applications.

Bamboo with mud and stone can create a new vocabulary of architecture. We are showcasing our journey after adding bamboo to our palette of materials in a wide range of buildings like housing, leisure, institutional, infrastructure etc. We developed each of the projects as participatory research based solutions in terms of materials and structure along with spatial, economical, ecological and social requirements with CGBMT, Aditi Constructions and Dayalbagh University, Agra, India.

Our office Bamboo Symphony is the major project presented depicting our principles, the symbiotic character and culture of Bamboo and the physical, chemical, ecological and environmental properties of materials expressed in the architecture as form, function and aesthetics of the building. The building connects the past to the future.

Symphony of the Bamboos celebrates the triumph of nature, unleashing the potential of natural materials, processes and the symbiosis! Because… “It takes a whole orchestra to play a Symphony”!

Halford E Luccock
Manasaram’s stall at Venice Biennale
Poster of “Symphony of the Bamboos” workshop and lecture conducted at Venice Biennale on 25th Nov, 2016
3.2 Harvesting the 5 Elements - Aditi Greenscape E5
To start with, the project has already been awarded IGBC Green-Homes Platinum Pre-Certification with maximum credits achieved in this category in the whole of India and has successfully hit the market even before the start of the execution.

This is a project developed as a modern utopia and a place for healthy and peaceful living.
Aditi, is a Sanskrit word for “ABUNDANCE” and creative power. It is the name of one of the most ancient goddesses – the ‘mother’ of all gods on earth, and is related to the terms “Beginning”.

The Aditi green scapes project saw its inception by the virtue of its name and the site. In the design, we have tried to harvest the elements of nature through the buildings and services in various ways possible.
Blurring the boundary between Buildings & Gardens.

Apartment and villas:
• Island Villas in the apartments with no common walls.
• Staggered gardens at every floor. Visual interconnection with other floors.
• Each apartment with large double height balconies with a dedicated space for vegetable gardening.
• Calm and serene interiors.
• Emergency lighting with renewable energy.
• Orientation of the apartment to have maximum light and ventilation.
• Terrace with a luxurious health club.
• Existing trees on both sides of the villas.
• Family lounge area, large terraces in villas.
• Courtyards in each villa act as an outdoor seating space.

Amenities:
• Infinity pool on the terrace - Connecting water to the sky.
• Facilities like fitness center with sauna and steam bath and massage areas.
• Party hall overlooking the swimming pool.
• Organic farming all over the terrace.
• Yoga hall facing Zen garden.
• Play areas for children with creativity center and crèche facility.
• Basketball and Badminton courts, gazebos, tree-house and Zen gardens.
• Amphitheatre of approximate 150 capacities.
• Park electricity run on solar panels.
• Natural landscaping with indigenous plants, water bodies and minimum lawn area.
• Community Club with a multi-purpose hall, swimming pool, fitness center, etc.
• Library with books emphasizing on the green way of living.
Concept sketches for community spaces

Central community gathering space

Green passages between the structures

Front view of the apartment building

Community Centre

View of a Villa
3.3 Sustainability Institute - Spreading the seeds: Striving for Holistic Architecture
This Sustainability institute aims to create all the sustainability technologies from design to execution. This is proposed to be a zero carbon footprint building itself housing centre of Excellence in sustainability. It will cover the aspects of sustainability materials, services, energy, water management, waste management, Biodiversity, social sustainability etc. under one roof and provide certificate courses to begin with by 2017-18.

Our future project - our headquarters for our Sustainability institute which will have Faculty research block, labs, exhibition spaces, restaurants staff housing, studios, hostels for the students and villas for visitors. This will be an edutainment centre in the Gurukul system but wired to the world!

BAT courses with Dayalbagh University
We are starting BAT courses with Dayalbagh University in modular units from 2017 with each module of 9 week duration. 4 modules will make up one certificate course. This will be done under the government programme for vocational courses and can lead to a B. Voc undergrad programme in vocation. The university wants to take it to the doctorate level in the field of bamboo; we have signed a MoU with the Dayalbagh University as knowledge partners in establishing the course and their various Bamboo Centres.
Our adventure so far has been one of exploration and intuition, learning from technologies that have existed for centuries and stood the test of time. Traditional technologies in every part of the world are responses to the immediate needs of the local inhabitants perfected over centuries.

We have been trying to study these techniques and adapt them to develop a contemporary vocabulary of design for our projects. Each of our projects is considered as a research opportunity where we experiment with new forms of construction, materials etc. which have roots in our traditions.

New frontiers...

We are continuing our search for solutions to solve several issues with the material like fire rating, color leaching, joints, database, standards, bond with concrete and several others.

Data base creation for traditional and contemporary technologies.
We are in the process of building a database of Bamboo based traditional technologies for the building sector with our own projects as the starting point. This compilation would give confidence and serve as reference for anyone looking to build with this beautiful material.

Our adventure so far has been one of exploration and intuition, learning from technologies that have existed for centuries and stood the test of time. Traditional technologies in every part of the world are responses to the immediate needs of the local inhabitants perfected over centuries.

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Stabilized Mud-Bamboo waste blocks

The use of strong bamboo fibers in the mix for stabilized mud blocks greatly enhances the strength of the blocks and are excellent for exterior or interior walling. We are planning to conduct testing for the block, so that they can be used suitably.

Stabilized Newspaper-Mud-Bamboo block

By compressing Bamboo and newspaper waste with mud, one can achieve extremely light weight blocks. Another great option for interior partitions and for even making furniture!

Bamboo Crete Walls

Bamboo crete technology uses bamboo splits and chicken mesh as reinforcement for walls. These are light weight and excellent for shear and curtain walls.

This method of construction is fast and can be employed in various forms of pre fab construction, be it small scale shelters or large scale multi stories and curtain walls for high rise building projects. These walls are 2” thick and serve as suitable choice for internal partitions.
Working with Bamboo and other natural materials has been a very rich and satisfying journey and has also taught me many lessons for life:
- Be humble- You are just a strand in the web of life.
- Be elastic- Adjust
- Be hollow- Absorb
- Be resilient- Don't give up or break
- Weak is strong
- Always be ready- opportunity can come anytime
- Commit to growth (continuous)
- Be simple, Be happy

With all these lessons, The Bamboo Architect continues her journey ahead... to new beginnings from... this end...
Our Orchestra  List of resource organizations

- Manasaram Architects, Bangalore
- Aditigreenscapes, Bangalore
- Dayalbagh University, Agra
- Indian Plywood Industries Research and Training Institute, Bangalore
- Institute of Wood Science and Technology, Bangalore
- Grow more biotech pvt. ltd, Hosur
- National Institute of Design, Bangalore
- Sandeep Sangaru pvt. Ltd, Bangalore
- School of Planning and Architecture, Bhopal
- CARE School of Architecture, Trichy
- Bamboo Society of India
- M P Bamboo mission
- Chattisgarh Bamboo mission
- Gujarat Bamboo mission
- Pointec Pens and Energy Private Limited, Attibele
ANNEXURE I

Publications
Mesmerising new bamboo houses coming!

Bamboo houses may dot urban landscape soon

Homing in on bamboo

Park to popularise alternative energy
it's stronger than cement, lighter than steel

Habitat

Build it with bamboo

Bamboo: strong and beautiful

ENCHANTING AND SUSTAINABLE WITH NATURAL ELEMENTS

Big on bamboo

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 Kamadhenu Sundar

National Pride

Bamboo gets city architect award

Green is in

City's elite join hands to rejuvenate its green lungs
On a versatile material

Bamboo conclave at UAS from tomorrow

Bengaluru: “No plant offers the kind of socio-economic benefit to society that bamboo does,” says architect Neelam Manjunath, executive committee member, Bamboo Society of India, ahead of the International Bamboo Conclave and Expo 2014 here.

India should realise that bamboo is one of the economical and environment-friendly materials for building purposes,” the society says.

Its applications include walls, beams, columns, doors, windows, furnishing and flooring. “What makes bamboo a wonder material is its light weight, making it an ideal material for structures in seismic zones,” Mr. Neelam says.

According to her, bamboo plays a meaningful role in biodiversity conservation and contributes to soil and water management. It has 1,500 documented uses to meet the needs of people, from the child’s cradle to the dead man’s bier.

Neelam: “Consider the ecological significance and the vast economic potential, the bamboo conclave is to bring about awareness on the market in all its assertions.”

There are 150 varieties of bamboo grown in India, with the artisans in tribal areas who are trained bamboo workers being marginalized.

The conclave will include a technical seminar as well as an exhibition of bamboo products and bamboo industries, showcasing the best solutions in the bamboo sector, and global trends will be discussed by experts.

The International Bamboo Conclave will be held February 20 and 21 at Infosys auditorium, IISc campus.

Architect Neelam Manjunath

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Bamboo, a better bet

A C Lakshman’s farm on the outskirts of Bangalore is not just a treasure trove of different varieties of bamboo plants, but also an effort to popularise the use of bamboo for construction purposes, says Shankuntala Borpatra.

Bamboo: strong and beautiful

Continued from P1

The other advantage of bamboo is that it grows 36 per cent more quickly than the “tallest tree” — some varieties grow more than one meter each day, and is ready to use in as less as three years. It is possible to grow enough bamboo on a 200 x 200M plot of land to build two houses measuring 40 x 40M in five years. Bamboo can be easily planted by village communities. Even individual families can grow for their own needs.

Buildings of bamboo can be easily recycled or dismantled and is easy to replace individual elements pre-fabrication - this concept has only recently emerged in western architecture and is not possible using conventional building materials. Bamboo is sturdy but extremely light and elastic.

Bamboo is ideal on account of its drilling walls and its other physical properties are much superior to wood, concrete and steel in many aspects. While wood has a hard core and goes softer towards the outside, bamboo is hard on the outside and soft inside - a far more stable structure. It can withstand even nuclear radiations.

To popularise bamboo as building material, the Centre for Green Building Materials and Technologies leaves no stone unturned. Its goal is to promote and provide “Green i.e. environment friendly, low energy and cost effective” building materials and technologies.

The Centre has associated with Manasuru Architects for designing, Adj D has constructed for execution and Bamboo Village Complex for production and marketing of bamboo based value-added products and materials. It has demonstrated a prototype of the bamboo house as a prototype housing at Bangalore.

Little Andaman under Tsunami Rehabilitation programme to UNESCO, an NGO based in New Delhi, it has already given consultancy services in green buildings and eco-friendly buildings, materials to more than 200 customers. The Centre is in process of setting up Bamboo Centre of Excellence in Bangalore.

“Her are in the process of starting courses and workshops through distance education programmes from January 2009. We have collaborated with Daulah College, University, Agra for this purpose,” says Neelam Marwah of Manasuru Architects.

All in all, one can no longer neglect bamboo, since it can be used for multiple purposes.
Thoughtful Impressions
Bamboo Architecture

N
eesh Shetty, Principal Architect of Manasaram Architects, has identified bamboo as a sustainable material for building structures. Bamboo is a fast-growing and renewable resource, making it a suitable option for architectural designs.

In a recent project, Manasaram Architects utilized bamboo to create a sustainable and visually appealing structure. The use of bamboo in this project demonstrates the potential of this material in architectural design.

For more information on the project, visit the Manasaram Architects website at www.manasaram.com.
Bangalore: The ice bucket and rice bucket challenges are passé; the bamboo bucket challenge has picked up steam in the city.

Ten bamboo saplings have been planted on the Mahatma Gandhi Institute of Rural Energy and Development (MGIRD) campus in Jakkur as part of the campaign launched by the institute and the Centre for Green Building Materials and Technology.

The drive began on September 18, World Bamboo Day, to increase the numbers of the dwelling “green gold” in the state.

The challenge is simple. One person plants a sapling and challenges two of his/her friends to do the same, and the chain follows. By each person re-multiplying two others, experts say the common available bamboo shoots in Malleshwarum, Kodagu and Mangalore are nowhere to be seen this time around. “Bamboo shoot pickle, which is popular in Kodagu, is also not available this year,” says Syam V. Vyaswani, a scientist at the Institute of Wood Science and Technology.

Growers do not find the state suitable for bamboo cultivation. “There is no incentive for growing bamboo as the trade and transit rules are heavily regulated by the forest department,” Vyaswani adds.
ANNEXURE II

CONFERENCE AND SEMINARS - PAPER PRESENTATIONS


• “Bamboo- As an appropriate Building Material” in March 2001 IPIRTI Auditorium, Bangalore.

• “Responsible Creativity Vs Creative Responsibility” at Practicing Architects Association meet on 21st February 2003 at ‘Garden Hut’ Century Club, Cubbon Park, Bangalore.

• “Bamboo Architecture in India – Through the times” at VII International “World Bamboo Congress” at Ashoka Hotel, on 27th Feb 2004 4th March 2004 at New Delhi.

• “Bamboo Housing – A Sustainable / Magical Solution” International Seminar on Transforming Habitat Development through strategic Interventions; Requirement Mapping and Change Analysis” at Colombo from August 20-23, 2004.

• “Bamboo as Wood Substitute” at the National seminar on Wood substitution through Engineered Wood, Bamboo and other Lignocellulose, at IPIRTI, Bangalore on December 17, 2004.


• “Introduction to Bamboo Architecture” at the National Seminar on “Introduction to Bamboo Architecture and Disaster Housing with Bamboo” jointly organized by CGBMT, Bangalore and IPIRTI, Bangalore on 5th June 2005.

• “Bamboo Dwellings - Crafts and Architecture” on 16th July 2005 at Ganjam Mandappa, Banashankari, Bangalore.


• “Bamboo for Sustainable Rural Housing & Infrastructure Development” at SPIRIT 2006. (Sustainable and participative initiative for rural Infrastructure technologies.), Max Mueller Bhawan, New Delhi, 16th march 2006.

• Hosted and Participated in the workshop “Sustainability Living 2007” at Bangalore 7-8th July, 2007.

• Hosted and Participated in the workshop “Designing beyond Sustainability 08” at IISC, Bangalore on 7-10th Dec 2008.
• Poster presentation on ”Bamboo, The Environment, and Climate Change” at World Bamboo Congress, Thailand , 19th September,2009.


• “International Colloquium” on Architecture-Structure interaction for a sustainable built environment, Bangalore on 22-25th April- 2010.

• Participated in the “World Architecture Festival awards” at Barcelona, Spain, 3 & 5th Nov, 2010.
• Presentation about the ”Bamboo Application Technology Course” at Sb 11 World Sustainable Building Conference 2011 in Helsinki, Finland on 20th October 2011.
• Participation In “World Architecture Festival Awards” 2011-2012 in Barcelona, Spain
• Presentation about the “Bamboo Application Technology Course” at World Bamboo Congress 2012 at Antwerp.
• Presentation about “Bamboo Application Technology Course” at the Lafarge Research Centre, Lyon, France in September 2012.
• Presentation about the “Bamboo Application Technology Course” at Architects Union, Paris in September 2012.
• Presentation about the “Bamboo Application Technology Course” at Madera Wood Research Institute at Ebswarlde, Berlin in October, 2012
• Presentation about the Architecture with Bamboo and “Bamboo Symphony” Project at IIA Trichy, Tamil Nadu at June 25th 2013.
• Presentation at F.E.E.D., Pune on “Architecture, Sustainability & Bamboo” on Friday 24th January 2014
• Presentation at International Bamboo Conclave and Expo conducted at University of Agricultural Science,Bangalore on “Bamboo in Buildings and Infrastructure” on  February 22,2014.
• Guest lecture at IWST,Bangalore on “Bamboo Handicrafts for Artisans” on March19,2014.
• Presentation at 10th World Bamboo Congress 2015 on “Contemporary Bamboo Architecture in India and its Acceptability and Skill development ” and “Model for Employment and Enterprise based Skill Development” on 19th Sep – 2015.
• Keynote speech at Exhibition at Sustainable social housing on “Think Global,Build social! Architectures for a Better World” conducted at InCITE Gallery,Bangalore on October 1st,2015.

• Presentation at Srishti Institute Of Art, Design and Technology on “Natural Lighting in Interior Design” on December 7,2015.
• Presentation on “Repositioning Bamboo in Indian Building Sector” at National seminar on Bamboo Reserve Management and Advances in Utilization Options,conducted at IWST,Bangalore.
• Keynote address at Bamboo Cultural Fest’16 conducted at IWST ,Bangalore on September 24th ,2016.
• Talk on “how to use local raw material and adapt building techniques in India” at NUMA Bangalore on October 19,2016.
AWARDS

2014
Felicitated at International Bamboo Conclave

2013
Aga Khan Award for Architecture: nomination for Bamboo Symphony

ArchiDesign Awards: Best Designed Sustainable Project Award- Winner- Bamboo Symphony
http://www.archidesignawards.com/archidesign-superstars-6th-year/

WAN House of the Year Award: Longlist for the house of Five Elements

2012
World Architecture Community Award 20+10+X- 12th Cycle: Selected through the Voting of Honorary Members- Bamboo Symphony
http://worldarchitecture.org/architecture-projects/mfvf/bamboo_symphony-project-pages.html

2011
Lafarge Invention Awards: 3rd prize- innovative structural system- Bamboo Symphony
http://www.lafarge.in/Lafarge-Invention-Awards-2011_Finalists-projects_vf-eng.pdf (Website link does not mention that we received the 3rd prize)

World Architecture Festival Awards: Shortlist for Bamboo Symphony

2008
Architectural Competition for Providing Architectural design concept for Police Bhavan to be constructed for KSRP at Kormangala, Bangalore, in view of KSRP Golden Jubilee Year: 2nd runner-up

2005
IIA-Shri Dharmasthala Manjunatheshwara Award: Excellence in Rural Architecture- Navodaya Vidyalaya Residential School at Gandsi, Hassan District, Karnataka

Sir M Vishweswaraya Prize: Design Ideas Competition 2004-2005 on Application of Bamboo in Construction- State Level Energy Park at Indira Gandhi Musical Fountain, Bangalore
“In this time of burgeoning development activity, the basic construction ingredients, whether for concrete walls or roofing membranes, are obtained by mining or harvesting natural resources. The extraction of raw materials, whether from renewable or finite sources, is in itself a source of severe ecological damage. In theory, harvestable materials like wood are renewable. In reality, a material is only considered a renewable or sustainable resource if it can be grown at a rate that meets or exceeds the rate of human consumption. Bamboo is definitely one of them. Neelam makes an honest attempt in introducing Bamboo as a core material amongst other sustainable technology in her designs. While the world heads to an “ecological credit crunch” far worse than the current financial crisis, Neelam’s experimentations in bamboo and its applications into living spaces makes a silver lining towards ecological balance thus energy saving.”

Ar. Anand D K
Co-founder, MD Consulting – Architecture, Project Management& RE Advisory, Bengaluru