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AMBI, PUNE

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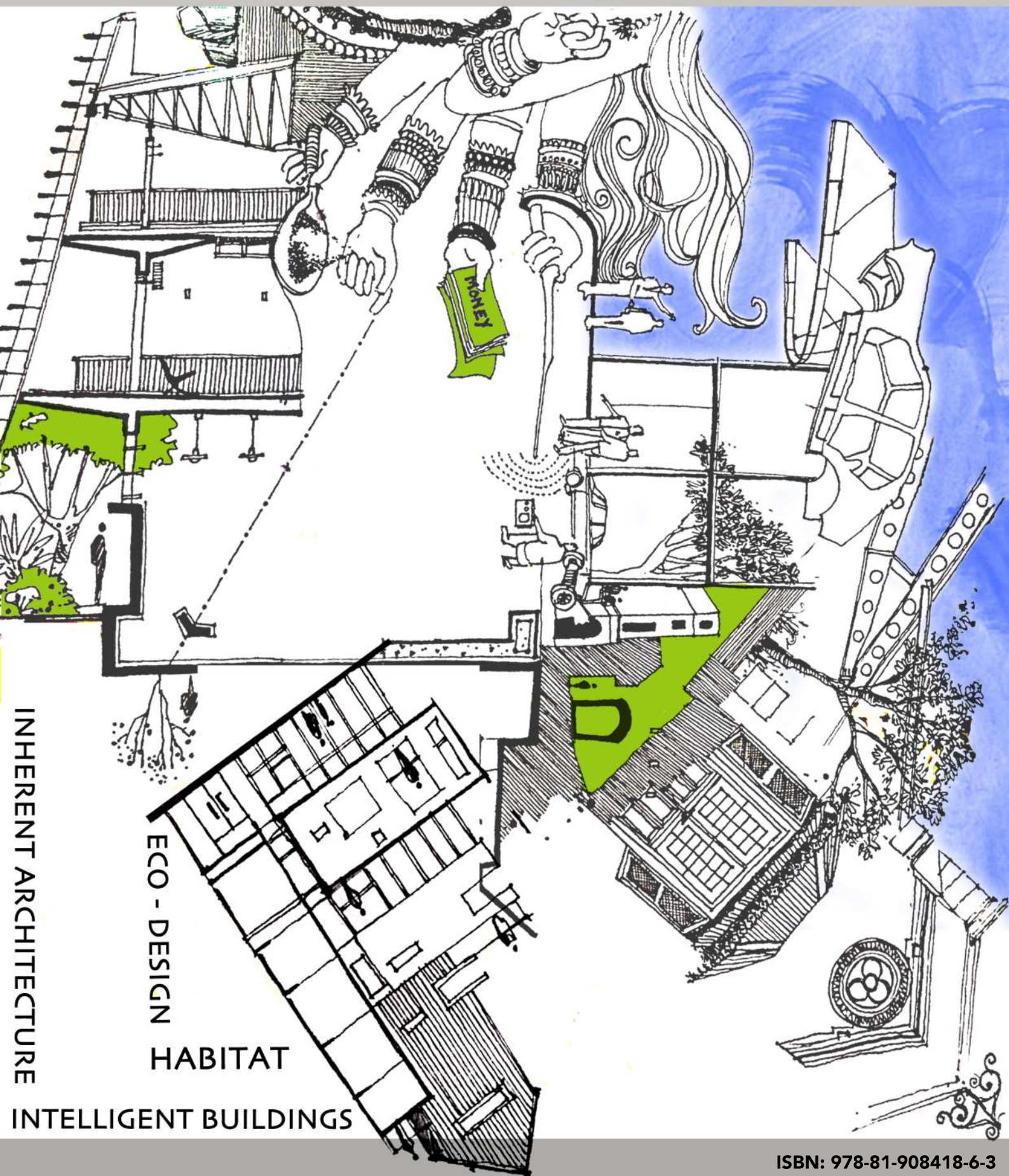
INDIA

Research Journal on

Building With Time

NCBWT - 2019

Savitribai Phule
Pune University



INHERENT ARCHITECTURE

ECO - DESIGN

HABITAT

INTELLIGENT BUILDINGS

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Eco - Design | **Intelligent** Buildings

Inherent Architecture | **Habitat**

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— Support —

D Y PATIL SCHOOL OF ARCHITECTURE AMBI, PUNE

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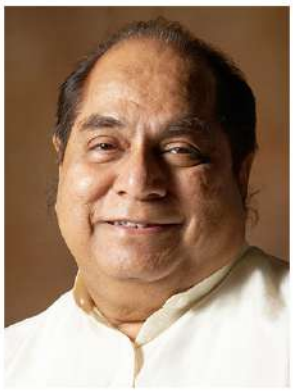


Message from Founder President

Dr. D. Y. Patil

(Former Governor of Bihar)

Founder President, DYPEA

I am delighted to know that the DY Patil School of Architecture, Ambi is organising a National Conference on "Building With Time" 2019. I hope that this conference succeeds in inducing new perceptions of time among the participants and pave the way for more research in Architecture and Buildings sector. My best wishes to D Y Patil School of Architecture, Ambi, for their initiative to organise such conference, as it will not only beneficial for participants and faculties but also expose students to different horizon through interactions and presentations.

Best Wishes!!

Message from President

Dr. Vijay D. Patil

President, DYPEA

It is a great pleasure for me that our DY Patil School of Architecture, Ambi is conducting a National Conference on "Building With Time" 2019.The conference is a meeting and information exchange between the end user, the development and the research communities. The purpose of this conference is to bring together researchers, experts from industry, academia, and other interested organisations to meet, exchange information and ideas in developments in the field of Architecture and Building Technology. The conference program has been designed to provide ample opportunities to researchers to network and to share ideas and information about the time in relation to urban development. I hope this conference NCBWT-2019 will be enjoyable, memorable, and productive for participants and looking forward to the innovations that result from your networking and discussions.

All the best!

Message from Managing Trustee

Mrs. Shivani V. Patil

Managing Trustee, DYPEA

I am extremely happy to know that the know that the DY Patil School of Architecture, Ambi is organising a National Conference on "Building With Time" 2019.

Time brings with itself change. And to understand the built form in context of time is the essence of understanding architecture. For a holistic approach to architecture and related studies, one must develop an understanding of the impacts that time brings. As change in time is the primary constant.
I send my best wishes to the participants of the conference and hope that this sparks a conversation among them that takes these researches forward.

Time has a wonderful way of showing us what really matters.

Message from the Principal & Convenor

Dr. Uma Jadhav

Principal, DYPSOA, Ambi

I am very glad to welcome you all to the National Conference on "Building With Time" 2019 being organised by the DY Patil School of Architecture, Ambi. After the success of multiple events in the last few years, we are organising first national conference NCBWT-19 on 24rd & 25th February 2019 and we feel immense pride in welcoming you for the same! On behalf of the NCBWT-19 organising team, I welcome all academicians, industrial professionals, research scholars and students of various institutes & universities to join us to exchange ideas and information.

TIME, which is understood as 'the indefinite continued progress of existence and events in the past, present, and future regarded as a whole', is playing its inevitable role in shaping architecture, which responds to the changing social, economic, environmental psychological, social needs of mankind. With the era of industrialization and modernization, overall development in every spectrum of life has resulted in more complex development patterns. Humane development and urban spaces to which society demands for Design with Time. The aim is to develop design strategies for programmatically, spatially and architecturally enriched infrastructures, transforming the strategic space of logistics into habitable space – experienceable architectural and urban terrain.

This conference explores the ideas about time in the design inclinations and choices of contemporary designers of the environment. The aim and objective of NCBWT-19 is to communicate the latest research and findings of documentation, analytical and experimental work related to Building With Time as Context. This conference provides opportunities for delegates to exchange ideas, explore & share innovative work carried out by different individuals. Four tracks of the conference i.e. Eco Design, Intelligent Buildings, Inherent Architecture and Habitat; help explore different themes related to Architecture and allied fields. I wish all the best to the participants, the Organising Committee of NCBWT-19 & the faculty members.

On behalf of the management, I thank the Savitribai Phule Pune University (SPPU) for their support. NCBWT-19 is a result of great teamwork from all the volunteers mentioned above and innumerable others who have taken time off from their busy schedules to make it a successful technical and social event. Wish you all a memorable time at NCBWT-19.

Reviewer's Note

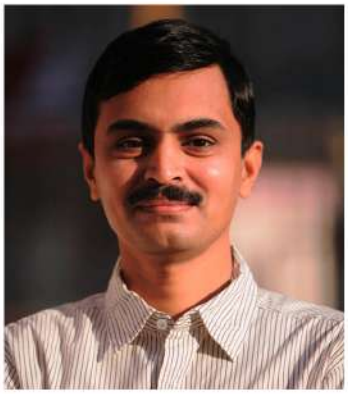
Dr Ravindra Deshmukh

It was a great opportunity to be a reviewer for "Building with Time" national conference at DY Patil School of Architecture, Ambi Talegaon MIDC, Pune. The conference revolved around sustainability as a central theme of the conference. The response received was overwhelming. That showed passion toward reduction in energy in construction and designing Green projects of the researchers who submitted papers. The papers had variety in topics of investigation. Ranging from housing trends to biophilic design; Green buildings to political influences on housing development; idea of bringing forest in urban jungle to traditional forms of housing; urban farming to regionalism in architecture; design with nature to decorative woodwork Maratha architecture and also, vernacular and contemporary aspects of a Warli house, the range of topics have been diverse encompassing almost all segments of sustainability.

Reviewer's Note

Dr Abhijit Natu

At the outset I congratulate DYPATIL College of Architecture Ambi for organising the research conference. I was assigned to review of the track on Conservation and Vernacular Architecture. There were about 10 to 12 abstracts. Some of them were very good ideas which had the seed of leading to a good empirical inquiry. But one had to put them into poster category. The others were having empirical findings and hence were found eligible for a paper presentation. This endeavour of the institute to promote research environment through the conference is laudable. I am sure the participants would have exchanged ideas and shared knowledge.



Reviewer's Note

Dr. Parag Narkhede

I would like to congratulate the organizers for hosting the conference on a very relevant topic. It's an open ended topic inviting a variety of professionals, together making it more interesting and inclusive. Good number of papers were received on various sub-themes of the conference. The papers were evaluated on the basis of relevance and significance to the theme and research method adopted to complete the study. Most of them were written appropriately and contextually. It was a good experience to see the participation of young as well as senior professionals and teachers in writing for the conference. Presentations of these papers in conference would surely bring forth interesting findings contributing to the body of knowledge in fraternity of Architecture, Design and Planning. I will like to appreciate all the efforts of committee working on preparation of conference proceedings.

The work of reviewing by the reviewers could finish in time because of all the support and assistance extended by the organizing committee members.

I sincerely thank to the organizers for giving me an opportunity to contribute as an advisor and reviewer for the conference. It was really an enjoyable experience while working with the organizing and review committee. I wish for the great success of the conference.

Reviewer's Note

Ar. Rahul Nawle

Eco-design approach can be termed as a responsibility and understanding of our actions towards environment conservation. It is imperative to search for new building solutions that are environmentally friendly and lead to a reduction in the consumption of energy.

The topics under Eco-design were diverse in its thought. It gave a new perspective of diverse approaches. From design per say to planning.

Eco-design is a need of the hour in the current situation that we are facing, i.e. climate change. All the authors have shown a diverse thought process, which combined will set a new path in making our built environment a more comfortable place.

I feel the scholars should improvise of the expression of ideas, which generally is lacking. The method of writing and quantitative approach will be helpful in convincing the people who are in a position to take decision and are non-technical.

A holistic approach is required while putting form a thought. Both qualitative and quantitative methods can be adopted in doing so. The concepts are common, but the application of the same should be innovative.

The papers, more or less appeared to be documentation of a concept rather than an investigation.

Reviewer's Note

Dr Shubhada Gadkar

It's my pleasure to be an expert reviewer for the National Conference – Build with Time (NCBWT) at D. Y. Patil School of Architecture, Ambi Pune. I think this conference is a great initiative to start a discussion about the role of future architects and building professionals in the build environment in India. The globalization and impacts of climate change have changed the traditional perspective and roles of everyone involved in building construction. Different topics selected for this conference such as Eco Design, Intelligent Buildings, Architecture and Habitat comprehensively cover the various important aspects of current and future developments in this profession. I hope the conference serves as the starting point of better understanding of these aspects and create more environment friendly and sustainable building practices for future building and infrastructure projects. Also, it's very important at this stage that architects and professionals in building industry in India takes a front lead role in reducing its carbon footprint and reduce adverse effects on environment, locally as well as globally while considering the social diversity of this country.

I wish all the best to the organizers as well as all the participants of this conference.

Organising Committee

PATRON

Dr. D. Y. Patil
(Former Governor of Bihar)
Founder President, DYPEA

Dr. Vijay D. Patil
President, DYPEA

Mrs. Shivani V. Patil
Managing Trustee, DYPEA

CONVENOR

Dr.Uma Jadhao
Principal, DYPSOA, Ambi

Co-CONVENOR

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Associate Professor, DYPSOA, Ambi

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Assistant Professor, DYPSOA, Ambi

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Ar. Sanjukta Das
Ar. Kavan Pednekar
Ar. Shrikant Parsewar
Ar. Aakash Shah
Ar. Ambalika Ekka

RAPPORTEUR TO THE CONFERENCE: Ar. Alice Agarwal

About the Conference

Welcome to the National Conference on Building With Time (NCBWT-19). We feel immense pride in welcoming you for the same! On behalf of the NCBWT-19 organising team, welcome all academicians, industrial professionals, research scholars and students of various institutes & universities to join us to exchange ideas and information.

The aim and objective of NCBWT-19 is to communicate the latest research and findings of documentation, analytical and experimental work related to Building With Time as Context. This conference provides opportunities for delegates to exchange ideas, explore & share innovative work carried out by different individuals. We hope that the conference will result in contributing knowledge into the field of Architecture and Building Technology. The organising committee of conference is pleased to invite prospective authors to submit their original works to NCBWT-19. All paper submissions will be peer reviewed and evaluated based on originality, technical and/or research content/depth, correctness, relevance to conference, contributions, and readability.

The Conference aims at fostering discussions of theory and research on innovative presents and Future Trends and Technologies. Focusing on multidimensional Phenomenon of Architecture, this National Conference aims to deepen the understanding of informality by opening it to discussion with contribution from various disciplines like architecture urban planning sociology, climatology, economy and ecology. The aim is to engage architects, planners, developers, policy maker, artist's, academicians and resident bodies The Diverse and often conflictive set of partners will be asked to discuss the present and future design trends and technology of architecture.

Track 1:

Eco-Design

Biophilic Design - A Sustainable Approach

[1] Pranita Pranjale, [2] Deepali K. Hejiib
[1], [2] Department of Architecture, Maharashtra Institute of Technology, Aurangabad

ABSTRACT

In an increasingly expanding but interconnected world, more than half of the world population lives in urban areas. In the present scenario, cities are important factors of expansion. At present the life in cities is more rapid, digital and urbanized than ever before. Urban environment is deteriorating even more rapidly. With the fast-pace of urban expansion, often unplanned and inadequate, alongside social, environmental and cultural factors that affects the intrinsic relationship that has always existed between Man and Nature. The outcome of this is thrashing our relationship with nature and the open space.Sustainable city has long been conceptualized but it has not yet been universally applied. One of the problems of our cities is away from nature. Distancing people from nature is leading to an increasingly compromised existence in relation to a broad spectrum of physiological, psychological, behavioural, affective and cognitive aspects. It is necessary to think of new models of development capable of facilitating for humanity an intimate and innate connection with Nature. One possible, experimental scenario is Biophilic design. Biophilic architecture has emerged as an attempt to reduce the gap between Man and Nature. Biophilic design is an innovative approach that emphasizes the importance of maintenance, enhancement and restoration of useful experience on the use of nature in the built environment.This paper focused on the Biophilic planning and designing which will increase the environmental attitude and knowledge of citizens. Enhanced environmental attitude and knowledge lead to environmental behaviour modification and green lifestyle of citizens and thus environmental sustainability.

Keywords: Biophilic Design, Biophilic Architecture, Sustainable Development, Environmental attitude, Environmental sustainability.

1. INTRODUCTION:

"The relationship between humankind and nature can be one of respect and love rather than domination...The outcome...can be rich, satisfying, and lastingly successful, but only if both partners are modified by their association so as to become better adapted to each other...With our knowledge and sense of responsibility...we can create new environments that are ecologically sound, aesthetically satisfying, economically rewarding"

- René Dubos, The Wooing of the Earth

Since the Industrial Revolution, the built environment and urban areas have exploded at an extraordinary rate, not seen in any other time in human history. For over two eras, humans have been immersed in the tangled complexities of nature where we both thrived and evolved into the intelligent species that we are today. It is in this environment that our ancestors inhabited

throughout evolutionary development, and became ingrained in our psyche, physical DNA and brain adaptation. In this natural landscape, we were provided with all of the necessities crucial which are required for the growth.

All ancient builders and architects were much attuned to their culture and the earth, mimicking forms they observed in nature and creating structures that still awe us today (Molthrop, 2009). Stylised animals and plants were used for decorative and symbolic ornamentation, such as the Egyptian sphinx, courtyard gardens, the Japanese intrigue with the bonsai tree, and fishponds.

Scientific and controlled studies are increasingly showing that our modern industrialised lifestyle with technology and changing cultures has been detrimental to our psychological well-being. This discrepancy is most-likely linked to the increases of psychopathology evidenced today. It is quite dangerous to assume or expect that our brains would be able to adapt and evolve to such extraordinary changes in a minute amount of time at an unlimited rate when compared to our ancestors.

Sustainability or sustainable architecture focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs. The three pillars of sustainability are composed of economic, environmental and social aspects. Architectural Modernity is the term now taking away man from the nature. Today we spend over most of our time indoors surrounded by drywall, concrete, wood, and steel. So it is vital to bring men close to nature for his healthy life. Biophilic design is an architecture which is a sustainable approach which incorporates natural light, materials, nature views, vegetation and other experiences of the natural world into the modern built environment. It has emerged as an attempt to reduce the gap between Nature and Man.

2. NEED FOR BIOPHILIC DESIGN:

In cities maximum time people are away from their houses, either they will be in offices or in public areas like stations, bus stands, malls etc. Due to continuous urbanisation the building footprints get reduced and became tall buildings. Full day working in a compact structures leads to stress-related illness and is predicted to be the primary cause of sickness by 2020.The downside of this is the overall loss of man's connection to nature and the outdoors. So its urgent need to create connection of man and nature by executing 'Biophilic Design' in buildings for the better future of human being.

3. WHAT IS BIOPHILIC DESIGN?

The term Biophilia, stemming from the Greek roots meaning love of nature, was coined by the social psychologist Erich Fromm. It came into use in 1980s by Edward O. Wilson, an American biolog is the and consequently pioneered a new school of thought focused on the need to bring humans back in contact with nature. The word 'biophilia' was first used by Edward Wilson in his book 'Biophilia'in 1984 . He defined the term, 'the connections that human beings

Figure 1: Biophilic Architecture

subconsciously seek with the rest of life'.

Biophilic design is focused on creating strong connections between nature and manmade environments which can have benefits for health and wellbeing.The term 'biophilic architecture' refers to adaption or design of a building to the environment.

Stefen Kellert, a professor of social ecology provided a set of criteria for the biophilic design. In his literature he mentioned six elements for biopllic design are:(Stephen R. Kellert, 2008):

- Environmental features
- Natural shapes and forms
- Natural patterns and processes
- Light and space
- Place-based relationships
- Evolved human-nature relationships

4. BENEFITS OF BIOPHILIC DESIGN:

Incorporating Biophilia into building design is considered to have a number of following advantages:

- A reduces the feelings of stress and anxiety
- Enhanced physical health as evidenced by decrease blood pressure and muscle tension
- A restoration of cognitive and emotional energy
- A sense of being more connected to other people.
- It eliminates pollution, and maintains a clean environment.
- Measurable beneficial impacts on productivity, enhancing creativity, improving wellbeing of persons.
- People/students/employee feel connected with nature even though they are sitting in a building.
- The primary factors driving this demand are to minimise energy consumption and conserve natural resource.
- It is one of the sustainable approaches for green building certification.
- It helps in healing and recovery of patients from illness and major surgical procedures.
- Healthy childhood maturation and development also correlated with contact with nature.

5. APPLICATION OF BIOPHILIC DESIGN

The task of Biophilic Design is to address the deficiencies of contemporary building and landscape practice by establishing a new framework for the satisfying experience of nature in the built environment. Biophilic design seeks out to create suitable habitat for people as an organic contemporary built environment that takes care of people's health, fitness and wellbeing. (Stephen R. Kellert, 2017)

Figure 2:The integration of the Biophilic elements contribute to the powerful

Biophilic design adds to sustain the efficiency, functioning and strength of natural techniques overtime. Adaptation of natural techniques certainly occurs as a result of major development and building construction. The application of Biophilic Design can modify the environmental requirements of a building or landscape in the short term, but over the long run, it should support an ecologically healthy and sustainable natural society. The successful application of Biophilic Design results in a wide range of physical, mental and behavioural benefits.

Three types of experience of nature signify the basic categories of Biophilic Design.These include the **Direct Experience of Nature**, the **Indirect Experience of Nature**, and the **Experience of Space and Place**. (Calabrese, 2017)

5.1. Experiences and Attributes of Biophilic Design (Kellert D. S., 2015)

Direct Experience of Nature

- Air
- Light
- Water
- Plants
- Animals
- Weather
- Natural Landscapes and Ecosystems
- Fire

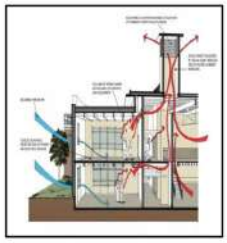
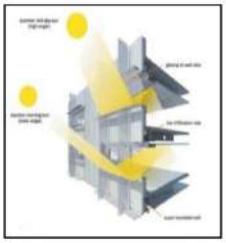
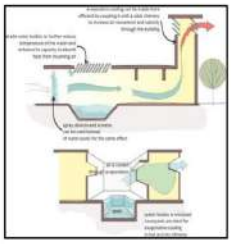
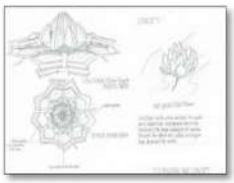
Indirect Experience of Nature

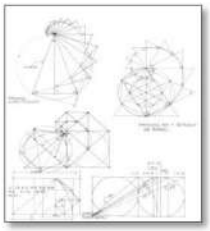
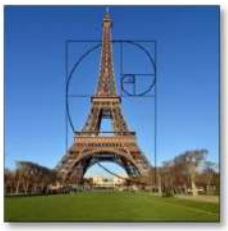
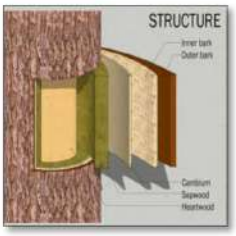
- Images of nature
- Natural materials & colours
- Simulating natural light and air
- Naturalistic shapes and forms
- Evoking nature
- Information richness
- Natural geometries
- Biomimicry

Experience of Space and Place

- Prospect and refuge
- Organized complexity
- Integration of parts to wholes
- Transitional spaces
- Mobility and way finding
- Cultural and ecological attachment to place

5.2. Application of Biophilic Design In Architecture

	Inspiration/ Concept	Use in Building	Application in design	Problem addressed	Attributes of Biophilic Design
Direct Experience of Nature			Natural ventilation in built environment can be improved by variations in airflow, temperature, humidity, and atmospheric pressure.	These conditions can be achieved through access to the outside by means as operable windows, stack effect, or by more complex technological and engineering strategies.	**Air**
			Natural light most preferred feature in built environment. The simple use of natural rather than artificial light can improve comfort, health and productivity.	Natural light can be brought deep into interior spaces by such means as glass walls and clerestories, the use of reflecting colors and materials, and other design strategies.	**Light**
			Varying design strategies can fulfill the desire for connection with water including views of prominent Water Bodies, Constructed Wetlands, Fountains, Aquaria,etc.	Water body inside house to regulate temperature.	**Water**
			Landscapes in and around building should be abundant, ecologically connected, and tending to focus on local species.	The plants can reduce stress, contribute to physical health, improve comfort, and enhance performance and Productivity.	**Plants**
Indirect Experience of Nature			Vernacular buildings are designed using the natural materials. Prominent natural materials include wood, stone, wool, cotton, and leather, used in as furnishings, fabrics, and other interior and exterior designs.	The transformation of materials from nature frequently extracts positive visual and tactile responses, but also use less energy in building and make it sustainable and economical.	**Natural Materials**
			The nauralistic forms can be varied from the leaf-like designs found on columns, the shapes of animals and plants on building facades, to animal facsimiles woven into fabrics and coverings.	The presence of naturalistic shapes and forms can transform a static space into one that possesses the dynamic and ambient behavior of a living system.	**Naturalistic Shapes And Forms**

	Inspiration / Concept	Use in Building	Application in design	Problem addressed	Attribute of Biophilic Design
Indirect Experience of Nature	 Natural Geometries include ordered scales such as the "Golden Ratio"and "Fibonacci Sequence."		Natural geometries refer to mathematical properties commonly encountered in nature. These include organized scales, flowing forms rather than rigid artificial geometries, self-repeating but varying patterns, etc.	A balance between architectural space and energy quality produced inside it, can be achieved.	**Natural Geometries**
		Tree Bark 	Protection from elements, insulation, fire protection, water protection with permeability, plus ability to store waste and transport nutrients seems like adescription of a successful building façade.	Protection from outer environment. Thermal comfort.	**Biomimicry**

	Inspiration / Concept	Use in Building	Application in design	Problem addressed	Attribute of Biophilic Design
Experience of Space and Place			This can be achieved through vistas to the outside, visual connections between interior spaces, and the occurrence of secure and sheltered settings.	Prospect refers to integration of surroundings that allow people to observe both opportunities and dangers, while refuge provides safety and security.	**Prospect and Refuge**
	Integration of natural and built forms		The emergent whole can often be achieved through the sequential and successional linking of spaces, clear and distinct boundaries.	Integration of space can be enhanced by a central focal point that occurs either functionally Or thematically.	**Integration of parts to wholes**
			Prominent transitional spaces include hallways, thresholds, doorways, gateways, and areas that link the indoors and outdoors especially corridors,porches, patios, courtyards, colonnades, etc.	Gives connections between spaces facilitated by clear and distinct transitions.	**Transitional spaces**
	Culturally responsive designs promote a connection to place and the sense that a setting has a distinct human identity.		Human's affinity for natural places reflects territorial inclination that can be enhanced by both cultural and ecological means.	Cultural and ecological attachments to place often motivates to conserve and sustain both natural and built environments.	**Cultural and Ecological attachment to place**

6. APPLICATION OF BIOPHILICS IN URBAN PLANNING

Today, more than half the world's population lives in urban areas. According to a UN report, urbanization combined with overall growth could increase global urban population by another 2.5 billion by 2050. (Nations, 2014) Mega-cities with more than 10 million people are increasing in number. India, for example, will have six mega-cities by 2020, thereby becoming the country with the largest concentration of mega-cities in the world. (Taubenböck) The consequences of increased urbanisation and sprawl are apparent. Many cities suffer from social and environmental problems that have seriously affected citizens health and leads to many problems in cities. In modern cities, building integrated greenery systems and urban green spaces plays a key role in improving the aesthetic and environment quality of life of its residents. In particular, greening the built environment provides ecosystem services and goods.

The goal of biophilic urbanism is to rearrange the contemporary urban disconnect with nature, making the experience of the natural world a more integral part of ordinary city life. Biophilic urbanism is emerging as a planning and design approach for holistic improvement of urban spaces with combined focus on physical setting, urban design, lifestyle as well as attitudes and experiences. (Russo, 2017)

6.1. Biophilic Smart Cities

According to Beatley, "***A Biophilic city is a city that seeks to foster a closeness to nature – it protects and nurtures what it has ... actively restores and repairs the nature that exists, while finding new and creative ways to insert and inject nature into the streets, buildings and urban living environments.***"

Biophilic smart city is an urban design concept that identifies how cities can be planned for and retrofitted to incorporate the natural environment. Biophilic urbanism that incorporates nature into urban environments can deal with wide range of ecosystem services, which include Air Quality, CO_2 Reduction, Microclimate Benefits, Flood Control and Water Quality, Food Production and Economic Benefits. For example, Singapore is a compact city that is considered a good model of a Biophilic city, where the development of green areas and green buildings is regenerating the natural systems of the city and creating an urban ecosystem similar to its original structure. (Giuseppe T. Cirella)

This can achieved through the following guidelines: (Hampson, 2011)

- Green (vegetated) roofs and walls (incorporating vines and trellises)
- Day lighting streams (referring to uncovering waterways contained in pipes, under roads or under urban landscapes)
- Creating proper roadways for commuting
- Vegetable gardens, and community gardens
- Street trees and canopies over streets,
- Internal plants and vegetation for buildings , Parks (connected by wildlife corridors)
- Urban constructed wetlands (incorporating storm water and wastewater capture and treatment)

- Communal green public spaces,
- Running water (incorporating water capture and storage, and evaporative cooling)
- Shade plantings (strategic planting to reduce internal building temperatures in summer)
- The use of natural light and ventilation in buildings
- Green sidewalks (rather than pavement)
- Connectivity within green spaces and greenways

7. CONCLUSION

Ultimately, Biophilic Design is more about restoring our connection to nature than it is about adopting a new methodology for designing the built environment. Its accomplishment will therefore, require a fundamental shift in human consciousness that leads to a new ethic of responsibility for caring for the earth and our relationship to it. A biophilic design approach has the ability to offer substantial benefits. It involves a varied social and psychological benefits to residents, as well as functional and economic benefits to cities at large. Collaboration between countries is required to facilitate knowledge-sharing on research, policy upgrade, biophilic planning and smart-innovation. This not only promotes cities to become sustainable and resilient to climate, but adds to a new financial instruments to support technology, smarter urban infrastructure and sustainable biophilic urban environments. More investment in sustainable public transportation, can reduce urban air pollution, encourage physical activity, minimize traffic congestions, and reduce the costs of mobility for poor and vulnerable groups. Setting up for a sustainable urban environment is complementary to the designing of Biophilic Cities.

8. REFERENCES

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Symbiosis between Human, Nature and Architecture - Urban farming as an idea

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ABSTRACT

India being the 2nd largest populated country and 8th largest in land area is rapidly urbanizing, the rate of urbanization has increased to 31.16% in 2011 census as compared to just 11.4 % in 1901 census. This demonstrates the rate of urbanization in India. Higher rate of urbanization means higher densities, excessive demand for food, shelter and infrastructure. Because of increased densities urban centers have become concrete jungles with increased pollution and harmony with nature is somewhat lost. This Study looks at urban forming as an idea and solution to the above stated urban situations.

Urban farming is process of producing and processing food in urban areas. Growing food in our own premises is not a new concept. It was a way of living in the recent past as well. Kitchen gardens, backyard gardens etc were very common but in course of time we have lost this practice. Urban forming is a way of reintroducing the public of the city as a means to increase access to locally grown food and the culture of growing.

The paper focus, through secondary data the ways in which the outdoor, indoor and transitional spaces in design can accommodate urban forming and can enhance the living experience of the urban dwellers be it a residence or a work space. It is also one of the ways in which sustainable built environments can be achieved in growing urban centre.

Keywords

Urbanization; urban farming, densities, sustainability, space and green relation, built environment

1. INTRODUCTION

Food sustainability is a major issue in today's world. Urban Agriculture seeks to ensure the sustainability of our cities proactively by addressing food security to the ever-increasing urban population. Urban agriculture can be defined as farming or gardening that occurs within an urban setting.

1.1 Food Sustainability

Sustainable food isn't just about the food itself, it's a combination of factors including how it's produced, how it's distributed and how it's consumed. For many, food sustainability is often described by food air miles, but it's a lot more complicated than that. The sustainability of food includes consideration of resource usage, environmental impact, agricultural practices, and health considerations as well as social and economic impact.

The global food system makes a significant contribution to climate changing greenhouse gas emissions with all stages in the supply chain, from agricultural production through processing, distribution, retailing, home food preparation and waste, playing a part. It also gives rise to other major environmental impacts, including biodiversity loss and water extraction and pollution.(7)

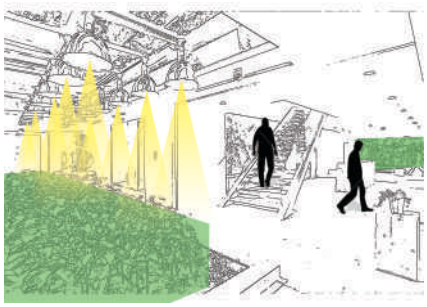
Though agriculture is the main occupation of India, food production is comparatively less when compared to other countries. This is mostly due to lack in modern technologies for farming, and the agriculture is majorly dependent upon rainfall. This situation can be better avoided when urban farming is introduced. By this, we can create a better connection between the producer and the consumer, it reduces food mileage and the farmers need not depend on rainfall or any climatic factors.

Fig 1. Existing market chain

Fig 2. Proposed market chain

Following is a chart showing the benefits of urban farming:

	General Benefit	Environmental	Social	Economic
1	Reduce food miles (travel distance from one place to another)	Reduce air pollution by purifying the air.	Improve air quality that in turn improves people's health.	Reduce energy spent in packing,transportation.etc.
2	Usage of recycled waste	Reduces need for landfill	Improved food quality	Turn waste into asset (nutrients)
3	Creating local jobs	Results in decreasing economical footprint.	Create a local community of workers and also creates better network with farmers.	Benefit local people economically.
4	Reduce water consumption for food growth by using high-tech irrigation system.	Reduce surface water runoff	Make potable water available to more people.	Reduces cost.
5	Improve productivity	Less space required	Reduce repetitive work and benefits socially.	Better yields.
6	Reduce use of fertilizers and pesticides	Improve environmental well-being.	Better food quality.	Decrease cost.
7	Control growth regardless of seasons.	Produce regarding seasons.	Can be cultivated at any time and so better respond to the population demand.	Fuel economic activities year around.
8	Avoid crop loss due to flood , seasonal change or to any other natural disaster.	Decrease cleanups of waste after damage.	Improve food security.	Comparatively less economic loss.
9	Brings nature close to city.	Increase Bio-diversity.	Enhance psychological well-being.	Create better job opportunities in the city.
10	Use renewable energy.	Reduce fossil fuels	Improve air quality.	Cost effective.
11	Promotes High tech green industry	The use of Green technology reduce harm to the environment and improve environmental performance.	Encourage high education and generate skilled workers.	Provides new jobs in a lot of fields like biochemistry , research and development , etc.
12	Reduce the activities of traditional farming	Preserve natural economic system.	Better health and living space for citizens.	Saves a lot of money that can be used to correct environmental damages.
13	Repurposing dilapidated buildings	Provides better environment. Remove eye soaring old buildings from the neighbourhood.	Better social interaction.	Retrieve economy.



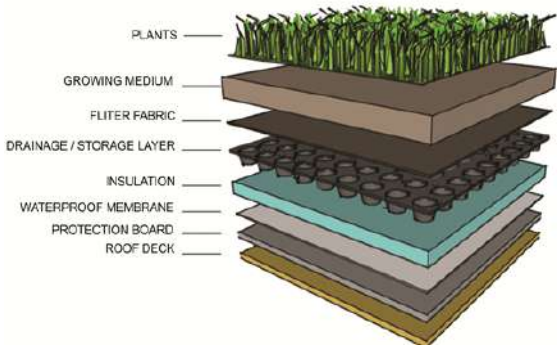
(Fig 3)Patterned facade in the One Central Park mall , Australia.

(Fig 4)Dynamic facade of the KMC office building (ArchDaily. (2019)

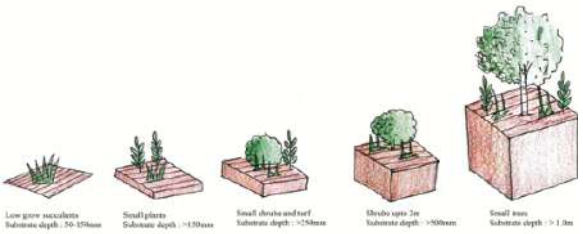
2.1 Urban Farming in Outdoor Spaces

Outdoor spaces can be improved by introducing vertical farming areas. So, spaces such as **balconies, parapets, rooftop spaces, facades** can be introduced with farming spaces. This not only results in better aesthetics for the building but also provides fruits and vegetables. It also creates awareness to the people about the importance of urban farming. Local species that can adapt to the climate can be planted. So, there will be change in plants for each season which gives an interesting look for the building. One of the best examples for such case is the [1] KMC Corporate office in Hyderabad. The outer screen takes an aesthetic function of dynamic façade where assorted species are organized in a way to create patterns, as well as bloom at various times of the year bringing attention to different part of the building façade at different seasons as shown in (Fig 4).

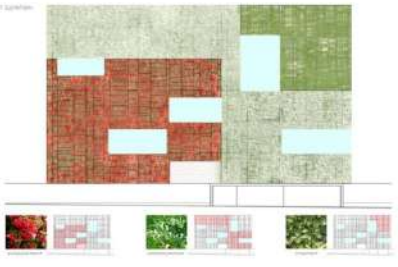
This can be made possible by altering the spaces to our requirement for depth , water proofing treatment , etc as sjown in (Fig 6). The structural load should also be considered. One cubic foot of dry agricultural dirt used for green roof weights around 80 pounds. When saturated with water it increases by 35%. This means 100 sq.ft of planted roof with 6 inch deep soil can add over 5000 pounds of dead load to the structure. A typical roof detailing is shown in (Fig 5).

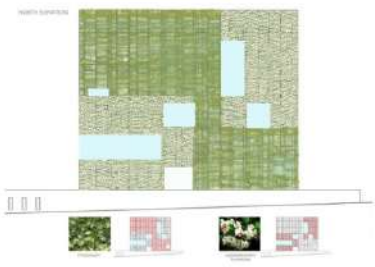


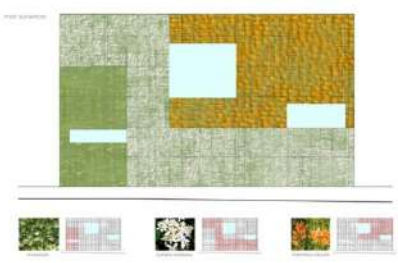
(Fig 5)Typical roof detail

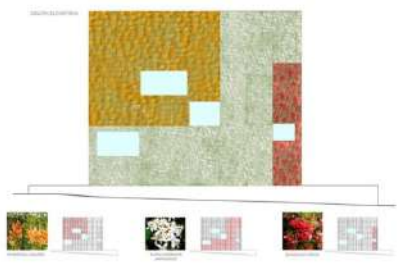


(Fig 6)Space requirement depending on type of species used.







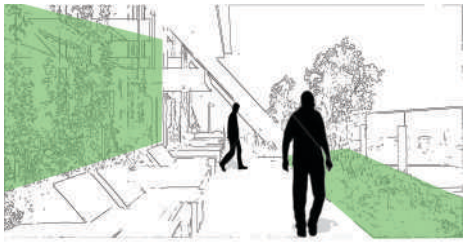


(Fig 7)courtyards with farming spaces (Fig 8) conference room and (Fig 9) seating areas, Pasona office , Tokyo (3).

2.2. Urban Farming In Indoor Spaces

Indoor space quality can be enhanced by introducing these urban farming green spaces. These provide a better and a peaceful environment for the user group. It can be introduced as an inner courtyard space or along seating spaces , etc. Best example is Pasona office [3], Tokyo. This office consist of green spaces introduced in courtyards , seating areas , meeting rooms , ceilings and a lot of different spaces as shown in (Fig 7 , Fig 8 , Fig 9).

Another example is the Greenhost boutique[2] hotel which has introduced green spaces in a very interesting way. The railings of the hotels are also treated with farming spaces which provides a very interesting feeling and space quality to the interior space as shown in (Fig 11).



(Fig 10) Seating space in One central Park mall.

(Fig 11) Hydroponic system used in railings of Greenhost boutique hotel[2]

In the One central mall building in Australia, the seating areas are also treated with green farming spaces which enhance the space quality (Fig 10).

Green wall in interior can also be created by providing growing pods / boxes or by hydroponic systems. They will enhance the space quality and also create a pleasant mood for the people. They also act as a layer that keeps the adjacent room cool by creating thermal lag and directly cooling the adjacent room wall surface. The plants can be cultivated under the help of HEFL **(Hybrid Electrode Fluorescent Lamp)** , LED and Fluorescent lighting techniques. Some plants can be grown indoor by providing indirect sunlight only.

2.3. Urban Farming In Transitional Spaces:

Transitional spaces such as corridors, passages, railings and staircases. The journey through these spaces can be made interesting and aesthetically appealing by provided with green spaces. Even the boring corridor spaces can be made interesting by providing creeper plants which will create a canopy for shade and will also protect from sunlight. One such best example is the (5)K11 mall in China. The mall consists of passage ways that are arcuated with steel rods and green\farming plants act as a canopy as in (Fig 12).

(Fig 12) Corridor space in K11 mall(5)

The mall combines urban farming with shopping centre and creative art space which creates a lot of transitional spaces. To improve the spatial quality , along the corridors are places cultivation rooms with glass facade so that people can look at the techniques of urban farming as they walk along the corridors.

In the (6)**Acros Fukuoka in** Japan ,the building has 15 stepped terrace levels which can be accessed by staircase that runs along it. This staircase is placed in between the vegetation done on the

roof and so , when people take the staircase , they feel like they are walking amidst nature. This totally changes the space quality of the staircase.

3. CONCLUSION:

Prospects for urban farming can be seen as an opportunity by city dwellers to live healthy. However, it is crucial that planners and designers start recognising the importance of urban farming with activities. As city dwellers, urban farming can be seen as self-food-reliance, as an important aspect of sustainable urban development and opportunity to enhance greenery and create better living and working environments. Together with initiatives on energy efficiency and resource productivity, urban farming has an important contribution to make towards shaping better cities of the future.

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Design With Nature: An Approach To Quality Public Realm and Place Making

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ABSTRACT

Despite the fact that India's cities are now the country's primary engines of economic and demographic growth, this is threatened by informality, poor infrastructure, and inadequate planning and governance, consequently cities are infringed with social conflict, environmental degradation, and the collapse of basic services. Cities are important from the point of view of their position in society as sites for representation, contestation and identification.

Though the concept of smart cities has gained increasing attention as an approach to improve economic growth, quality of life, governance, mobility, and environment, ground reality clearly shows that more attention is being paid to technological integration in the existing infrastructure rather addressing adequately the Public realm - pedestrian walkways, streetscapes, pavements, and street crossings, public squares and open spaces; and the quality of buildings. Reconnecting people with nature through Architecture, Urban Design and Technology improves public realm, places and also reduces public travel, energy and carbon footprint and makes more livable and sustainable cities. Curitiba, Brazil, demonstrated that city through integration and interlinking of technology with urban design and planning, can achieve economic, social, and environmental sustainability.

With the line between human and natural environments becoming increasingly blurred, this paper explains, how Architecture, Urban Design and Technology can bring back to nature in cities in making quality public realm, great places and efficient utilization of city resources.

Key words

Public Realm, Urban Design and Technology, Sustainability, Place making.

1. INTRODUCTION

The type of recent urban development has had negative effects in a great part of its population and in the name of modernity and progress; consolidated and traditional urban areas have been destroyed. Though the transformations are taking place in an uncontrolled, sporadic and piece meal manner, creating haphazard and chaotic physical or spatial environments in the cities. The deterioration of urban sectors is attributed to ad hoc planning, poor management, inadequate governance and the shrinking financial resources of urban local bodies. Statistics show that so called "advanced and developed" cities have serious social problems amongst their residents like, depression, frustration, and other social ailments out of pressure.

Our cities should be living places that reflect our changing lifestyles and values. And our cities should be places where it is a pleasure to live, which are attractive, safe, well- connected and where families can grow, children can play, and where good physical environment is supported by good social, economic and institutional support. When you ask any residents what city locale offers them, a sense of place, of identity, of peace and harmony in the amidst of the stressed, harried and dehumanising grind of every day urban life. Chances are that they will not mention a mall, an air conditioned office, or any other enclosed space. They wistfully, passionately or imaginatively about an outdoor space that, for them, symbolizes the unique character and cultural identity of their city

2. ARCHITECTURE, URBAN DESIGN AND TECHNOLOGY FOR ECO DESIGN

Liability is the goal of urban design. The goal and objective of urban design and Architecture are social progress that recognizes the need of everyone, facilitating the restructuring and enhancement of the local economy, prudent use of natural resources and protection of the environment, increase the facilities, development the built structure in urban area. It also includes objectives and character of the area, continuity and enclosure, quality of the public realm, ease of movement, legibility, adaptability, diversity.

Integration of Technology in urban design offers quality public realm and great places. (Nasrin Khansari et al. 2013) This promotes complementary mixed uses – Locating activities to allow constructive interaction between them, Character and meaning – Recognizing and valuing the differences between one place and another, Order and incident – Balancing consistency and variety in the urban environment in the interests of appreciating both, Continuity and change – Locating people in time and place, including respect for heritage and support for contemporary culture, Civil society – Making places where people are free to encounter each other as civic equals, an important component in building social capital.(EWING, R.et al.2006). The use of technology helps authorities inform and connect people, while giving officials the ability to make immediate and informed decisions

2.1. Quality Public Realm: City image, character and Quality of life

A Quality Public Realm, the streets, squares, parks, green spaces, and other outdoor places, create high quality public spaces that are attractive, safe, comfortable, well maintained, welcoming and accessible to everyone. Unfortunately, most smart city plans in India, focus on technological solutions to provide a better quality of life, and the importance of the ecology for urban resilience and sustainability has been ignored by planners, managers, and practitioners. We very often forget that the quality of life must be of priority and the urbanization concept should address all those weaknesses that hinder the promotion of good quality of life.

Good and enthralling public realm are not only suitable element of regeneration, but also they are essential to creating successful, vibrant and inhabitable spaces. It also offers a sense of civic pride, greater social inclusion and interaction, improved safety and access to goods and services for the community.

2.2. Place making: Social, economic, Environmental Sustainability and quality urban environment

Place making is a skill that is transferred either formally or informally. It identifies and catalyzes local leadership, funding, and other resources. Place making is a bottom-up approach that empowers and engages people in ways that traditional planning processes do not. It draws on the assets and skills of a community, rather than on relying solely on professional "experts." Place making identifies and catalyzes local leaders, funding, and other resources. The Place making approach builds on the ability of local institutions to create great community places that bring people together and reflect community values and needs. This is a traditional, organic human skill that often goes under-utilised by top-heavy technocratic bureaucracies.

2.3. Technology: Catalyst for economic progress, sustainability and safety

Technology shifts the social behaviour of citizens towards a more efficient and sustainable utilization of city resources and it allows service providers and city government to provide more efficient and sustainable services. The use of technology helps leaders inform and connect people, while giving officials the ability to make immediate and informed decisions. Nevertheless, in making use of technologies, cities must deal with challenges related to privacy, security and government surveillance.

Fig 1 Explains integration of Technology in to Urban design builds local economies, civic pride, social connection, and human happiness

Figure 1: Place Making and Quality Public Realm through Architecture, Urban Design and Technology

Source: Project for public spaces

The central tenet of appropriate technology is that a technology should be designed to be compatible with its local setting. The appropriate technology includes passive solar design, active solar collectors for heating and cooling, small windmills to provide electricity, roof-top gardens and hydroponic greenhouses, permaculture, and worker-managed craft industries.

3. ECOTECHNOLOGY (ECOLOGY + TECHNOLOGY) - DESIGN WITH NATURE

Rapid growth of the human population and its associated economic activity, the depletion of both non-renewable and renewable resources, and extensive and intensive damage caused to ecosystems and biodiversity are the three major themes which Earth is experiencing a so-called environmental crisis. The environmental crisis is a predicament of inappropriate design-it is a consequence of how cities have been developed, industrialization undertaken, and ecoscapes used. Fundamentally, the problem has been one of inadequate integration of ecological concerns into planning (Shu-Yang et al., 2004). Eco technology design should address three fundamental, mutually inclusive objectives: the maintenance of landscape integrity; promoting landscape sustainability; and reinforcing the natural and cultural spirit of place. Ecological landscape design engages the designer's rational, intellectual, emotional and creative capabilities (Makhzoumi and Pungetti, 1999).

The following case study presents an overview of Curitiba, Brazil transportation system, better places through place making, and public participation and suggests important lessons to Indian conditions.

3.1. Quality of Urban Environment – Curitiba, Brazil – Case study

Curitiba has been called the most environmentally advanced urban area on Earth and Jaime Lerner 'a figure of international interest among green thinkers' (Moore, 1994), Curitiba represents a fascinating synthesis of the equity planning model and the environmental planning model. Earlier, equity planning measures viz, providing mass transit for those who cannot afford private automobiles have hardly been linked to environmental planning i.e. providing recycling opportunities for the conscientious. By linking equity planning measures with environmental ones, Curitiba has shown that positive synergies result in a fundamental economic sense.

3.2. Quality urban environment through Transportation, Resources and Public participation

In 1971, architect Jaime Lerner was elected mayor for his first out of three terms, and came up with innovative and creative solutions which made Curitiba go through an incredible evolution. It's one of the greenest cities on the planet, with over 50 square meters of green space per capita – much more than the UN recommends, and remarkable considering that its population has tripled in the last 20 years. (Kepp, M.1992).

Figure 2 shows how Curitiba achieved sustainability and quality urban environment through Transportation, Resources and Public Participation

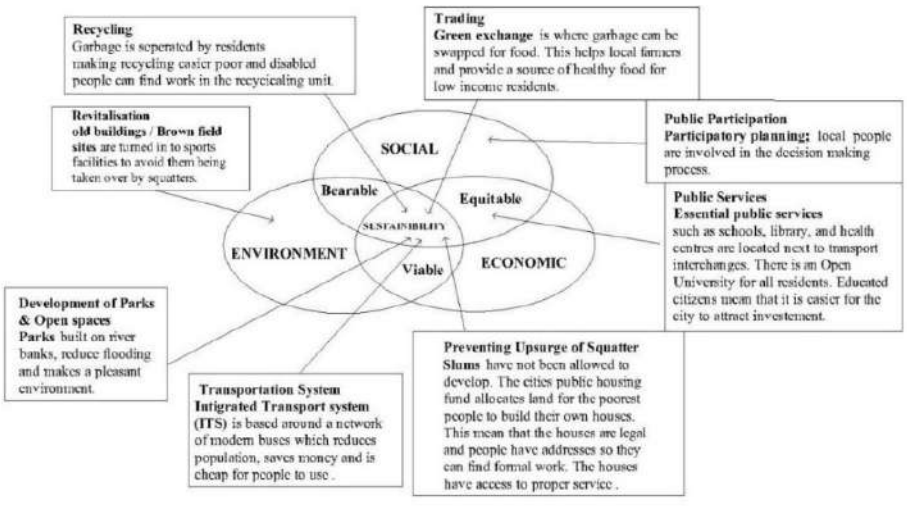

Figure 2: Social, Economic and Environmental sustainibility through Architecture, Urban Design and Technology

Image Source: The Venn Diagrammatic Principle of Sustainability (O'Riordan 1998)

The Transport system in Curitiba is founded on an integrated land use and transport policy along the major radial corridors of the city or linear, structural axes. Each of the structural axes was developed as a "trinary system" comprising three roads. Figure 3 shows a schematic layout of the radial and circular routes and gives an overhead perspective of this trinary road system, this system use two wide road which has opposite direction, but the special thing about this road`s system is, in the middle of the road it has the road used only for the bus way. (Goodstein,C1992).

3.4. Key findings from the Curitiba, Brazil.

Well designed and developed public realm and public participation would help built a sense of community, civic identity, and culture. Successful town design is not top-down, it is organic, it involves the people, it is bottom up. Most important of all, the best ideas and implementation comes from its citizens. Curitiba is a success because it involves all its people, treating them, not as a burden, a nuisance, but as its most precious resource, the path to the future.

The lesson of Curitiba is that its vision of the green city is not merely an Ecotopian one. Environmentally responsible policies in mass transit, urban greening, and recycling are integrated and interlinked to programs to foster the health and economic well-being of the urban poor. To achieve urban sustainability, Urban Designers, and Planners must address the ecological concerns of the cities and due importance for social, economic, and environmental sustainability should be considered. (Waldheim.C. 2006).

4. ECO DESIGN AS A DESIGN TOOL IN MAKING OF QUALITY PUBLIC REALM AND PLACE MAKING

Healthy public realm is the springboard for revitalizing communities, whatever they are and wherever they are. That an attractive, active, well-functioning public realm can jumpstart economic development in a community and creates a friendly, healthy microclimate in its vicinity.

Employing Eco Design as an analytical tool in the urban design strategies simultaneously incorporates spatial definition, circulation, ecological and sustainable concepts. As a principle element of the design development, Eco Design can help identify and address urban issues through a comprehensive planning approach in demarcating public realm that comprise Transportation system and other important places in urban areas.

4.1. Understanding Public Space Regulation

Eco design strategies that involve field operations can capitalize on the inherent potential of a particular site, to render itself to public usage in place making and quality public realm. Field studies, surveys and user behavior analysis that focus on identifying the issues relevant to the specific field can help generate a site program. Spatial character plays a pivotal role in determining space usage. Accessibility to activities and supporting amenities that facilitate everyday living is of key importance to a city dweller. Urban open spaces should be planned to incorporate facilities that enhance convenience, through saving time and travel distance to work place or home bound individuals. (Lynch, K.1960)

Strips of linear connectivity interspersed with expansive open spaces such as tot lots and retail zones, even plazas, space permitting enhance the spatial quality. Linear stretches of connectivity induce monotony and it is important to introduce elements of interest through diversity in spatial morphology, geometry and activities that promote discussion or dialogue. Guided circulation and segregation for

casual walking, bike paths and jogging tracks ensures smooth transition. Connect to the site surrounds through visual and physical means enhances the experiential quality of the space. (Bovill C.2015).

4.2. Social activities

Places that are inviting, well configured and programmatically activated can attract a lot of people. If we analyzed more often how urban spaces are actually used, we could probably develop valuable insight for designing good places and cities. (Jacobs,J.,1961). The social value of public space is wide ranging and lies in the contribution it makes to 'people's attachment to their locality and opportunities for mixing with others, and in people's memory of places'. Places can provide opportunities for social interaction, social mixing and social inclusion, and can facilitate the development of community ties.

4.3. Civic Safety and Security

In addition to promoting social interaction, increased public usage helps establish safety and security in urban areas, especially during late evening hours.

4.4. Mapping urban ecosystem

Ecosystem services relevant in cities Trees, parks, gardens and (peri-) urban for-ests help improve the quality of the air, re-duce noise and mitigate extreme summer temperatures or peak wood events. Also provide non-material benefits, such as recreation, education, cultural and aesthetic values and contribute to social interactions.

4.5. Service Integration

Low resource usage coupled with the extensive recycling; preference for renewable over nonrenewable resources; emphasis on environmental harmony; emphasis on small-scale industries; and a high degree of social cohesion and sense of community should be integrated.

Energy efficient systems such as passive solar design, active solar collectors for heating and cooling, small windmills to provide electricity, roof-top gardens and hydroponic greenhouses, permaculture, and worker-managed craft industries integrated in to site programme through layering or on site modifications can reduce site demands.

4.6. Economic and Aesthetic Value

Eco Design plays as a visual relief from a chaotic built environment. It can be extended to the concept of human connect with nature and living system. Legibility and way finding – Helping people to find their way around and understand how a place works, Animation – Designing places to stimulate public activity, Function and fit – Shaping places to support their varied intended uses.

5. ADAPTIVE DESIGN STRATEGIES

Efforts must be focussed in ensuring that spaces are comprehensively designed to suit the ever-changing need of the user. It is very much essential to consider Urban structure – How a place is put together and how its parts relate to each other, Urban typology, density and sustainability - spatial types and morphologies related to intensity of use, consumption of resources and production and maintenance of viable communities, Accessibility – Providing for ease, safety and choice when moving to and through places.

The following notes are suggested by this paper in order to propose a model through the Eco Design process to achieve quality public realm and great places.

1. Emphasis on Development of Streets and Squares

Streets that are planned for people, meaning they are not completely auto-centric, add to the social cohesion of communities by ensuring human interaction, and providing safe public spaces that promote cultural expression. A great square can be a focal point of civic pride and help to make citizens feel connected to their cultural and political institutions. A bad square repels people, business, and investment. Place making promotes a simple principle: if you plan cities for cars and traffic, you get cars and traffic. If you plan for people and places, you get people and places.

2. Networking of Parks, Open Spaces and Biotic factors

A great urban park is a safety valve for the city, where people living in high density can find breathing room. Network of parks and open spaces, planning of transport hubs and corridors, lake systems and other natural features along with built spaces promote safety, security, environmental degradation and aesthetic appeal while enhancing the naturalness of the urban environment.

3. Integrate Last Mile Connectivity concept

Last mile connectivity is defined as the distance to be traversed from nearest transport nodal point to the ultimate destination and is expressed by the ease and speed of commuter transit from point of origin to point of destination. The prime criteria to ensure quality in last mile connectivity is to make access points pedestrian friendly. This enhances spatial, environmental, ecological quality and transport efficiency

4. Integrate nature based solutions

Community gardens where everyone collaborating grow fresh organic produce. Lake walks, science fair, bird and insect watching tours, proposing cycle track/ jogging pathway etc. This will not only help people develop a caring attitude and respect for one another, but will also spread harmony and enhance the liability of spaces in the vicinity.

5. Design Buildings to Support Places

Massive gated communities are being built for the middle class, exacerbating the gulf between rich and poor. Traditional neighborhoods are being replaced by towering skyscrapers, sometimes only meters apart. Civic institutions such as schools and libraries, key community assets, end up looking like fortresses. This trend has spread across the globe, and it is damaging the fabric of cities everywhere.

6. Link a Public Health Agenda to a Public Space Agenda

A healthy city is one in which citizens have access to basic infrastructure such as clean water, ablution facilities, and sewage treatment. It is also a place where healthy food is available, where women and children can walk without fear, and where people can enjoy parks, squares, and other public spaces in safety and comfort.

7. Balance between top-down and Bottom-up governance

The Place making approach builds on the ability of local institutions to create great community places that bring people together and reflect community values and needs. Bottom up strategy focuses on the evolution of design from the individual to the whole. Goals may be partially defined and it could lead to a civic Enterprise where every citizen is a part of the decision making process and is the primary stakeholder in the design deliverable. In the top down strategy, an overview is formulated based on design parameters. Goals are outlined and objectives listed.

6. CONCLUSIONS

Investing on public realm and place making can foster social interaction, inclusion and participation as well as lead to connections to physical spaces and people, networks and neighborliness. Great places impact positively on the health and well – being of people and can enable people to feel part of a place, as well as create a sense of identity and shared ownership. They create opportunities for activity and enterprise and for personal growth.

All places have hidden assets, particularly skills and knowledge that should be tapped in to and shared. In addition, while making use of technologies, cities must deal with challenges related to privacy, security and government surveillance. Author concludes that Eco Design through Urban Design, Architecture and Technology create enjoyable places to live, work and play while greatly reducing energy use.

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Five Wisdoms From Architecture of Two Climates

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ABSTRACT

Climate is primarily the reason man went for architecture. Imagining back in the primitive era, one can infer that climate is the only factor which gave birth to architecture. Man might have wanted protection from climatic forces e.g. rain, wind, heat, cold etc., so he must have built some structure. Traditional/ vernacular architecture in India has profusely demonstrated excellent solutions in architecture for climate, especially hot-dry and warm-humid. Lessons drawn by architects are not substantial. This paper deals with lessons, an architect, especially future architects i.e. students of architecture need to acquire. Lessons in architecture through simple, easy instances given at this paper add good value to knowledge body in architecture. Thus, one needs to examine the climatic design in these two climates. Traditional architecture or architecture which has evolved over centuries has strong examples of wisdom to offer to us. This paper attempts to explain them in simple language.

1. FIVE WISDOMS FROM ARCHITECTURE OF TWO CLIMATES

Culture, construction technology and climate have remained factors governing architecture and architectural design. It is primarily the reason man went for architecture. Imagining back in the primitive era, one can infer that climate is the only factor which gave birth to architecture. Man may have wanted protection from climatic forces e.g. rain, wind, heat etc., so he must have built some preliminary, simplistic structure. In modern times also climate is primary reason man has to go for architecture. For instance, modern, luxurious houses are also primarily for protection from climatic forces and one goes for air conditioning or heating to have protection from climate. In fact traditional architecture in India has profusely demonstrated excellent solutions in architecture for climate, especially hot-dry and warm-humid (Refer 5 examples cited below). Irony is that despite this demonstration, lessons drawn by architects are not much. This paper deals with lessons, an architect, especially future architects, i.e. students of architecture need to acquire. Thing one needs to examine is how the climatic design is in these two climates. Traditional architecture has few examples of wisdom to offer to us. Traditional architecture or architecture which has evolved over centuries has five examples of wisdom as following.

[1]: 1st example of wisdom ascertainable through balcony gives ready and satisfactory answer to it. Analysis of balcony in two different climates explains it.

Figure 1: Jharokha in Patwonki Haveli.
Image courtesy: ohmyrajasthanofficial@gmail.com

(a) Temperature is very high in hot dry climate and there is no humidity in air. Standing out in balcony would invite harsh sunny breeze, often leading fever, instances say.

Figure 2: A.S.Raju House, Antarvedipālem, Andhra Pradesh.
Image courtesy: in.geoview.info

Balcony invites lot of sand/dust and adds to contiguous sweeping/ mopping. Thus one does not need balcony and it is redundant cost/feature in hot dry climate. But one often needs to look out of building in temperature of 46 degree c. in summer. One can only peep out of the building for a short while due to severe heat. Choice remains that one projects his head from a small puncture in wall and takes a glance outside. But in this process also, he invites send/dust permeating in room. Screen in shape of elliptical or hemispherical ball projecting out of wall called jharokha (Refer Figure 1) thus is evolved. "Jharokhas" are profusely visible in the cities like Jaisalmer and Jodhpur.

(b) In warm humid climate, temperature is high and there is high humidity in air. Indoors is suffocating due to simultaneous presence of high temperature and high humidity. One therefore frequently needs to be outdoors for a long span of time. Outdoors e.g. balcony, verandah in warm humid climate does not attract much of sand/dust. Thus one needs exterior space in warm humid climate. But, there are heavy and contiguous rains also in most places of warm humid climates. Here comes context of balcony/verandah in warm humid climate. Balcony is not only necessary, it is mandatory and vital to warm humid climate. It is an integral, meaningful cost/ feature in a building. This is the reason balcony and verandah (Refer Figure 2) are profusely visible in the cities like Antarvedipālem, Chennai, Mengaluru, Puducherry etc.

[2]: 2nd example of roof form in traditional architecture teaches about importance of climatic design in architecture.

Figure 3: Jodhpur, Rajasthan.
Image Courtesy: QT Luong, terragalleria.com

Figure 4: Terraces with higher parapets, Jaisalmer, Rajasthan. Image Courtesy: Avinash Jha, Tripoto

Figure 5: Karakala, Karnataka.
Image Courtesy: Sudhir Shenoy, Flickr

Indoor sleeping during night is highly uncomfortable due to high temperature in hot dry climate. Outdoor sleeping becomes not only necessary but almost mandatory in summer making it delightful experience. Rains are negligible in cities like Jaisalmer and Jodhpur. Roof form therefore doesn't demand rapid drain off of rainwater like that of warm humid climate. Flat terrace (Refer Figure 3) as a roof form is readily evolved roof form therefore in hot dry climate especially in urban areas (Refer [5]-(a) below). Terrace cools down much late to receive beds over it. Therefore, parapets towards few sides (especially south & west) are normally raised up to around 2 to 3 meters (Refer Figure 4). This serves 2 purposes at a time. Privacy is readily achieved & shadow cast by its height starts cooling down terrace to facilitate sleeping over a cooled down floor. Jaisalmer and Jodhpur have well demonstrated this roof form and terrace has evolved as synonym to hot dry climate.

(a) Warm humid climate does not facilitate outdoor sleeping by night. Chennai, Mengaluru, Karakala have high rainfall and essentially demands roof form to be with slope for rapid draining of rainwater (Refer Figure 5). Warm humid climate also has menace of insects especially mosquitoes accruing to profuse vegetation and sporadic water logging. Outdoor sleeping doesn't

become advisable in warm humid climate due to this reason. Pitched roof therefore is an evolved roof form in warm humid climate.

[3]: 3rd magical example of wisdom traditional architecture has demonstrated is courtyard. Though courtyard considered synonym of hot dry climate, it is found in warm humid climate as well. Users avail great relief due to courtyard and spaces around it revolve around it. It offers a private space for interaction, for cooking and for doing several activities.

Figure 6: Mandawa, Rajasthan. Image Courtesy: memorableindia.com

Figure 7: Athengudi, Tamilnadu. Image Courtesy: team-bhp.com

(a) Courtyard is vital and integral element to hot dry climate (Refer Figure 6) for it works wonder during harsh sun hours as well as it is soothing in nights. It offers different choices/functions depending largely upon its size/scale.

(b) Warm humid climate also has courtyard (Refer Figure 7)and remains equally celebrated space. Difference from hot dry climate here is visible in long eaves at periphery of courtyard for rapid disposal of rain water.

[4]: 4th example of wisdom is visible through fenestration in both climates.

Figure 8: Khuri-Jaisalmer, Rajasthan. Image Courtesy: Pinterest

Figure 9: House in Kerala. Image Courtesy: Pinterest

(a) Openings are very less and very small in traditional buildings in hot dry climate (Refer Figure 8). Large openings invite more light indoors and more the light, more the heat indoors. Hence focus in hot dry climate is on providing less and small sized openings. Buildings in Jaisalmer, Jodhpur region demonstrate this. Be they out of mud in rural areas or stone in urban areas (Refer [2]-(a) above also), they have less no. of openings and they are smaller.

(b) Openings are more and large in buildings in warm humid climate (Refer Figure 9). Large openings provide maximum ventilation indoors. Buildings in Kolkata, Goa, Kerala etc. are examples of such buildings. Ventilators are generously provided unlike hot dry climate ant pitched rooves also carry dormer windows.

[5]: 5th example of wisdom in built form (at city/village level) teaches about importance of climatic design at larger level.

Figure 10: Jodhpur. Image Courtesy: India.com

Figure 11: Street in Andhra Pradesh. Image Courtesy: Rajastills, Storyblocks

(a) Minimising exposure (to sun) of walls in hot dry climate remains top priority as this priority will keep indoor temperature as low as possible. This is the reason traditional built form in hot dry climate is compact (Refer Figure 10) especially in urban areas. Most buildings have common walls and rely on mutual climatic advantage to each other. Buildings are in rows i.e. one building unit touches another in cities like Jaisalmer, Jodhpur, Bikaner.

(b) Maximising fenestration at exterior walls and roof remains top priority in warm humid climate unlike hot dry climate. This is required because maximising fenestration will minimize the suffocation indoors. This is also the reason traditional buildings in warm humid climate are sparse and separate (Refer Figure 11) to maximise fenestration ultimately to maximise ventilation, if not a breeze. More the ventilation, minimum the suffocation. Word bungalow evolved in Bengal i.e. cities like Kolkata and rural Bengal indicates of urban/rural built form of warm humid climate.

Conclusion can be drawn thus that built form in hot-dry climate needs to be compact, with less openings. Buildings shall be with minimum openings, mutually relying on each other for cutting down heat. Same in warm-humid climate needs to be sparse with buildings free from each other and with more/large openings.

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GREEN FACADE

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ABSTRACT

Any specific vertical face covered in vegetation can be considered as a green facade. The term green has a versatile meaning in line with sustainable architecture. It can be achieved through various advanced technologies such as kinetic façade ,photovoltaic façade etc. However focus of study will be concentrated on Vegetation only, called as Green wall. It includes limitation, maintenance issue and various scope and availability of the advance new system. Use of soil and without soil and new systems discussed. Use of wet waste generated though day to day life and its effective use in green wall system through various examples. Ecological impact of green wall and use of sustainable materials in the making of green wall are important highlights of this paper.

Keywords: Green wall, urban green wall , soil for green wall.

1. INTRODUCTION

In today's context construction has immersed with several new technology to achieve maximum comfort for the human only. However to achieve this comfort human has been destroying the nature a lot. If this has been continued for longer time then it will affect the sustainability of the urban space. As there is scarcity of space in urban area , there is hardly any space for the vegetation around the urban neighbourhood. Vegetation should be rejuvenated as it has a important role to maintain sustainability of urban space. By keeping all the limitation of urban space in mind there is a solution called Green facade system. Any specific vertical covered in vegetation can be considered as a green facade. And most frequently used term in this field however is called as green wall. The term green has a versatile meaning in line with sustainable architecture. As mention in abstract , it can be achieve with different technologies. Hence focus of study concentrated only on vegetation.

2. OBJECTIVE

To find out alternative solution for vegetation in urban space in context of present urban problem. One of the major urban issue which need to addressed is , day to day wet waste generate in house hold as well in the commercial building like hotel etc. This wet waste can be converted as a manure as a feeding material for Green wall.

3. ABOUT THE SYSTEM

Broadly there are two type in the system that is
Connection with soil : This is sub divided as climbing without structural support and climbing with structural support.
No connection with soil : In this pocket and container type can be used as modular system.

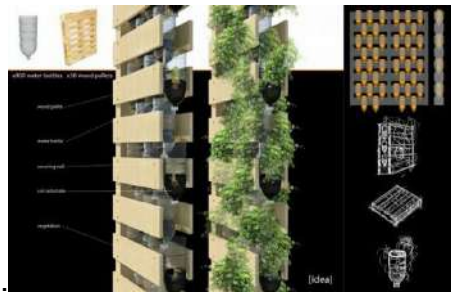
3.1. When there is a soil connection : If the facade structure to be covered by plants has connection with the soil, a climbing plant system can be used. These are relatively cost-saving and simple solutions; however, there are several compromises that need to be made, among others in the selection

of plants. The major advantage of these solutions is their inexpensiveness as well as their traditional acceptance. For the appropriate development of the plants, a sufficient quantity of soil that is appropriate to the needs of the plant is required. In many cases, on building sites, this is not available, therefore, the provision of additional artificial soil needs to be ensured.

3.1.1. Climbing without a support structure : All green facade systems have their natural configuration. Plants holding onto trees in the jungle or climbing onto cliffs (epiphytons) can be considered as configurations for plants climbing onto the facade of buildings. The potential climbing height of the trained plants is genetically restricted to a scale (2-20 meters) dependent on the species.

3.1.2. Climbing with a support system : The training of the plants available in this group requires a support system, which the clinging parts of the plants (tendril, offshoots) can cling to. A support system is required if the plants are not able to cling to the wall on their own or the wall is not suitable to receive them. Recycle material can be a good solution to use as a support system. Toilet duct also can be converted as a green wall with minimal structural supports.

Use of discarded plastic water bottles and reused wooden pallets as shown in (a.) and to hide services like toilet duct in spite of giving any other aesthetic treatment green wall can be good solution as shown in (b. & c.)



a. b. c.

3.2. No soil connection

The majority of systems that do not require soil are based on the principles of hydroculture(A technique where plants are grown in nutrient enriched water rather than soil or compost.), where, in contrast to traditional "soil culture" plants, a substantially smaller rootstock is sufficient for plant growth. It is of primary importance to keep both the price and the weight down.

3.2.1 - Pocket planters : The system is built by fixing a watertight material (to protect the frame and wall) to a frame that is secured to the façade. One or more felt or textile layers are added with the plants inserted being between layers, into the pockets cut onto the outmost felt layer, and root over time into the material. With this system, although not too costly, technically there is much room for improvement:

3.2.2 - Container planters : This system is closest to the balcony box planters. In a container green wall system the planters are placed in multiple lines above the each other. The pots may be made of metal, wood, plastic in a wide variety of sizes and designs. It has to be water and weatherproof, thus in respect of the usable material the same questions arise as in the case of modular systems, which are of similar price. The use of hydro culture is also recommended for this technology,

and although soil based mediums can be used, all of the previously mentioned disadvantages have to be considered

2.3.3 - Modular : The modular solutions combine the benefits of the pocket and container systems, while trying to eliminate their disadvantages. The material is typically recycled plastic or metal, and the plant growing system is almost exclusively hydro culture. Compared with the previous systems, they provide further technical solutions. The developments in recent years focused mostly on lowering the cost price whilst retaining these beneficial qualities. Today's research targets almost entirely the creation and perfecting of such systems; the modular systems dominance is continually increasing amongst completed installations. The appearance required after installation can be precisely planned and even 100% coverage can be provided immediately following implementation. Systems of various designs and prices are now available in the market.

Recycle pockets and plastic bottle can be used for plantation for green wall.

4. MICRO BACTERIA AND WET WASTE / GARBAGE

Micro bacteria can be used to convert wet waste into rich manure. It is available in the form of liquid. Once the micro bacteria liquid sprayed on wet garbage , it start decomposing. Because of micro bacteria there won't be any odder or bad smell though it is a wet garbage of previous day. This is get converted into almost wet less rich manure. This can be use directly for plantation.

5. Advantage

1. No soil required for plantation.
2. Organic rich manure for plantation.
3. Weight less plantation is possible on terrace or balcony.
4. Effective use of wet garbage of day to day life.
5. 80 % water can be save through this manure.

6. Urban ecology

Urban ecology is the scientific study of the relationships between living organisms existing with each other and their developed surroundings. It examines the natural and social components, which through human processes and activities influence the natural eco system and vice versa. So what is the role for green facades? By covering walls with vegetation, the intention is to bring nature back into the artificial urban environment so that is made liveable again. The decreasing number of horizontal options has resulted in landscaping flooding onto vertical surfaces. Compared with today's widespread use of green roofs, their urban ecological benefits are similar. However, in many respects, they go beyond the scope of green roofs with their visual impact, as well as attracting birds and insects, improving the quality of life of not only those using the building, but of a wider range of the city's inhabitants.

7. Conclusion

On the basis of above study it can be stated that Green wall would be a good solution for the urban space as it caters the two major problem at the same time.
That is provide arrangement for vegetation in scarcity of space as well it can address problem like wet garbage.

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URBAN AGRICULTURE: MULTIDIMENSIONAL TOOL FOR SMART CITIES

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ABSTRACT

To feed present and Future cities using sustainable food production is an urgent task. With continually growing world and urban populations, climate change and pressure on natural resources, global food security is paramount. Modern technology has allowed for a further separation of agriculture and the city; however, new thought and experimentation has shown a symbiotic relationship between the two. Vertical farming and urban agriculture are new movements that seek to reduce human impact on the Earth and enable cities to become more resistant to environmental collapse by creating farms into urban areas.
It's in the crossroads of climate change, social wellbeing, and economic challenges where Smart urban farming emerges as a possibility to generate a new model of community building, a new field for social experimentation, a new tool for empowering our communities, and a new means to promote sustainable development. A space with a multiplicity of uses and benefits, where the community can gather and socially interact, where children can directly observe nature, and where technologies can be developed and tested is the establishment of a space that creates social welfare in a truly holistic sense of the term. In this paper the authors made an attempt to describe theory behind urban Agriculture, various urban agriculture types and future challenges to fulfil the needs of Smart Cities.

Key Words: urban populations, climate change, Modern technology, Urban Farming, future challenges, Smart Cities.

1. Introduction:

Traditionally, agriculture and the urban environment have been separated; however, new thought and experimentation reveal there exists a symbiotic relationship between the two. The implementation of agriculture into our public and private spaces can provide urbanites with a series of benefits that foster new communities. Modern technology has allowed for a further separation of agriculture and the city; however, new thought and experimentation has shown a symbiotic relationship between the two. Theoretically, by incorporating agronomy into our cities, vertical farming and urban agriculture can transform our approach to urban development and enable people to become self-sufficient.

With the advent of civilization, open field agriculture is facing some major challenges most importantly decrease in per capita land availability. Agricultural productivity is one of the key challenges for the future. Food production will need to double by 2050 to meet the UN's Millennium Development Goals on hung. This needs to be achieved in the world where suitable agricultural land is limited and climate change is predicted to have an adverse impact on food production.

2. Urban Agriculture Timeline: History and Theories:

Urban agriculture is grounded in recent urban theories and modern precedents, which utilize it as a program to enhance public space. Pre-dating modern times, this conversation begins with ancient civilizations. Monuments and cities such as the Hanging Gardens of Babylon and Machu Picchu begin the conversation by juxtaposing agriculture and the built form. Machu Picchu incorporated many stepped agricultural terraces in close proximity to the urban fabric. While the Incans didn't blur the lines between public space and agricultural field, the correlation between proximity of agriculture and city is undeniable. Having agricultural space close to the city walls was vital to sustain the activities of the Incan population, and without it, the city would not have been able to survive. This need for local food and sustenance became a driver for the creation of their unique stepped urbanism

With the industrial revolution, the harmonious relationship between agriculture and urban environment became severed. Cities harbored new industries, and populations flocked from the countryside to these new occupations. Cities quickly became overcrowded and as a result, architects and urban planners reimagined what a city should be. Since cities were expanding, agriculture was pushed further and further away from the city edge. Ebenezer Howard reimagined the overcrowded, industrial city and published his vision for the urban environment in Garden Cities of To-morrow. In 1898, Howard began the Garden City Movement, which was focused on the creation of public space in the form of public gardens. At its essence, the urban theory focused on bringing the city to the farm by utilizing agricultural land as the site for his garden cities. Each city was planned to have six boulevards with non-productive, public green space anchoring the center of the city. By allowing large swaths of public space to be incorporated into the city, Howard creates a more healthful environment by allowing light and air into the urban context. Even though agriculture is highlighted within the diagrams for Howard's theory, agriculture still remains outside of the Garden City. Five-sixths of the agriculture surrounding the garden city is kept intact and functioning to support the metropolis. Dairy farms, fruit farms and allotment gardens are all incorporated and in close proximity to the garden city, which support the city's health and welfare. Although agriculture serves an important function to the garden city, the focus of the theory becomes the relationship between buildings and open space.

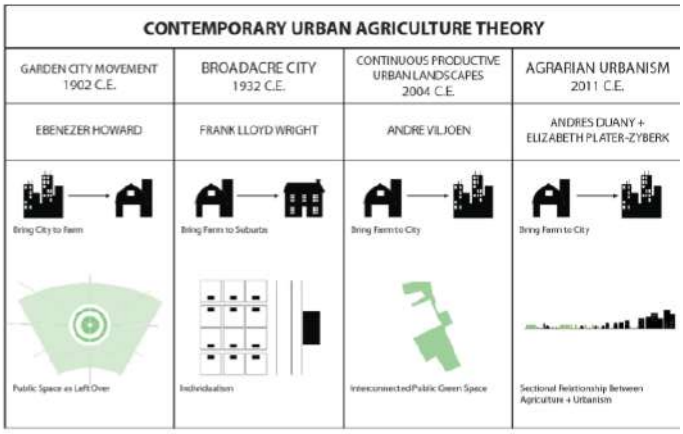

Fig 1:Showing contemporary Agriculture Farms

With Howard's Garden City Movement focusing on public health through public space, Frank Lloyd Wright rethinks the American suburbs and cities by integrating agricultural practices. Broadacre City moves the population away from the unhealthy, overbuilt city and implants people into the countryside. With one acre per family, Wright's ideal city focuses on the individual instead of the collective need. "Whatever a man did would be done – obviously and directly – mostly by himself in his own interest under the most valuable inspiration and direction: under training, certainly if necessary. In the contemporary era, our civilization has achieved a high degree of separation between agriculture and the population. With the aid of technology, we have taken many large strides away from our ancient precedents and can now indulge in cuisines that come from thousands of miles away. Industrialization, zoning regulations and suburban sprawl has pushed agriculture further away from the city limits, and as a consequence, we have lost an aspect of life that was once deeply rooted in our culture. Inspired by the

green movement, two theories reconsider agriculture as a program that can be integrated into cities. Continuous Productive Urban Landscapes (CPUL) promotes the integration
Of agriculture into our public spaces and streets.

3. Urban Farming Types:

Urban Farming is a method of agricultural activities to reduce the problem of agricultural land limitation in urban areas. There are various types of Urban farming those are Green roof construction, Green wall construction, Green Façade construction and vertical Farming.

3.1 Green Roof Construction:

A green roof or living roof is a roof of a building that is partially or completely covered with vegetation and a growing medium, planted over a waterproofing membrane refer Fig 2. It may also include additional layers such as a root barrier and drainage and irrigation systems. The number of densely populated urban centres is increasing. More than half of the world's population now lives in towns or cities, where undeveloped or green spaces are seldom to be found. Green roofs, as a counterbalance to this, have made the breakthrough in such densely-populated areas.

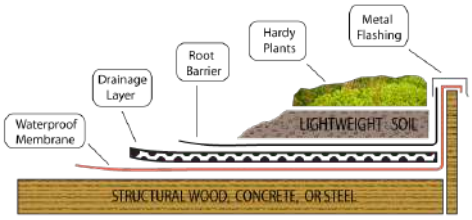

Fig 2:Green Roof technology

3.2.Green Façade or Wall construction:

The term Green Wall refers to the growing of plants on, along, or against a wall or façade of a building. Dunnet and Kingsbury (2004) define Green Walls as "a living and therefore a self-regenerating cladding system for buildings, with traditional use of climbing plants to cover the surface of a building. Green walls can be created by the use of climbing plants directly at the façade or also with the assistance of a supporting system to create a space between façade and the plant structure.

In 2008, Köhler defined Green Walls as "typically covered with woody or herbaceous climbers either planted into the ground or in planters in order to cover the building with vegetation. Living wall systems involve planters or other structures to anchor plants that can be developed into modular systems attached to walls to facilitate plant growth without relying on rooting space at ground level. Supplemental irrigation or hydroponic systems are necessary for these systems. Living walls systems can be used outside a building as well as inside a building."

Fig 3 Green Façade Planted in to the Soil(www.selector.com)

Fig 4 Green Façade Planted in to planters(www.geolocation.us)

3.3. Vertical Farming:

The vertical farming architecture is categorized into various sections that there are energy management, water management it also known as hydroponics, cropping method and harvesting manner etc. The vertical farming architecture is also depended on the construction oriented process, where it takes the complex situation some times that there enough sunlight radiation has to pass on all crops of the plants for the healthy growth.

3.3.1. Renewable Resources:

Vertical Farming system is designed for the future purposes where the sources such as electricity, low level of water availability are may or may not be occurred in the future days. So in the way of handling those situations the system involved with the renewable resourcing process, where the wind mill can be used to generate electricity for the water pump process for supplying water to the crops, and solar energy are also added additionally to generate power for the producing of artificial sunlight to the crops.

3.3.2 Reaping Process:

The reaping process also known as water management process, thus especially the water is going to be managed in the vertical farming structure. Where some of the methods are going to be discussed such as rain water harvesting method, this method explains that water which are collected for the rain are too passed through pipes to crops, so by getting of the rain water through indirect process will get an healthy and natural yielding, these activities are done through the hydroponic system it is stated as the nutrient content are going to be passed on the crops through the pipes, while flowing of water to the crops regularly the mineral is also to be added in the water.

3.3.3 Working of Hydroponics:

Hydroponics methodology is the important process of the vertical farming system, where this has to be constructed with the excelling as the crops are planted with the soil with the connection of the pipeline these pipeline connection will require the injector to pull the force of the water and it consists of sufficient power generation. And filter also available in the hydroponics system to remove the wastages in the water and it is built with the mixture that the minerals are kept in the separate storage whenever the need of bug killer minerals also can be mixed with the water to protect the crop from the insects which destroys the crops entirely, so hydroponic is done in the multiple ways to grow crops.

Fig 5 : hydrophonic system

Fig 6 : vertical farming model

4. Planning for the Future:

In order for vertical farms to be considered there must be sufficient planning, space, and funding. Cities must have a plan to incorporate green infrastructure, such as vertical farms, green roofs, and vertical walls. Vertical farms can be placed in abandoned buildings and because they reuse water they do not need a lot of additional infrastructure from the city but zoning; distribution must be taken into account when choosing a location for vertical farms. The farm will produce food that are distributed locally, so

there must be pedestrian access, roads, and transportation infrastructure. Some abandoned buildings may have a certain zoning assignment that may have to be amended. If vertical farming is going to be designed in new structures there should be a requirement that portions of new buildings must be zoned for farming or planting.

5. Conclusion:

It is predicted that over the next 50 years, the human population is expected to rise to at least 8.6 billion, requiring an additional 109 hectares to feed them using current technologies. That quantity of additional arable land is simply not available. Without an alternative strategy for dealing with just this one problem, social chaos will surely replace orderly behavior in most over-crowded countries. Novel ways for obtaining an abundant and varied food supply without encroachment into the few remaining functional ecosystems must be seriously entertained. One solution involves the construction of urban food production centers – vertical farms – in which our food would be continuously grown inside of tall buildings within the built environment.

By exploring urban agriculture as a viable option to produce some of our food, we are enabling the population to become more self-reliant. With our food sources closer to home, we are mitigating Environmental damage by relying less on technology to preserve our food and more on ourselves. The

Source Type		**Description**
World Health Organization (1997)	1. Stationary Sources	Agriculture production, mining and quarrying Industrial sources – manufacturing of chemical, Mineral, metal, power etc. Community sources – building heating/ cooling, cooking, incinerators and other service facilities
	2. Mobile Sources	Combustion engine vehicles – ranging from motor cycles to air crafts
	3. Indoor Sources	Tobacco smoking, biological sources (pollens, pet Allergens, etc) and other indoor materials and substances/ activities (carpets, joysticks)

product is healthier produce, a more diverse urban environment and better informed populous.
Vertical farming offers a realistic alternative to conventional production for some crops. It could help to achieve the necessary level of food production, whilst overcoming some environmental challenges. This approach may also allow for the production of goods vertical farming is likely to become more commonplace, in both urban and more rural situations. More and more research will be conducted not only at the university level but also at world level on new ways of food production and will be included as a part of Smart City development.

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Pollution Absorbing Facades: An Ammunition For Healthy City Atmosphere

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ABSTRACT

Air pollution has become a major environmental concern as an impact of Industrial Revolution which has become dangerous since last few years. An increasing level of air pollution is by far the leading environmental cause of uncomfortable urban life and death. Air pollution in India's cities is a well-known threat to urban populations. As a sustainable alternative, pollution absorbing facades can help to reduce the rate of pollution. This paper discusses the quantity of NO2 emission of vehicles which is a major cause of air pollution. The use of pollution absorbing facades as building skin can absorb this NO2 resulting into reduced level of air pollution.
The method used in this research includes the data collection through observations, interviews and literature surveys. Based on data collected, the paper checks the possibility of pollution reduction by proposing pollution absorbing facades. Paper concludes that the pollution absorbing facades can significantly become a solution to achieve comfortable life conditions to urban population who are suffering due to air pollution.

Keywords: Air pollution, Green facades, NO2 emission, Pollutants absorption, Pollution absorbing facades.

1. Introduction

Before Industrial Revolution, transportation was rudimentary. Transportation was accomplished through the use of domesticated animals or by walking. Manufacturing was often done in people's homes, using hand tools or basic machines. Industrialization marked a shift to powered, special purpose machinery, factories and mass production. The transportation industry also underwent significant transformation during Industrial Revolution. This era has seen a dramatic improvement in transport and communications, although this major transaction helped in increasing the productivity of labor by reducing travel time. It enabled trade between people which developed the civilizations. Transportation always plays important part in growth and globalization. The impact of Industrial Revolution on transportation domain changed the world dramatically. It created networks of infrastructure that linked up and tied together countries and eventually even countries.
Although transportation benefits our society, it damages the environment. The availability and usage of different motorized modes of transport not only affect the environment but also contribute to global warming and climate change. It is well-known fact that transport has significant detrimental effects on both built and natural environment along with human beings. Such effects have lifelong impacts and therefore the same may be mitigated at the stage of planning, designing, construction and operation. Reducing energy use and indoor air pollution are two major challenges faced by the construction industry today. The US publisher Ward's estimates that as of 2010, there were 1.015 billion motor vehicles were in use throughout the World. This figure represents the number of cars, trucks (light, medium and heavy) and buses, but does not include off-road vehicles or heavy construction equipment.
The application of Green Façades can improve the built environment's aesthetics and building occupants' quality of life. Such facades, if proposed for the buildings on major roads, can help in

reducing NO2 emitted from vehicles. These facades can become an ammunition for healthy city atmosphere.

1.1 Air pollution and its impact on city atmosphere

Air pollution has been aggravated by developments that typically occur as countries become industrialized. The high influx of population to urban areas, increase in consumption patterns and unplanned urban and industrial development has led to the problem of air pollution. Currently, in India, air pollution is widespread in urban areas where vehicles are the major contributors and in a few other areas with a high concentration of industries and thermal power plants. Vehicular emissions are of particular concern since these are ground level sources and thus have the maximum impact on the general population. Also, vehicles contribute significantly to the total air pollution load in many urban areas thereby leading to pollution problems.

1.1.1 Air Pollution

Air pollution is defined in Indian Standards Institution IS4167 as "the presence of substances in ambient atmospheres, generally resulting from the activity of man, in sufficient concentration, present for a sufficient time and under circumstances such as interfere with comfort, health or welfare of persons or with use or enjoyment of properties.

1.1.2 Classification for sources of pollution

World Health Organization classifies sources of pollution as shown in table 1.1.

Table 1.1 CLASSIFICATIONS of sources of pollution Source: WHO Air Quality Standards

World Health Organization (WHO 1998) identifies six most harmful air pollutants which are termed as "six classical air pollutants". These air pollutants are grouped into two main categories based on their emission status of the source or origin and their state of existence in the air:
1. Primary Air Pollutants– emitted directly from identifiable sources {SO2, NOx, CO, SPM (suspended particulate matters or fine particulates which is smaller than 10 micrograms), VOC, Lead (Pb)}
2. Secondary Air Pollutants– produced in the atmosphere due to chemical reactions take place among primary pollutants {e.g.; Smog = smoke + fog (due to photochemical reactions and Ozone is a major component of smog), CO + O2 = CO2, NO + O2 = NO2}

1.1.3 Air Pollution Impacts and Consequences

Air pollution levels should be within the limits that are harmless to human living. Levels beyond these limits are considered as harmful that create impacts to health, buildings, flora and fauna, and affect the economy. Therefore it is important to identify these desirable levels. Table 1.2 explains the adverse impact of air pollution.

Impact	Consequences	Affected Groups
Health	Aggravation of respiratory or cardiovascular diseases like cancer, heart disease, influenza, asthma, lung damages, coughing, wheezing, irritation of nose/throat etc.	Young infants and children
	Young infants and children	Pregnant women
	Impaired visibility, eye irritation, headaches and fatigues.	Elderly people
	Impaired liver and kidney functions and causes neuro damages	Workers in certain industries - road construction, postmen, hawkers

Buildings	Deterioration of colour –Blackeningn of building facades	Regular and high cost for maintenance and coloring
	Damages to materials – decaying and corrosion	Decaying, monuments and archeological artifacts
Flora and Fauna	Yellowing of leaves	Crop losses
	. Reduce growth	Forest damages
Economics	Reduced work capacity	Reduce productivity
	Reduction in tourism	Effect on national income
Others	Diffusing direct sunlight into scatter light	Reduce solar access and visibility
	Long range transportation, acid rains and acidifications of fresh water and soil	Drinking-water/food contamination
	Impact on urban micro climate	High temperature inversions, humidity level

Table 1.2 Air Pollution Impacts and Consequences Source: WHO 1998

1.2 Vehicular Pollution

Besides substantial CO2 emissions, significant quantities of CO, HC, NOx, SPM and other air toxins are emitted from the motor vehicles into the atmosphere, causing serious environmental and health impacts. Like many other parts of the world, air pollution from motor vehicles is one of the most serious and rapidly growing problems in urban centers of India (CRRI 1998). The problem of air pollution has assumed serious proportions in some of the major metropolitan cities of India and vehicular emissions have been identified as one of the major contributors in the deteriorating air quality in these urban centers (CPCB 1999). Although, recently, improvement in air quality with reference to the criteria pollutants (viz. NOx, SO2, CO and HC) have been reported for some of the cities, the air pollution situation in most of the cities is still far from satisfactory (CPCB 2000). The problem has further been compounded by the concentration of large number of vehicles and comparatively high motor vehicles to population ratios in these cities (CRRI 1998). In India, the number of motor vehicles has grown from 0.3 million in 1951 to approximately 50 million in 2000, of which, two wheelers accounts for 70 per cent of the total vehicular population. Two wheelers, combined with cars account for approximately four fifth of the total vehicular population. Vehicles in major metropolitan cities are estimated to account for 70 per cent of CO, 50 per cent of HC, 30-40 per cent of NOx, 30 per cent of SPM and 10 per cent of SO2 of the total pollution load of these cities, of which two third is contributed by two wheelers alone. These high level of pollutants are mainly responsible for respiratory and other air pollution related ailments including lung cancer, asthma etc., (CPCB 2002)

2. Literature review

2.1 Recent Challenges

Due to increased level of harmful substances into environment, many cities are facing many problems. City populations are experiencing unhealthy and uncomfortable city atmosphere. A harmful environment is the biggest problems in many cities. Environmental issues facing today's population include:

1. Maintaining healthy environment
2. Pollutants from industry and vehicles

3. Poor indoor quality
4. Contracting infections from health service areas.
5. Creating an environmentally friendly workplace.

Due to the increasing human population, more areas are becoming increasingly urbanized. Growing urbanization leads to increased pollution caused by industries and fossil fuel-burning vehicles. The increasing population of cities needs housing, which requires materials manufactured and constructed with products that emit harmful vapors and fumes. Along with the increasing human population, viruses and bacteria can spread more rapidly and be widespread. Hospitals and assisted living facilities have been struggling to control nosocomial infections, which cost the healthcare community in millions of dollars annually. Cleaning and maintaining surfaces is costly for businesses and individuals and increases over time. [1]

2.2 Green Facade

Buildings, as the largest users of energy in our society, are also our greatest opportunity for energy conservation and protection of the environment. The rapidly growing World energy use has raised global concerns over continued depletion of energy resources and their negative environmental impacts. Current predictions show that this growing trend will continue.

The facade is one of the most significant contributions to the energy budget and the comfort parameters of any building. Recent developments in façade technology are following three trends: The first is small-scale methods: coatings this films, advanced glazing technologies and advanced materials developed to improve façade performance at micro level. The second is toward large-scale innovations, such as double skin facades. The third trend is the increased integration of energy-generation components into the building.

With each of these trends the functional performance goals are the same; separating the indoor and outdoor environments, mitigating adverse external environmental effects. [2]

2.3 Self Cleaning Façade

The self-cleaning building façade using TiO2 has been utilized in the past ten years. This type of chemical coating can be applied to all types of facade material, frame or structure. TiO2 is a photo catalyst, which exhibits high oxidative property when exposed to ultraviolet (UV) light. TiO2 can decompose harmful organic compounds, kill bacteria and eliminate odors. TiO2 is a non-toxic chemical base application that has been widely used in Mexico to solve the air pollution problem. Building installed with TiO2 coatings manage to reduce air pollution in the building. The TiO2 facades are applied in most polluted areas especially near roads and car parks. It is the simplest and most effective treatment that can be used. Coating the building façade materials with a super-hydrophilic photo catalyst will help the dust and dirt on the
walls cleaned by rain, keeping the outside wall clean longer than the untreated wall. The mix of photo catalysis and super-hydrophobicity permit oil and soil to be cleared away with water.

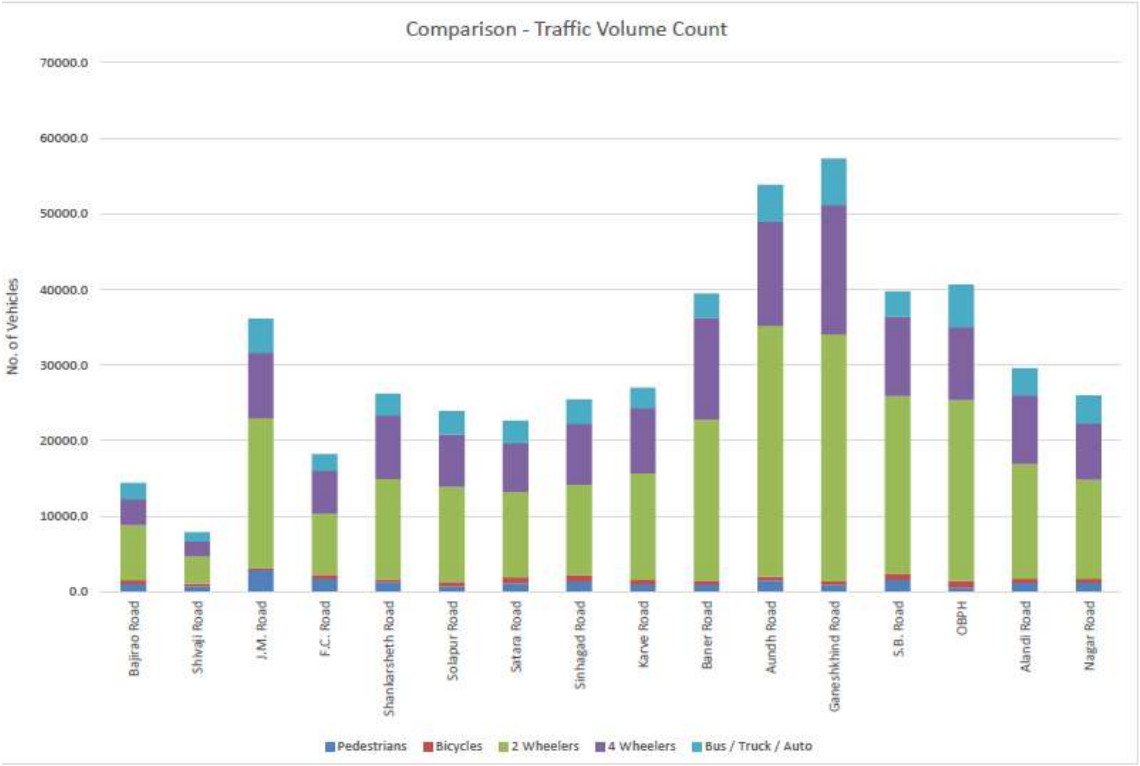
The self-cleaning facade utilizes daylight to activate the TiO2 nanoparticles, bringing about high oxidation force and super hydrophilic impact. It allows for a more robust and sustainable façade. During the rain, downpour water cleans the TiO2 surfaces effectively. [3]

3. Methodology

3.1 Data collection through observations and literature

Author of this paper has conducted a survey at indicative level which involved the observations to find out the approximate number of vehicles travelling from Pune to Talegaon. Observations made at Talegaon toll plaza on Old Pune Mumbai Highway (NH4), on 5th February 2019 between 5.00pm to 6.00pm. It is observed that 425 to 450 vehicles travel towards Talegaon, Lonavala and Mumbai from

Pune. It means approximately 10,000 to 11,000 vehicles travel from Pune towards Mumbai in 24 hours. [4]
A survey conducted for traffic volume control by-- iTrans, PDA & CEE in Consortium, for Pune Cycle Plan on 9 arterial roads of Pune city gives direct number of vehicles on these 9 arterial roads. This traffic volume gave the count of pedestrians, bicycles, 2 wheelers, 4 wheelers and buses/trucks/autos on various arterial roads as shown in Graph 3.1.[5]



Graph 3.1 Traffic Volume Count for Pune City Source: Survey-Traffic Volume Count, Pune Cycle Plan 2017

4. Discussion

4.1 Role of Vehicles in Air Pollution

As per the report of World Health Organization, September 2011, urban outdoor air pollution is estimated to cause 1.3 Million deaths worldwide per year. Nitrogen Dioxide is the reactive gas that is mainly formed by oxidation of Nitrogen Monoxide (NO). High temperature combustion processes (e.g. those occurring in car engines and power plants) are the major sources of Nitrogen Oxide, NOx, the term used to describe the sum of NO and NO2. NO makes up the majority of NOx emissions. A small part is directly emitted as NO2 typically 5-10% for most combustion sources, with the exception of diesel vehicles. There are clear indications that for traffic emissions, the direct NO2 component is significantly due to increased penetration of diesel vehicles. Such vehicles can emit up to 50% of their NOX as NO2.

4.2 Effects of NO2 on human health

Negative health effects can be seen as a result of short-term exposure to NO2 (e.g. changes in lung function in sensitive population groups) and long-term exposure (e.g. increased susceptibility to respiratory infection). Epidemiological studies have shown that diseases such as bronchitis in asthmatic children increase in association with long-term exposure to NO2. Reduced lung function is also linked to NO2 at concentrations currently found in cities of Europe and North America (WHO, 2008). It should be noted that as NO2 is highly correlated with other pollutants (in particular PM) it is difficult to differentiate the effects of nitrogen dioxide from those of other pollutants in epidemiological studies.

4.3 Photo Catalysis: Ammunition on NOX reduction

Photo catalysis is a natural reaction occurring in presence of light, water and oxygen. The reaction is accelerated by a catalyst (Titanium dioxide – TiO2) and it is activated by the energy of the UV light ("photo").

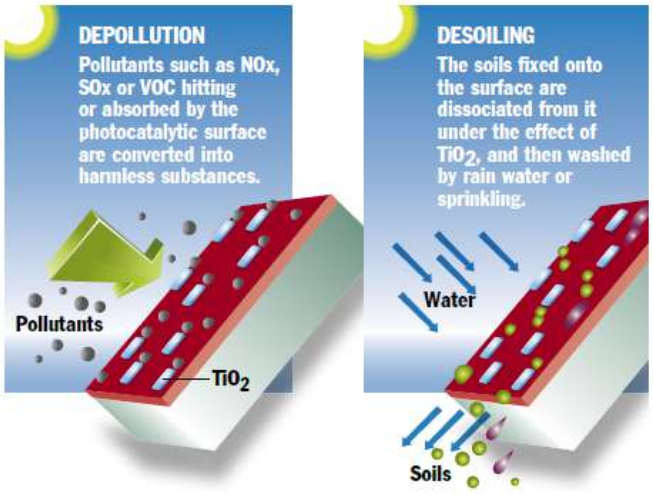


FIGURE 4.1 PHOTO CATALYSIS Source: Photo Catalysis Technology, Crystal Active Broacher

When TiO2 is exposed to UV light, electron-hole pairs are generated, facilitating reduction and oxidation reactions through the formation of adsorbed free radicals on TiO2 surface. These radicals are extremely highly reactive species, capable to degrade the pollutants hitting or absorbed onto the photo catalytic surface; the reaction of degradation converts harmful materials, such as nitrogen oxides, Sulphur oxides, VOC (volatile organic compounds) into harmless substances.

4.4 TiO2 coated Facades for pollution reduction

Titanium dioxide can be applied on glass surface or exterior surface of concrete or any other material as a Photo catalytic coating. Photo catalysts are compounds that use the UV bands of sunlight to facilitate a chemical reaction. When exposed to sunlight, the titanium oxide triggers a strong oxidation process that converts noxious organic and inorganic substances into harmless compounds. The self-cleaning process on glass involves two stages, as seen in Figure 4.3.1.

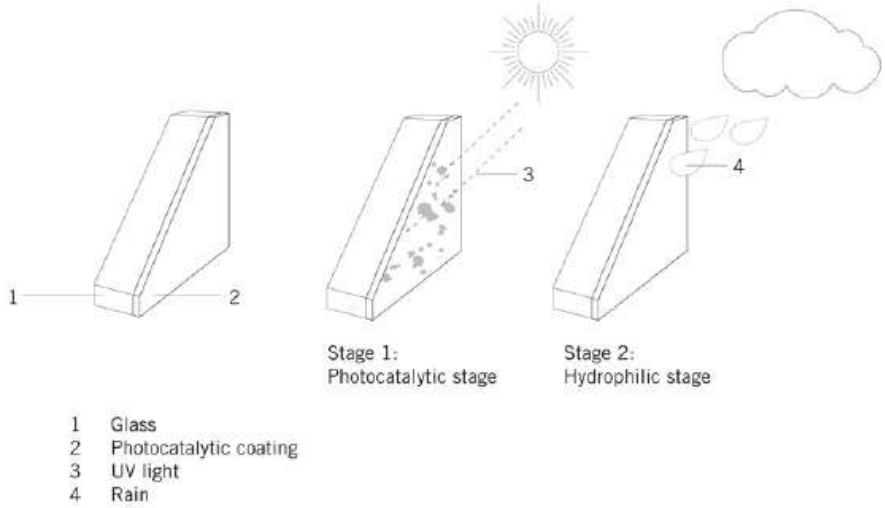


FIGURE 4.3.1 Diagram showing the two steps in the self-cleaning process for glass with photo catalytic coating. Source: Azla Aksamija(Perkins+Wills), Sustainable Facades

In the photo catalytic stage, organic dirt breaks down when the glass is exposed to sunlight. Next, in the hydrophilic stage, rain washes the dirt from the glass by picking up the loose particles. This is an effective way of keeping glass clean without high maintenance costs. However, in drought-prone locations with low precipitation, the second stage may require some intervention and maintenance. Research has shown that self-cleaning glass also helps in reducing air pollutants in dense urban areas.

4.5 Performance of TiO2 coated Facades in NOx reduction

A depolluting trial was conducted with Camden Council and Kings College on an exterior wall of the Central St. Martins College of Art and Design at Granary Square, London, UK. Background data of pollutants in the area were collected for a period of one year prior to a transparent photo catalytic coating being applied to the wall surface (135m2). Chemilluminescence monitoring of NO, NO2 and NOx was employed in order to record the pollution levels. Two detection probes were placed at different distances from the wall surface to detect the changes in pollution levels. Parallel monitoring of pollution in a nearby area was performed to establish an ongoing baseline of air quality levels as a basis of comparison. Meteorological data such as wind speed and direction, rainfall, temperature and humidity were also continuously monitored every 15 minutes. Monitoring of the area continued for more than two years after the application of the photocatalytic coating. The results from this trial show NOx reductions of 35-65% depending upon the time of the year and local weather conditions. The product showed the capacity to remove up to 0.5g/m2/ day of NOx. A surface of 300m2 coated with this TiO2 transparent can offset the NOx emission of 50 cars travelling 20km per day. [6]

4.6 Properties of Photo Catalyc Facades

Surfaces coated with PCOs display the following properties:

4.6.1 Anti-Microbial

When photocatalytic oxidizers are activated with light, treated surfaces display properties that are both environmentally-friendly and cost-beneficial. Surfaces become antimicrobial. Treated surfaces remove volatile organic compounds, disengaging bioaerosols.

4.6.2 Self-Cleaning

Treated surfaces create a superhydrophilic surface that allows water to separate dirt, stains, and other foreign particles from the surface, minimizing cleaning time.

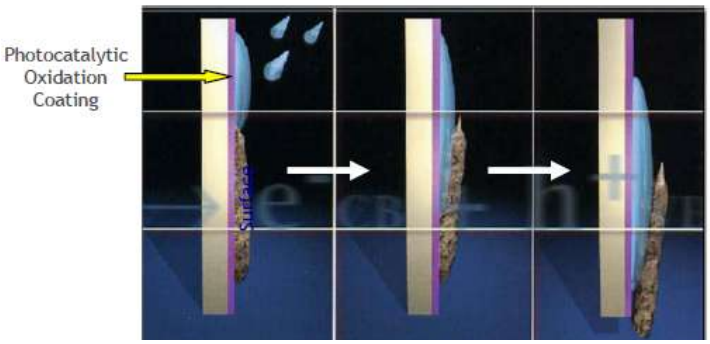


FIGURE 4.3.2.1 self cleaning of photo catalyc facade
Source: Benefits and Applications of Photo Catalytic Oxidation Coatings

4.7 Deodorizing

Odors are caused by bacteria and other microbes; treated surfaces provide natural deodorizing properties by decomposing the microbes as they come in contact with the Photo Catalyc treated surface.

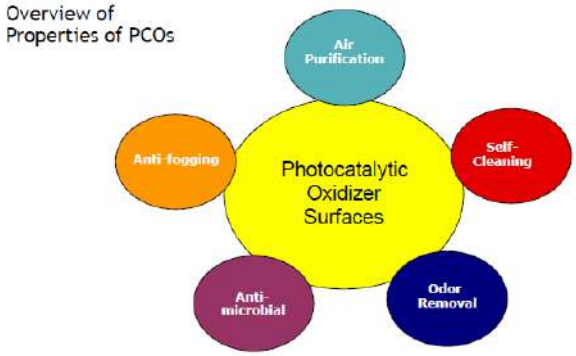


FIGURE 4.3.2.2 overview of properties of photo catalyc facades
Source: Benefits and Applications of Photo Catalytic Oxidation Coatings

4.8 Application and benefit of Photo Catalyc Facades

Advantages of PCOs on Tiles

1. Decomposition of bacteria, fungi, algae, moss and germs
2. Elimination of odors
3. Improvement of room air quality
4. The original characteristics of the tile, such chemicals, etc., are maintained
5. Requires only minimum care
6. Low cleaning costs as resistance to abrasion, resistance to
7. Free of irritating substances,
8. Environmentally friendly
9. Long-term guarantee
10. Varied range of products

Application locations for PCOs include these areas:

1. Health and healthcare areas such as hospitals, assisted living facilities, and
2. medical office buildings
3. Transportation and the public sector such as airports, mass transit stations, tunnels
4. Fitness and wellness areas such as pools, spas, and saunas
5. Building facades including rain screens
6. Shopping and business areas including shopping malls and office buildings
7. Residences in kitchens and baths

Application locations of PCOs are virtually unlimited.

5. CONCLUSION

Urban air pollution is the source of a range of problems, including health risks with inhalation of gases and particles, accelerated corrosion and deterioration of materials, damage of historical monuments and buildings, and damage to vegetation in and near urban areas. All these problems have increased in recent years. Buildings that are designed to lower the impacts of air pollution via passive means are much welcomed. Photo catalytic surfaces can dramatically reduce local NOx levels. Photo catalytic coatings are cost-effective and easy to apply. It is a useful tool to support the NOx reduction in areas of non-attainment of air quality. Photo catalytic materials are also effective at decomposing organic stains, mold and algae that accumulate on exposed surface. Air pollution and specially NOx pollutants remains a major issue in developed and emerging regions. The issue forces local authorities to take actions. Photo catalysis, as a novel and proven solution can help local authorities to meet the legal ceilings. Specifiers, construction and estate management companies can differentiate their projects or business with low maintenance and depolluting materials. Construction materials and paint formulators are under increasing pressure to provide active products to meet low maintenance and depolluting requirements. The pollution absorbing facades can significantly become a solution to achieve comfortable life conditions to urban population who are suffering due to air pollution. Use of such intelligent materials can improve the urban atmosphere and can become an ammunition for developing cities.

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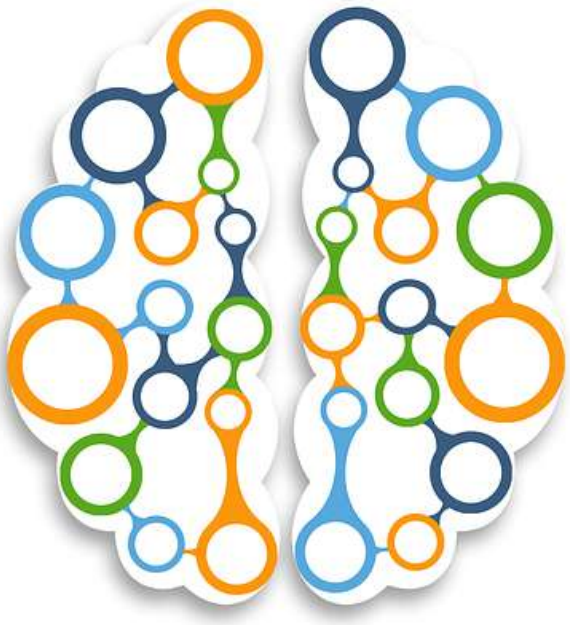

Track 2:

Intelligent Buildings

Documentation Waste Management Practices In Market Yard, Pune

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ABSTRACT

Waste management is one of the key elements in environmental protection. Its management has become an acute problem due to rapid economic activities of urbanization. Government has become more conscious in recent years to handle this problem in effective and safe manner. Dhere (2008) has observed that everything is dumped in dumping yards increasing the load on these areas. Majority of this waste is organic in nature, which could be reused; reducing load on the dumping yard. Report on Strategic Action plan for Integrated Solid Waste Management Plan, Pune (Vol. I 2006) also states that Market Areas contribute about 15% of the total waste generated in the city which is more organic in nature. Thus proper characterization of waste is fundamental for the planning of waste management services. It is also important to understand the cycle from generation to disposal with the institutional framework of the agency. To understand this, the paper documents and analyses the waste management practices of Market Yard, Pune through field survey, observations interviews, secondary data. The paper takes the overview of current practices and indicates that the waste management practices in market yard needs improvement.

Keywords: Solid Waste, Market Areas, Waste management practices.

1. INTRODUCTION

"We Humans have an amazing potential to convert everything useful into waste." –Anonymous1.

Rapid industrialization, economic development, urbanization have led to high an improved standards of living. This has indirectly led to increase in amount of waste generation. There is a link between the growth in wealth and increase in waster- the more affluent the society becomes; waste it generates (Kumar 2009).

Improper disposal leads to spread of diseases, contamination of air, soil and water leading to major environmental threats (Mandaan /TNN 2011). Thus, Waste management is an important element of environmental protection. Municipal Solid Waste (MSW) consists of components shown in, Fig1.

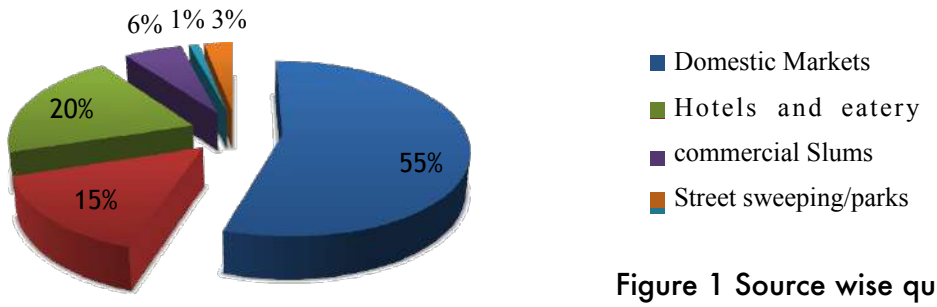

Figure 1 Source wise quantity of waste generation

[1] From '*State of Environment Report 2003 – Bangalore*'

The percentage of organic waste (kitchen waste, vegetables, flowers, leaves, fruits) generated is 70% and non organic waste (glass metal, plastic, etc.) generated is 30%2. Its management requires major financial and logistical resources for its collection, recycling and disposal. More than 25% of the MSW is not collected at all; 70% of the Indian cities lack adequate capacity to transport it and there are no sanitary landfills to dispose of the waste3.

Generally, solid waste planners place emphasis on residential waste and industrial waste which has a greater tonnage but its management is the responsibility of relatively small and specific sector of society. The market areas which contribute to waste generation largely; generally about 10% - 15% of the total waste, Fig1 are not addressed. The functioning of these spaces itself is a major source of waste generation because of its activities like loading- unloading, packaging, transport, cleaning, segregation, maintenance, etc. This is dumped at the landfills without any segregation or treatment.

In order to design and operate appropriate solid waste management systems; It demands assessment of waste in terms of quantification and characterization. Thus the study aim at documenting and analyzing the existing conditions of the waste generated and its management in market areas. Its objective is to understand the market management and cycle of waste generation to disposal.

1.1. Selection of Market Area

Markets here refer to the wholesale sell or purchase are of perishable commodities like agricultural produce such as vegetables, fruits, grains, flowers, etc. In Pune there are two major market areas; namely, Market Yard4, Gultekdi and market at Mandai. There are also small vegetable markets designated in various localities of the city but their main source is from either Market yard or Mandai.

Market yard is a major wholesale market for the farmers to sell their produce under – Agriculture Produce Market Committee (APMC)5. Mandai on the other hand works only as a retail outlet for consumers. From basic observations, it's seen that the quantity of waste generated is less in Mandai as compared to that in Market yard because of its scale and nature of working. Therefore, Market yard is selected for the base of study.

1.2. Scope of Study

Thus the scope of study takes into account only case of main market area in Pune city i.e. Market Yard, Pune. Further looking at the size of the market, the study only focuses on Fruit, vegetable, flower, Pan and banana market.

2. Introduction to Bazaar Samiti[6]

2.1. Background

The Agriculture Produce Market Committee, Pune was established on 1st May.1957 and came into force on 1st April, 1959 and also official known as Krushi Bazar Samiti, Pune or Bazar Samiti from 2008,

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2 Environmental Status Report, Pune, 2011

3 www.ENVIS.com

4 Market Yard is an Agriculture Produce Market Committee under Maharashtra State Agricultural marketing Board.

5 Agriculture Produce Market Committee.

6 Bazar Samiti refers to Market committee in Marathi language.

under the Maharashtra Agricultural Produce Marketing (Regulation) Act was passed in the year 1963. It's situated in market yard, gultekdi, Pune.

Figure 2 Plan - Location of Market Yard, Pune

Figure 3 Google Picture of Market Yard

Its main objective is to establish a platform for farmers to sell his goods at the rates desirable without any interference of the commissioning agents and get them their money immediately without any delay. In addition, to protect them from any illegal actions happening against them and further help them to develop the farming activity more efficiently.

2.2. Physical Features of the market:

- Market spread over 190 acres of land. The ownership of the land belongs to the bazaar Samiti. The Samiti has given land on lease to the sellers.
- It comprises of the several types of markets as shown in the Fig4. Along with amenities like petrol pump, weighing bridge, banks and other requires amenities either self - constructed or given on contract basis to the respective agencies. (Paan – refers to type of mouth freshener leaves eaten in India).
- The Sanitation and operation and maintenance department is responsible for the waste management system for the market areas. It is responsible for the health and sanitation measures for the area.
- The Operation/Maintenance department carries out any civil or repair work and supervises the sanitation department for its functioning. Further, it calls for tenders for collection, transport and disposal of waste generated in the market.

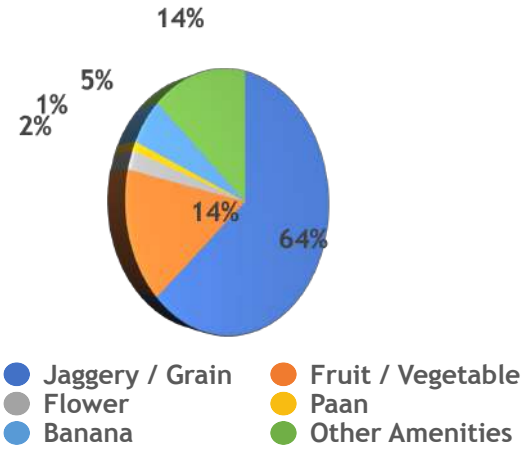

Figure 4: Percentage wise distribution of Market Yard area

2.3 Limitation of Study

Since the area is too large and looking at the research time, the amount of waste generated through mere observations and other constraints; the study for documentation of waste focuses on the Vegetable, fruit, flower, banana market instead of grain and jaggery market.

3. Waste Management Practices in the market

The Sanitation and Operation/Maintenance department are responsible for management of waste generated in the market.

- The sanitation inspector takes a tour to the area, supervises the area and allots the duty to the workers.
- The activity of sweeping and collection of heaps starts from 10:00am as the selling activity by farmers is over by 8:00am and till 5:00pm.
- The waste is collected in the form of heaps in front of the galas7.
- The waste is not segregated for paper, plastics, leaves, etc.
- All the waste from the galas, roads, and eateries /hotels present is collected together.
- Since the laborers are uneducated, and have many addictions like chewing tobacco, smoking etc, they find inconvenience in using these instruments.

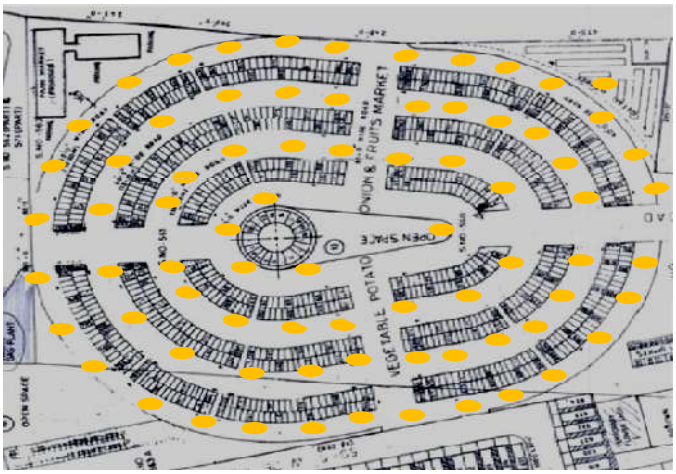

Figure 5 Plan showing collection points of waste in front of *galas*.

3.1. The steps followed for waste quantification and characterization is as under:

10.1. Identification of the source for generation
10.2. Classification of waste
10.3. Collection of waste
10.4. Waste handling
10.5. Quantification of waste
10.6. Waste Storage
10.7. Waste Transfer and Transport
10.8. Waste Treatment, processing and Disposal

3.1.1. IDENTIFICATION OF SOURCE OF WASTE GENERATION:

The loading and unloading activity in the market is the basic reason for the waste generation. It is also the outcome from manufacturing and packaging quality of commodities, its handling, transfer from one place to another, etc.

Figure 6: As the wholesale activity descends by 7:30am -8:30am, the generation of waste starts **increasing.**

[7] *Galas* – A local word for the shop area allotted to the particular vendor for its selling in the market.

3.1.2. CLASSIFICATION OF WASTE:

The area deals with the agricultural commodities thus the material is all natural and perishable. Therefore the basic nature of waste is organic and of wet type.

3.1.2.1. COMPOSITION OF WASTE:

The basic composition of waste consists of vegetable and fruit waste, banana stem, hay, straw, plastic, wood, paper, etc. The following table gives the inventory of the waste according to the commodity categories.

TABLE 1: INVENTORY OF WASTE

Sr. no.	Type of Market	Wet Waste	Dry waste
1.	Jaggery and grainy market		Plastic, cartons, paper, dries And waste grains, husks.
2.	Fruit market	Leaves, wet grass, droppings of fruits while transfer, rotten materials, degraded quality materials, skins of fruits.	Wooden boxes, paper, cartons, dry straw, plastic, plastic rags and containers, metal nails, jute ropes, Packaging strips.
3.	Vegetable market	Leaves, wet grass, droppings of fruits while transfer, rotten Materials, degraded quality materials, vegetable skins.	paper, cartons, dry straw, hay, plastic bags, rags,plastic Containers, jute ropes, packaging strips.
4.	Flower market	Leaves, petals, dry flowers.	Packaging paper, straw, Threads.
5.	***Paan*** market -	Dries leaves	Straw, broken cane baskets
6.	Banana Market	Leaves, stems, skins of Banana, rotten fruit.	Dried leaves
7.	Onion/Potato Market	dried rotten onions and potatoes	Onion skins
8.	Hotels inside the area	The waste water used for washing, raw vegetable and fruit remains	Plastic bags, paper, packaged material waste like sachets, tetra packs, etc, tobacco Sachets, cloth pieces.

3.1.2.2. CHARACTERISTICS OF THE WASTE

Depending upon season, there are large fluctuations in the quantity and nature of waste generated daily from the market. It is inconsistent due to data recordings, collection methods, seasonal variations, and insufficient information.

3.1.3. COLLECTION OF WASTE

The inspection of the market is done by the sanitation department head and the duties are allotted to the labors. This starts in the morning around 10:00 – 10:30am when almost the wholesale market is on the verge of closing and the trucks have almost loaded and unloaded themselves and moved out of the market area. Two labors are allotted one gala for sweeping and collecting waste in front of that gala. The labors collect the waste paper, vegetable remains wet or dry and make a heap in front of the gala(Refer fig.7). This process happens at respective places like fruit market, paan market, banana market, and flower market. The labors collect the heaps of waste in the nearby area. They do not carry it anywhere.

While collection; the waste is not sorted out into wet and dry. All of it is collected in a heap irrespective of its nature or character. Thus the waste collected is unsorted and bare handled at their respective locations.

Figure 7: Collection of waste by Labors in Heaps

Further, the Bazaar Samiti appoints contractor on tender basis for waste collection, transfer, transport and disposal. The contractor is responsible for getting his own labors, vehicles and any other equipment required for collection, transported, etc. of the waste.
The contractor first surveys the whole market and identifies the maximum waste collection areas of the area. After this, he instructs his workers to start collection of waste from the where it is collected in quantum. The waste is collected in the trailers attached to the tractors. The waste accumulated by the Samiti labors is picked and collected by the workers appointed by contractor and dumped into the trailers moving along the area.

Figure 8: Contractors labors collecting waste and dumping into trailers

3.1.4. WASTE HANDLING, SORTING:

The waste is handled by the labors appointed. The heaps are collected in front of the Galas, thus handling becomes much easier and convenient. Further even the contractor also does not need to travel the waste at a long distance. The workers who handle the waste are provided with carts, brooms, gloves and masks so that the smell and the unhygienic conditions are avoided. In rainy season they are also provided with raincoats for the efficient working. Thus the safety measures are taken by the committee for the workers. The workers do not use the resources like gloves, mask etc because of the majority of them are addicted to tobacco chewing habits and are illiterate thus making them inconvenient to use them. No sorting or segregation of waste is done before or after collection. Thus the waste handling is easy.

Figure 9: Images showing some Waste Handling equipment's

3.1.5. QUANTIFICATION OF WASTE:

Quantification of waste is carried out by following methods.

i.1. By Weight

i.2. By Volume

i.3. By Random Survey

To quantify the waste, following procedures were carried out -

3.1.5.1. BY WEIGHT

The trailers were weighed before and after they were filled by the waste for three days in the month of September - October at the time of Navratra8 festival. The observations are as follows.

Table 2 Observations carried out for by weight survey

Sr.No.	Date of weighing	Weight of empty tractor (Ton) **A**	Weight of filled tractor (Ton) **B**	Difference in weight – B-A
1.	30-9-2011	6.6 Ton	26.15 Ton	19.55 Ton
2.	2-10-2011	6.6 Ton	35.85 Ton	29.25 Ton
3.	3-10-2011	6.6 Ton	32. 35 Ton	25.75 Ton

The average waste generated for three days = 24.85 Ton. Therefore on an average daily 25 tons of waste is produces at the market. This may vary according to the season.

3.1.5.2. BY VOLUME

The volume of one trailer is 144 cubic feet = 4.08 cubic meters

Table 3 Observations by volume of the trailer

Sr.No.	No. of trailers - **A**	Volume of one trailer - cubic meters -**B**	Total volume – cubic meters **A x B**	Total - by weight – **Ton**
1.	6	4.08	24.48	24.48
2.	8	4.08	32.64	32.64
3.	8	4.08	32.64	32.64

Therefore; average volume of waste = 29.93 cubic meters = 29.92 **Ton**[9]

3.1.6. WASTE STORAGE:

On site i.e. market area: The waste is stacked at the respective collection points. It is not moved from the collection area. Thus the storage of waste on site is temporary.

3.1.7. WASTE TRANSFER AND TRANSPORT:

From source to collection: The waste is collected in form of heaps at the generation point itself. The waste; further is transferred from the heaps to the tractor trailers manually by the contractor's labors and

[8] Navratra – is a festival specially celebrated in Gujarat, dancing to praise goddess Durga.

[9] 1 cubic meter = 1000 Kg = 1ton

not the samiti labors. The tractor moves to the points where the heap is formed. Thus the tractor moves along the whole area saving transportation energy of labors carrying the waste.

From the trailers to dumping site: The waste is transferred from market area to the dumping ground by tractors 40km away from the market out of the Pune Municipal Corporation limits at a village named Saurtapwadi near Urli. The dumping site is a rocky terrain, about 2 acres in area, situated at one corner of the agricultural farm lands. Thus an additional transportation cost is increased.

Figure 10: Transfer and Transport of waste in tractors

3.1.8. WASTE TREATMENT, PROCESSING AND DISPOSAL:

The waste is not treated before disposal. It is left to dry on the dumping site. Thus direct disposal of waste takes place on the dumping site. Care is taken by the contractor that, the dumped waste is being shuffled up and down for proper drying with the help of JCBs. After drying, only plastic elements such as plastic bags, rags, etc which do not degrade are segregated from the collected material. It is done with the help of an electric grater kept on the dumping site.

The dried waste thus gets converted into very fine particles/powder which is rich in nutrients as it is all organic in nature and acts as a manure /fertilizer for the soil. Thus it is packed in the bags and given to the farmers as manure for their fields.

Figure 11: Disposal of waste at site without treatment

Figure 12: Waste after drying

Figure 13: Segregation of plastics by grater

Figure 14: Dries segregated waste packed in bags used as manure.

Figure 15: Heap of segregated plastic left on site

The plastic thus left is burned on site, directly in open area and not fiving it to recyclers.

4. Observations

- The market area in the early morning looks clean; thus the waste is cleaned and disposed off on the same day of generation.
- The collected waste is organic in nature.
- It is not segregated in terms of dry and wet like plastic, paper, metal, etc.
- The equipments are provided to the labors for their safety, according to the rules, but its use is not promoted among them by the authority. No education or training programs are carried out for the labors to teach them about the importance of health and hygiene.
- The waste is transferred and disposed by the third party person i.e. Contractor. The Bazaar Samiti does not take care of its treatment and disposal.
- It does not use its valuable organic waste to its fullest for the benefit of the authority or its members or the functioning of its place.
- The transport of the waste happens in the open container, which is not covered with anything.
- The dumping area is also not fenced or covered from the top so that there is less air pollution due to smell and rotting of organic matter and in rainy season the area is unhygienic and dirty as all the waste becomes wet. This also leads to contamination of soil and air as decomposition of waste takes place releasing harmful gases in the atmosphere.
- The segregated plastic is burned which again ads to release of smoke with other toxic gases into the air causing air pollution.
- Such polluted air is unfit for human health and environment.
- The Samiti does not hold any responsibility after the waste is handled to the contractor, thus is not liable for anything happening because of the waste transport and disposal.

5. Conclusions

The first step in waste management is; understanding of the waste types being generated in order to design appropriate collection and disposal strategies. Secondly, the role of management authorities and its working is important for interventions through policies, acts and rules for the management of waste. Lastly, education and awareness amongst members for generating less waste, segregation, recycle, etc. Thus looking at the current scenario in Market yard, there is a great potential for use of the organic waste generated at the site; which is not yet realized. There is not much emphasis given to the waste management. Thus the waste management system at market yard needs improvement.

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PROPERTIES AND APPLICABILITY OF EPS PANELS

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ABSTRACT

The clay brick manufacturing is recognized as resource intensive, energy efficient and highly polluting; still over the year's clay bricks and other conventional construction materials are the most popular building material in India. An eco-friendly alternative to conventional material can help to reduce Carbon Dioxide emission at global level. Polystyrene core panel system is based on factory made panels consisting of self-extinguishing expanded polystyrene sheet sandwiched between two engineered sheets of welded wire fabric mesh. Expanded polystyrene panels have many advantages when compared with conventional construction material such as thermal comfort, fire and earthquake resistance, light weight, sustainable, energy efficient, etc. This paper focuses on the properties of EPS panel and their applicability in residential buildings. Also it will focus on design flexibility in EPS panel.

Keywords – Burnt clay bricks, Eco-friendly, Expanded Polystyrene (EPS) panels.

1. INTRODUCTION

Conventional designs that comprise beams, columns, brick and plastering have inherent inefficiencies during construction. Bricks are labor-intensive and manufacturing is recognized as resource intensive, energy efficient and highly polluting. There are also constraints in concealing and routing M&E services. Apart from using more intensive manpower and longer construction duration, there are some inherent difficulties in achieving high quality. (Anon., 2013) Building better is a way of providing more quality and functionality for less money, time or effort.

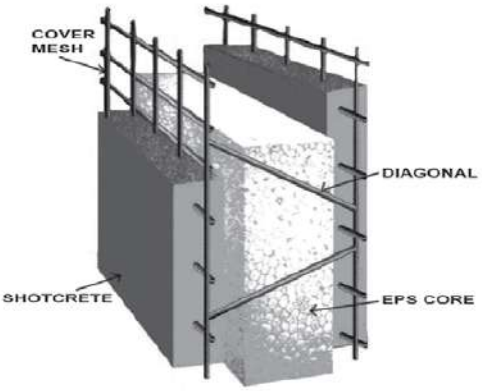

Figure 1-3D Cross section of panel

Polystyrene Core Panel System is based on factory made panels, consisting of self-extinguishing expanded polystyrene sheet with minimum density of 15Kg/m3 and thickness not less than 50 mm, sandwiched between two engineered sheet of welded wire fabric mesh, made of high strength galvanized wire of 2.5 mm to 3 mm diameter. A 3 mm – 4 mm diameter galvanized steel truss wire is pierced completely through the polystyrene core at the offset angle for superior strength and welded to each of the outer layer sheet of steel welded wire fabric mesh as seen in figure 1. The panels are finished on the site using coat of minimum 30 mm thick shortcrete (1:4) applied under pressure. (Systems, 2011)

Table 01: EPS panel specification

1.	Width	1200 mm
2.	Length	2000 mm - 6000 mm
3.	EPS Slab thickness	50, 80, 100, 120, 150 mm
4.	EPS Slab type	Plain or corrugated
5.	Mesh spacing	50 x 50 mm, 100 x 100 mm

6.	Mesh wire thickness(dia.)	2.5 mm, 2.0 mm, 3.0 mm

2. PROPERTIES OF EPS

2.1. **Load carrying capacity-** Numerous lab tests, performed in different parts of the world, have shown that they withstand a maximum load of up to 1530 kN/m ≈ 153 ton/m. The Monolithic joints of the building system provide a high level of structural strength to buildings.

2.2. **Seismic performance-** Buildings made using panels are particularly lightweight, so have a low seismic mass, but are at the same time rigid due to two sheets of reinforced plaster that interact to create an enveloping 'shell' of the whole structure

2.3. **Thermal behavior -** The thickness and density of the panel can be customized to deliver specific thermal insulation requirements. Furthermore, the EPS core extends throughout the surface which makes up the building envelope eliminating thermal bridging.

2.4. **Acoustic behavior -** The panel has got good acoustic behavior, coupling with sound-absorbing materials (such as plasterboard, cork, coconut fiber, rock wool, etc.)

2.5. **Sustainability and energy efficiency -** The system provides significant improvements in indoor thermal comfort by greatly reducing energy consumption and promoting strategies aimed at sustainable development. It minimizes the energy required for heating or cooling up to 60-80% depending upon the thickness as well as density of EPS used and also the thickness of concrete applied on both sides

2.6. **Fire resistivity -** The quality of the expanded foam polystyrene used for panels is self-extinguishing and is perfectly encased by layers of reinforced concrete as external coat to sides of the panel and inhibit combustion.

2.7. **Cost effectiveness -** Compared to traditional products, panels achieve far better results, at considerably reduced cost. The speedy construction represents additional savings.

2.8. **Rapid installation -** The construction experiences using the system show marked reduction in construction time compared to traditional building methods.

2.9. **Lightness, ease of transport & handling -** Being light weight and rigid, panels are both easy to handle and transport even in the most adverse conditions.

2.10. **Versatility -** The building system gives full design flexibility as it offers a complete range of building elements such as load-bearing walls, curtain walls, domes, overhangs, floors, stairs etc.

2.11. **Compatibility with other existing system -** It is an extremely versatile building system which is completely compatible with all other existing construction systems; in fact, panels are even suitable for completing reinforced concrete or steel structures.

2.12. **Blast resistance -** The tests were conducted using a powerful explosive, in a test chamber optimized to produce uniform shock waves on the face of the panels. The panels performed excellently withstanding explosions of 29.5 tons/m2.

2.13. **Wide choice of finishes -** Buildings constructed using panels can be completed in a variety of finishes, or can be painted traditionally on smoothed plaster.

2.14. **Cyclone resistance -** Laboratory tests conducted on buildings, to determine the resistance of cyclone impact and damage caused by wind- borne debris confirm the strength of the building System against such loads.

3. CONSTRUCTION TECHNOLOGY

For foundation Marking, Leveling, Excavation for plinth, and filling with layers of Sand and PCC, providing steel reinforcement for plinth beam. Re-bars are provided at 2 feet span and 1 ½ feet height, all along the plinth beam to hold the panels. Pour concrete to form the plinth beam. Complete erection of all wall panels leaving space for the doors or other openings. Panels are placed in between the re-bars on the Plinth beam. Erected panels are then bound to the re-bars with binding wire. Panel to panel is joined with a joining mesh, I-mesh is used for a flat joint. I-mesh is overlapped over the two panels and is bound with a binding wire or stapled using a Clinching Tool. At every 100 mm span the joining mesh is bound to the panels. Panels at the corners are joined with a L-mesh (corner joining mesh). The Mesh is placed over the joint at the corner and is bound with a binding wire or stapled using a Clinching Tool to the panels. All corners of the building panels are joined from both inside and outside with the L-mesh. Cut opening for window with a help of a cutter. Fix door frame and window frame to its corresponding opening. Window frames are fixed with a help of a C-clamp. On one side it is screwed to the wooden frame and the other end is fastened to the panel with Binding wire. Grooves are made in the EPS core using a hot air gun and necessary PVC pipes are inserted into the grooves. Switch Boxes are fixed by cutting of the mesh where the boxes are to be fixed. Piping is placed in the core material behind the Wire Mesh. No Chipping and Rework required afterwards. Plaster both sides of the wall panels with mortar (1:4). The plastering can be applied Manually or with a shotcreting machine. First coat of plaster called rough plaster is 15 mm thick up to mesh level. Erect the Roof Panels on the walls and join them using L-mesh on all the corners where wall panel and roof panel meet. L-mesh should be on inner and outer side of corners. Finish the house with fine Plastering. Fix tiles, decorative POP, etc. on walls/roof as needed. AC's, stabilizers, wash basins, etc. can be fixed as done in the conventional type of building. (Systems, 2011)

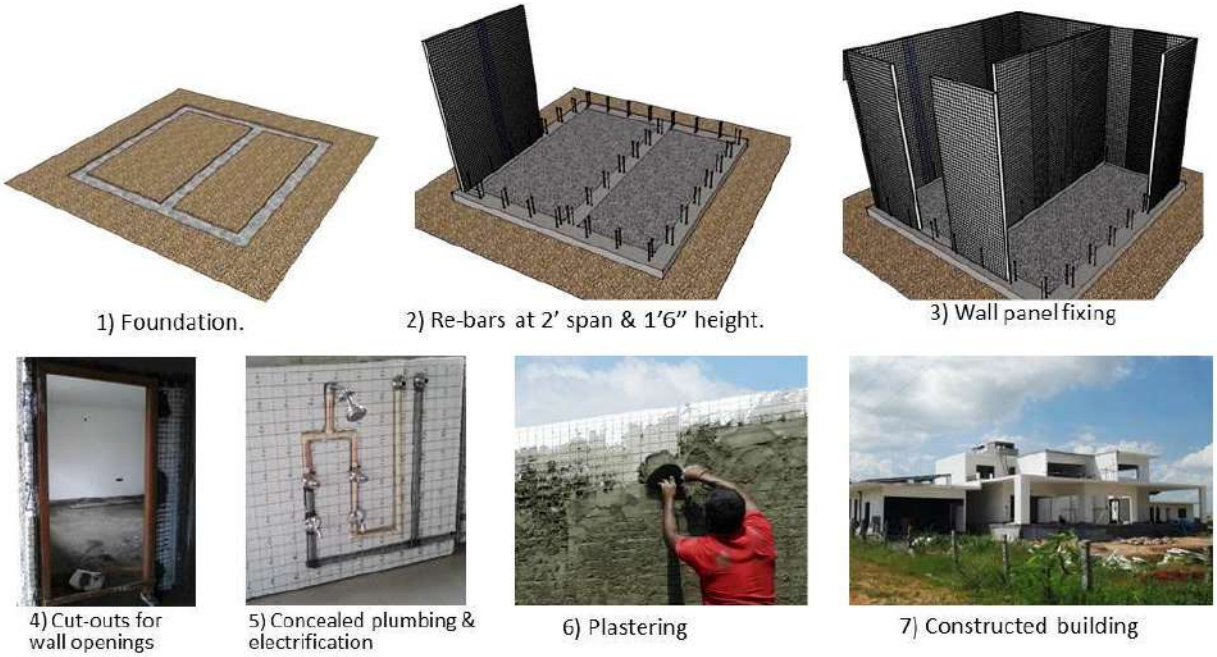

Figure 2 –Process of construction methodology of EPS panel

4. DESIGN FLEXIBILITY

The high stiffness & low weight efficient structure is beneficial in the construction industry. The lightweight EPS is combined with other stronger materials to make it a viable structural material. Concrete is then used with EPS to create a strong composite structural system. EPS panels, tailored for specific projects are used as walls panels for partitioning and for floor slabs. These are normally finished on-site by applying concrete/sand crate with pneumatic devices. (Anthony Nkem Ede1 (PhD), 2014) The EPS panels can use in both load bearing and framed structure. In load bearing structures, as discussed in above construction methodology, the panels can be used as walls, columns, slabs, etc. The load bearing structure erecting with EPS panel can go G+2. In framed structure, the frame of column, beam & slab is made of RCC with conventional method and the panels are used as an infill panels instead of brick walls. The fig. __ is a farm house in Hyderabad. The whole structure is erected in EPS panels including partitions, domes, overhangs etc. Due to the main advantage of being lightweight, it can mold to form difficult shapes like domes.

Figure 3 - Farm house at Hyderabad for Mr. Ravi Mandava

5. APPLICATIONS OF EPS

Expanded Polystyrene (EPS) is a multipurpose plastic material made available for a multiplicity of applications. EPS has experienced wide range of applications owing to its lightweight, rigidity & thermal and acoustic insulating properties. Initially, EPS was mainly used for insulation foam for closed cavity walls, roofs and floor insulation. But ultimately, the application has extended vastly in the building and construction industry such that EPS is now used in road construction, bridges, floatation and drainages. EPS used for building construction are of various types and sizes with the most common ones being for wall panels and for slab. As the EPS sheets are impermeable it requires minimal long-term maintenance, especially in areas prone to extreme weather and temperature conditions summer heat, winter snow, heavy rains and high wind. It is found earlier that buildings made with EPS can withstand wind velocities of more than 300 Km/ hr. and endure earthquakes of 0.4 g Ground Acceleration or more than 7.5 on the Richter scale. (Anthony Nkem Ede1 (PhD), 2014)

6. CONCLUSION

The benefits of expanded polystyrene (EPS) in the building industry worldwide can be summed up as lifetime durability, moisture resistance, proven acoustic and excellent thermal insulation, design versatility, cost-effective, easy installation leading to record time completion, flexible mechanical properties, good strength and structural stability. Specifically, on the cost of production and time of construction, EPS material has an edge over conventional building materials. (Anthony Nkem Ede1 (PhD), 2014) The simple design, efficient production, easy transportation and quick erection of the building unit reduces time lines of projects of all sizes. The monolithic structure created by the panel in conjunction with concrete enables it to withstand earthquakes, hurricanes and high winds. As a standardized factory product, the EPS panel brings uniformly high qualify to a construction project of any size. often evaluated over the whole of its life cycle shows that it affects the environment less than other more biological insulators. It is SAFE. It does not release toxic or harmful substances and is totally inert- It does not contain chlorofluorocarbons {CFCs} or (HCFCs) (bmtpc, n.d.)

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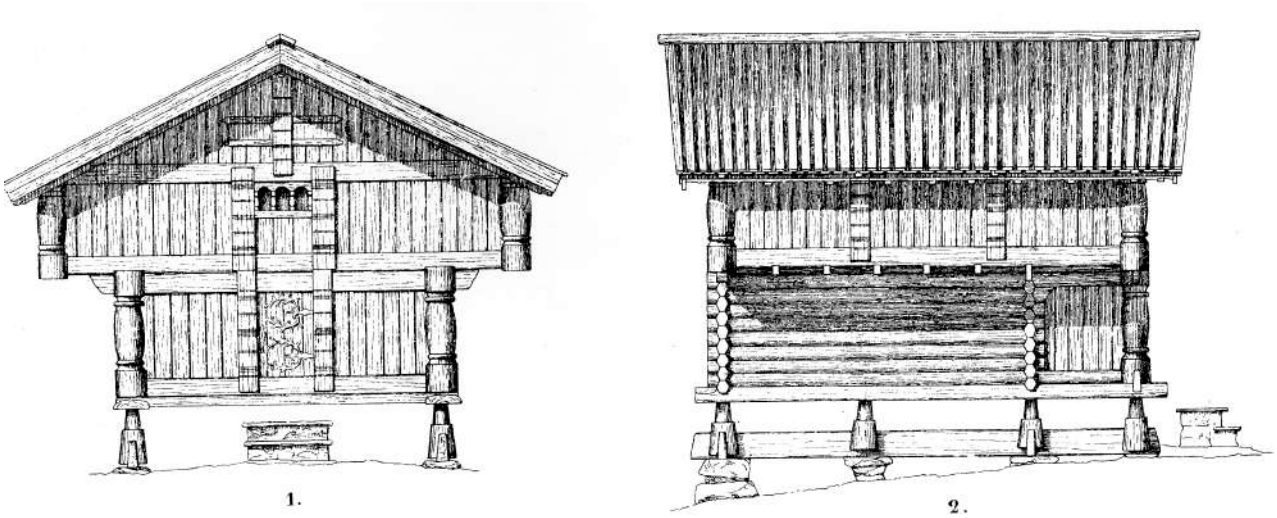

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Track 3:

Inherent Architecture

Ayodhya: Interpretation Of The Other

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ABSTRACT

Interpretation of sensitive sites has to be done carefully as sentiments of a huge population are attached to them. Parts that are remembered or forgotten, greatly influence the way in which histories of contested sites are built. The Babri Mosque was built in 1528. Some Hindu groups assert that the mosque was constructed on the spot where a Hindu temple had stood, provoking protests. Such sites are usually emotionally charged and defended as symbolic landscapes.
The aim of this paper is to address how this sensitive site should be interpreted to provide justice to the built environment, by studying good interpretation practices from a universal perspective. Interpretation is the bridge between architecture and public. Appropriate interpretation - acknowledges the past, promotes peace for the present, and instils acceptance for the future, giving room for a peaceful conclusion to an ugly time, instead of a situation where 'resolve' is seen as compromise and bitterness pertains.
The interpretation should be relatable to someone who doesn't confine to either of the two sides. The division of the site maybe done to assign possession rights, but the interpretation must be unbiased and collective, failing which, visitors will not get a holistic reflection of the facts.

Keywords: Interpretation, History, Dark Heritage, Intangible, Ayodhya

1. INTRODUCTION

Interpretation of sensitive sites has to be done very carefully as sentiments of a huge population are attached to them. Dumper and Larkin (2012) in their paper- The Politics of Heritage and the Limitations of International Agency in Divided Cities, comment on how the politics attached to heritage not only has an impact on these public sites and related events but also creates a big affect on personal memories. They say that parts that are remembered and the things that are forgotten greatly influence the way in which the histories of contested sites are built. Memories are capable to shape the experiences visitors have in a city by the people who chave lived through the conflict as well as people who carried forward their stories. While heritage sites could pre-empt ethno-national ideas, very dedicated meanings and portray directional ideas of the past, they also retain the potential to reveal an alternative pluralistic pasts which encourages shared futures. But Dumper and Larkin admit that this can be difficult where control of the site is contested and represent biased views. In this paper we look at the example of one such city- Ayodhya, India. It will explain in brief, the history and current state of this conflicted site. The paper then tries to address the need to provide useful interpretation to this site after looking at the facts and existing interpretations in various forms. Finally, suggestions have been made for the approach and content guidelines of this interpretation. The purpose achieved through the interpretation would be to encourage understanding, peace and acceptance among the visitors. This will be done while keeping in mind interpretation principles provided by scholars.

1.1 Background

The Babri Mosque was built in 1528, in Sharqi architecture style, by the Mughal emperor Babur (Bernbeck and Pollock 1996). Graham Pickford, architect to Lord William Bentinck (1828–1833) observed and quotes, "A whisper from the Babri Masjid Mihrab could be heard clearly at the other end, 200 feet [60 m] away and through the length and breadth of the central court". The mosque's acoustics

were mentioned by him in his book, Historic Structures of Oudhe, where he adds "for a 16th century building the deployment and projection of voice from
the pulpit is considerably advanced, the unique deployment of sound in this structure will astonish the visitor".
Some Hindu groups assert that the mosque had been constructed on the spot where a Hindu temple had stood. They justified their discontent by claiming that it had not been just any Hindu temple, but one that was the birthplace of Rama, a mythological king who was the reincarnation of one of the main Hindu gods, Vishnu. As per this rendition of events, Babur was seen responsible to erect his mosque after destroying the temple. (Bernbeck and Pollock 1996). Shortly after independence from Britain, in 1949, the mosque was ritually cleaned and asserted ownership as a Hindu temple (Rao 1994: 156). Although, very shortly it was closed and remained shut until 1986, when a judge ordered it open for Hindu worship. This provoked protests by Muslim groups.

1.2 Current Status

Friedland and Hecht (1991) in a research on The bodies of nations: a comparative study of religious violence in Jerusalem and Ayodhya, state that all groups identify places that are sacred. These sites are usually very emotionally charged, treasured, and defended as symbolic landscapes more evidently so, when they face situations that are seen as threats to the group itself (Ross 2008). Following further conflict between the two sides in the Ayodhya conflict, in an attempt to reach a negotiated settlement, the national government brought them together in 1990. Bernbeck and Pollock (1996) recall the discussion being centred and focussed around two primary questions: Had Babur indeed destroyed a Hindu temple in Ayodhya, and, if so, had he built his mosque on the same spot? However, the negotiations led nowhere and in December 1992 Hindu militants stormed the mosque, leaving it in ruins. The day after the destruction, the then prime minister of India, Narasimha Rao, promised that the mosque would be rebuilt, a promise which he repeated in August 1993. To date, this has not happened. In 1993 the case was referred to the Indian Supreme Court. The court refused to rule on it and returned the case to the government.
Khan (2015), reported that sixty years after the matter first went into litigation, a Special Full Bench of the High Court of Allahabad has ruled that the disputed land shall be divided into
three parts. A two-thirds portion is to be shared by two Hindu plaintiffs and one-third will be given to the Sunni Muslim Waqf Board. As it is a 2-1 majority verdict, plaintiffs representing Lord Ram, the Nirmohi Akhara and the Waqf Board were declared joint title-holders of the property. Hence, the management is assumed to be communal or shared. Although, in such a fragile site, administered by extremists, it is hard to imagine how that shall be achieved. Khan informs that the court cited faith as the basis to declare the site the janmasthan (birthplace) of Lord Ram, but ordered a three-way partition on the basis of historical use of the site by Muslims and Hindus.

2. INTERPRETATION OF CONTESTATION

Tilden(1977) reinforces, "The chief aim of Interpretation is not instruction, but provocation", hence an appropriate interpretation is expected to be one where the past is acknowledged, peace is promoted for the present and acceptance is achieved in the future. Through familiar and emotionally salient expressions, connections within a community are created, strengthened, and differentiated from out-groups. What is particularly important here is how convincing the imagined community becomes for people when they see themselves at risk (Bowen 2007). This influences and brings a wide difference in the interpretation that visitors with differing beliefs expect from such a site.

2.1 Relationship between Visitor and Interpretation

From all this, Ross (2008) makes the following hypotheses; First, contestation disputes are most intense when the participants' core identities are threatened. The second is that cultural expression itself does not cause intense conflict but rather whether or not conflict occurs depends upon how particular cultural acts

are perceived and then interpreted. Visitors rely on archeologists for the factual knowledge provided in the interpretation. As engaged members of society, archaeologists must find ways to argue against the use of the past for racist, sexist, and other oppressive purposes. It will not be false to state that the archeological results were conflicting and volatile. The mindless destruction made future excavations more difficult.

The use of the past to build present identities often involves the ideological manipulation of time. Kus (1989) has drawn attention to this in her discussion of the historian Delivre's concepts of ascending and descending anachronisms. In case of Ayodhya, Bernbeck and Pollock (1996) show how there are both; an ascending anachronism where this event is pushed farther back in time conferring legitimacy upon it in the present, by demonstrating that it has an ancient precedent, and a descending anachronisms, where they have brought this event forward in time allowing people in the present to claim particular innovations as their own. Hence, through ascending and descending anachronisms they have created a history in which events moved around in time in order to serve the interests of particular groups in the present. As valid as the concept may seem, all these stories must be interpreted sensitively in order to chronologically explain the events from a secular point of view while providing accurate knowledge that engages the visitors of all interests.

2.2 Existing Interpretation

Looking at the existing interpretations, Radhakrishnan (2002), in his article Ayodhya Issue and Freedom of Expression says that he finds it appalling that there has hardly been any reaction or response from the media to the order of the Lucknow Bench of the Allahabad High Court against the publication of news reports and comments on the Ayodhya issue by the print and electronic media. This led to a loss of information, the reporting of which would be used as the basis of future understanding and interpretation of the site. He made some utilitarian observations and points out the main concerns of an act like this: a fledgling democracy like India will neither be able to survive nor materialise completely devoid of constructive democratic action. Thus, a complete ban, even for just one issues, on the media will amount to depriving the people of the nation of the vital contribution media had on uncovering the issue to its full capacity in its aftermath.

Other types of interpretation include movies, short films, podcasts, etc. that are widely available, though not officially published in many instances, which address boldly the darker side of the events and its impacts. This includes Ayodhya Gatha (2007) a film by Vani Subramanian in which she "Ayodhya Gatha weaves together a tapestry of perspectives about how the politics
of hate affects personal, everyday lives." Another notable podcast is 'The Road from Ayodhya: Muslim Inclusion in a New India' where Basharat Peer(2010) discusses his visit to the city of Ayodhya and through a series of interviews he conducted in Muslim neighbourhoods in New Delhi and several other cities, Peer looks at the ways India's Muslim population, have been trying to find their place at a time of rapid economic growth and lingering sectarian tensions.

2.3 Necessity of "Good" Interpretation

There is a notable increase in audience to this type of coverage of the issue and is increasing with active participation from generation Y. This brings up the concept of 'dark tourism' that came up as an emotive label when Foley and Lennon (1996) first introduced the term and eventually attributed it to the title of their book: 'Dark Tourism: The Attraction of Death and Disaster' (Lennon & Foley, 2000). And in the case of Ayodhya, both sides are expected to principally preach peace, but a good percentage of visitors would want the dark heritage linked to the site to be addressed in the interpretation on site. According to Stone's (2006) dark tourism spectrum framework, Ayodhya falls on a range in the shades, from the lightest where the site is associated with death and suffering, to the darkest as the site of death and suffering. The shades depend on a number of factors, in case Ayodhya being: the educational orientation of the site, its central purposes being both heritage and historic, perceived locational authenticity and it's time scale from original event (longer–shorter). Magee and Gilmore (2015) state that the motivation for visits to a dark site defines its demand perspective. The integrated supply–demand perspective is a useful

one in the study of management challenges at dark tourism sites as it allows more emphasis on the critical investigation of dark tourism management and focuses on visitors' interactions with sites. They speak about the growing awareness by site management to address all three- visitors with personal meaning of the site and not leisure, ones who visit for leisure and visitors seeking knowledge or 'ambivalent' tourists (Biran et al. 2011).

Although, through research Magee and Gilmore (2015) also found out that site managers did not want the term 'dark' heritage being associated with the sites. They stress on the fact that sites should not only present an accurate historical narrative but should also address profound moral questions. Therefore, for Ayodhya, the interpretation should clearly and accurately answer

questions such as- why the events occurred in the first place, and how the deaths of approximately 2000 humans could occur in the midst of civilian society. Once, people are provoked to think about such issues, the interpretation should provide a servicescape where visitors can interact and engage, thus enhancing their knowledge and understanding. Magee and Gilmore (2015) validate that a blend of cognition(learning, understanding, meaning) and emotion (empathy, disbelief, self-reflection) could create an unexpected meaning for an individual and eventually contribute to the wider context of societal meaning over time.

3. CONCLUSION

Their study has demonstrated that transformative experiences can germinate in sensitive heritage sites. These sites allow reconceptualising of the events and stops visitors from perceiving them as a quotidian site offering limited exchange to a cathartic experience of mutual understanding and respect insisting sensitively that peaceful resolve is achievable. They add, however, that the overall message that visitors take away with them is that empathy, respect and humility are core principles as human beings (Magee and Gilmore 2015). In case of Ayodhya, achieving this by bringing out the message through the site will give room to peaceful conclusion to an ugly time than a zone where the resolve is seen as a compromise and the bitterness pertains.

To conclude, all the above points covered can be related to five of Tilden's(1957) principles of interpretation. First of all, the interpretation should show relation to the site to something within the personality or experience of the visitor. This would also mean, as pointed out earlier, that the interpretation cannot be biased to one of the two sides, and should be relatable to someone who does not confine to either of the two sides. Secondly, he points out that information, as such, is not Interpretation. Hence, the interpretation on site should be a revelation based upon the acquired information. In this case, the suggested revelation would be to learn from past and find peace and acceptance in the present. Thirdly, he feels that the chief aim of interpretation is not instruction, but provocation. In case of Ayodhya too, the interpretation is expected to make visitors think of the question to which violence was seen as an answer. Four, Tilden says that "interpretation should aim to present a whole rather than a part, and must

address itself to the whole rather than any phase." This has been reflected while speaking about the decision to divide the site between both parties. The division of the site maybe done to assign possession rights, but the interpretation must be collective. Without a common panel, the heritage of the site cannot be justified, at least it will not be an honest or holistic reflection of the stories attached to it. And finally he says, "interpretation is an art, which combines many arts, whether the materials presented are scientific, historical or architectural." To do justice to this careful measures must be taken to cover all these aspects in the panel, while taking care that it doesn't get mundane by using different ways to encourage visitors to engage with it.

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The Study Of Decorative Woodwork In Maratha Architecture And Its Conservation Practices

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ABSTRACT

This paper discusses about the use of wood and various artworks created and used for different building typologies by Marathas in their period and its conservation process.
In Maratha period 1650A.D.-1850AD they developed various typologies like Forts, temples, Palaces, Wadas and residences of Maratha Sardars. Material used for the construction were bricks, stones and wood.
Marathas excelled in fort architecture. The wood work they used to decorate their palaces and other civil buildings was intricate and minute. Maratha art could have developed and attained a distinctive character but it was not possible because of the turbulent times.
In Peshwa period detailed documentation of any construction work was not recorded in a consolidated manner. The study has been done on the actual site visits and documented the decorative woodwork of Wadas, residences and temples in and near Pune.
Timber has excellent structural and aesthetic properties along with being an energy efficient and renewable resource. In recent times the old system of craft training has been destroyed and new materials and techniques have been introduced at an ever increasing speed.
Traditional timber architecture forms a repository of the insight, wisdom and knowledge of the previous generations about nature. The timberwork not only traces the history of design and construction of timber buildings, but also craftsmen's understanding of the logic and nature of the wood as a building material, whose reliability and durability has been proved over centuries.

Keywords: 'Maratha Period, decorative woodwork, wadas, traditional timber architecture'

1. INTRODUCTION

Maratha architecture is famous for construction of Wadas and excelled in fort Architecture. Maratha architecture lacked the aesthetics and grace of Mughal Architecture. The woodwork they used to decorate their Wadas and other mansions was intricate and minute and had a impact of Gujarat and Rajasthan style of Architecture.
Maratha architecture has been studied here not only as a manifestation of the artistic genius of a people, but also a faithful reflection of the cultural life of the people concerned. One as to keep in mind that the art of the mason is employed primarily to fulfill certain social needs. These are numerous and ever changing and the mason respond to them with various means and methods, systems and techniques that gives us a true insight into their lives. The study of Architecture as a manifestation of culture of a people can be complete only if both these aspects are studied.
As in 18th century, in the Peshwa reign, no such huge constructions were done like Mughals. Majority of the buildings were either temples or mansions and of moderate scaled. The various typologies developed were forts, Palaces, Wadas and temples. .(M.S.Mate 2002)
Wada architecture evolved under the reign of Peshwas. It was residence of Peshwas and Sardars and best example of traditional residential form from Maratha Period. A wada was typically a large building with two or more stories with courtyards and group of rooms arranged around it. Its style was an

amalgamation where features from Mughal, Rajasthan and Gujrat architecture were combined with local construction techniques. The houses of the Maratha period built with the system of quadrangles, beam, bracket and timber construction. Decorative features were carved brackets, cypress pillars and foliated arches that are the characteristic of Maratha work. The Maratha buildings were constructed largely out of wood. In all buildings best kind of timber was used. Even if it was used, without proper care, that is, does not last long. (Samita Gupta and Jaymala Diddee,(2000),Due to many reasons like poverty, flood and liquidation many mansions were deserted and slowly and gradually the wood work deteriorated. Very few structures from Maratha period in the form of residences, wadas and public buildings are still standing today. Some of the Famous Wadas in Maratha period Shaniwar wada,Vishram bagh wada,Bhor Rajwada and many more.

2. IMPACT OF STYLE

Around 1730 A.D. use of decorative woodwork had started in Maratha structures were the impact of Gujrat style of Architecture and many craftsmen from Gujarat shifted to Maharashtra. In Nasik city decorative woodwork was more intricate. The use of the arch was kept to the minimum and, where used, followed the Deccan style. Forts were naturally the most common feature of the earlier period.(M.S.Mate 2002) Wadas represent elements of the Delhi style and elements of Hindu style in its existing facade. On Maratha style there was a major impact of Mughal and Bijapur style of Architecture.

3. MATERIAL USED

It is found that brick was the main element of the Peshwa buildings instead of stone and were used almost in every part of the construction. Only the foundation and plinth were built in stones but the entire superstructure was built in bricks and timber. Even the bricks were seen used as a filler material in the wooden flooring. So, timber was used as a main reinforcement material in Peshwa period.
Timber was locally available, easy to transport and cut in various shapes as per need as compared to stones. Moreover, in the total work quantum, the contribution of timber was about 60%. Posts, beams, ceilings, brackets, roofing and doors and windows, for all these elements timber sections were used.
Generally the teak wood has been referred in the contemporary documents as 'Sagwan' and the wood other than teak has been reflected as 'Rayval'.
Natural thin round sections of wood were referred as 'Vase'. Thick planks were referred as 'Falya' and thin planks were referred as 'Takhte'.
Maratha style from later buildings such as forts, palaces and temples. Bricks, Stones , lime mortar and timber were the materials used for construction. Besides other apartments, the palaces contained Darbar halls and Ranga and Chitra mandirs. (Dr.Avinash Sowani, (1995),
Traditional timber architecture forms a repository of the insight, wisdom and knowledge of the previous generations about nature, Imbued with message from the past, it preserves not only the traces of the history of design and construction of timber buildings, but also the craftsmen's understanding of the logic and nature of wood s a building material, whose reliability and durability has been proved over centuries.

3.1. Construction techniques

- In Peshwa period , above the stone plinths , brick walls were erected between wooden frames.
- Masonry work was erected around a framework of timber. Wooden columns and beams formed the pivots of all construction. Wooden rafters were inserted in the walls to prevent any vertical cracks.

3.2. Advantages of using timber

- Wood being the most valuable and the healthiest resources in the world has to be preserved to its fullest extent

- Many varieties of timber have beautiful surface patterns, with infinite variations in grain, texture and color.
- Timber is lightweight material that is easy to cut, shape and join with nails, screws, bolts etc. which requires the simplest kind of tools. The traditional joints produces strong joints.
- Timber has favorable weight to strength and weight to modules of elasticity ratio, which makes it usable as a structural material.
- The resistance of timber to damage by fire varies depending on the size of timber and the sort of wood from which it was cut. Timber burns only at temperatures of about 350 degree Celsius.
- In case of possibility of an attack, timber can be made to last by applying fungicides and insecticides.

4. A CASE STUDY OF BHOR RAJWADA

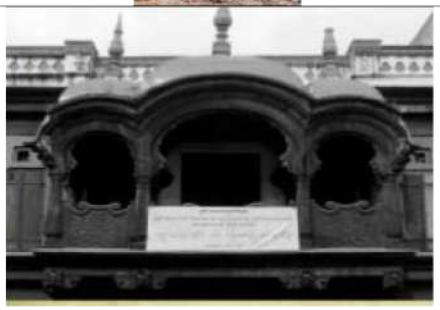
Wada at bhor is one of the best example of Maratha style of architecture selected as a casestudy.The Wada at Bhor is a beautiful Maharashtrian vernacular courtyard wada house situated on the banks of the river Neera. It was built in the year 1869 by the then Pantsachiv Shrimant Chimnajirao alias Nanasaheb, successor of Shankaraji Narayan, after the pre- existing Wada caught fire and was completely destroyed. The previous Wada was a double courtyard house of which only the plinth stood the fire. Later two more courtyards were added and a gigantic four courtyard house was built in response to the multifunctional use of the Wada. Shrimant Chimanji approached the British government for an immediate loan of 2 lakhs which was utilized for erecting the Wada. The

Wada thus erected in the late 19th century shows elements influenced by the then introduced British styles and the legendary vernacular Wada style.
Wood is extensively used in Bhor rajwada for various structural components as well as for decorative purposes.
Structural woodwork - Pillers, Beams, Staircase, Trusses, Door and Windows.

DECORATIVE WOODWOK ELEMENTS

Brackets, Jali,, Window Railings, Decorative pillars, Doors and windows, Arches, Pendents ,false ceiling ,Megdambri (Narrow Balcony facing the road).

Sr.No.	Decorative Wood work Elements	Images
1.	**Brackets,** Brackets are structurally design to give support the horizontal members like beam and balconies. Brackets are light and heavy brackets. Heavy brackets are richly carved with the ornamentation of flowers, eaves and bird figures like parrots or peacocks.	
2.	**Peshwa arch and mahirap** Mahirapdwar means a window having a wooden Mahirap or decorative arch (kaman) fixed in it. This Mahirap placed in between two Cyprus shaped pillars in Diwankhana.	
4	**Jali** Decorative wooden jali work was used for windows.	

5	**Railings** Peshwa style window has wooden railing till up to 1/3rd height of window Rails with intricate carvings in wood are fixed with tenon and mortice joint in wooden frame	
7	**Decorative pillars with Column base and capital** **W**ooden pillars and beams were used for all residential structures. The pillars were of two types. They were either Cyprus shaped or were plain square shafts. In room and halls, where special decorative effects were desired, the Cyprus pillar and cusped arch were used. For all other places and purposes square shafts were used. The ornamentation with parrot motifs and acanthus leaves shows Hindu, Persian and Greek inputs. The column exhibits proportions of Greek Ionic order with its height being ten times its lower diameter.	
8	**Devali** Decorative Devalis on the walls near the entrance used to keep Diyas decorated with arches and floral motifs.	
9	**Meghadambri** Meghadambri is a narrow balcony entirely made from wood near the entrance. The typical gesture of a Hindu house of having intricately detailed projecting balconies marks its origin in the Islamic era where it emerged due to the many confinements on women. These balconies are supported either on brackets or on girder extensions and are perfect examples of several styles co-existing in perfect harmony. The bizarre combinations of *jalis* and stained glass or the roundels within the cusped arch relief reflect influence of different styles.	
10	**Pendents** Decorative wooden pendants were hung in the corner where the two rafters covering the main beams met at right angles in the main quadrangles. Series of spherical motifs of diminishing size ending in a conical pendent	

Now a days because of use of RCC and deforestation, use of woodwork is tremendously reduced and because of scarcity of wood in today's context the use of metals is increased.

CAUSES OF TIMBER DECAY

Timber is affected by destructive elements viz. weathering, chemical attack, fungi, insects and fire. Timber does not deteriorate by natural, physical or chemical changes or by pure ageing. The decay due to weathering and discoloration on the timber members due to the effect of chemicals in the atmosphere which combine with rain are also visible in the extant temples. The causes of timber decay are described as follows

Fungi depend on living or dead part of plant and animal for their food. The food required by the fungi is got from the wood substance itself but there are only a few fungi which attack all kinds of wood probably because of the dissimilarities in the chemical composition of different woods. The initial decay of wood also causes loss of strength accompanied by color change.

Carpenter bees are usually found flying under the eaves of buildings not exposed to sunlight. These bees are usually found hovering under the eaves of the buildings and drilling holes on unpainted surfaces. They cause great destruction to the timber members which affect the structural system.
The timber in which bees are found active is located and the preservative is applied by injection into the hole directly and the holes have to be plugged or filled.

Termites are social insects living in large colonies and they are classified into two main Groups such as ground dwelling (subterranean) termites and dry wood termites. Termites require a constant supply of moisture for their existence and enter in the wood from ground. They can severely damage timbers in contact with the ground and may extend attack to the roof timbers of high buildings by travelling through cracks in cement or brick work or create build Runways over the different materials.

Weathering Any unprotected wood exposed to alternate wetting and rapid drying will soon suffer deterioration at the affected surfaces, which swell and shrink in response to moisture Changes and develop case hardening, checking, and lifting of the grain. (Binumol Tom, (2007)

CURRENT CONSERVATION PRACTICES

Epoxy grouting is used to fill the cracks and holes which is efficient method, In today's context various chemicals are used for polishing of woodwork which is harmful and not eco friendly material. Many traditional eco friendly methods were in practice in the early days but many of these methods are presently not in use and are unknown to the present generation

TRADITIONAL PRESERVATION TECHNIQUES OF TIMBER

The oil traditionally used for preserving timber is known as 'Octad'. It is prepared from locally available herbs, waxes, rhizomes and roots. This preservative have a pungent smell, which keeps away organisms that cause the bio-deterioration of wood.
Different types of herbs are mixed together and add in a boiling oil and it is allowed to cool and applied on a timber component or pieces before assembling. Important timber components are immersed in this oil for many hours for better performance.
Special care should be taken from hewing, cutting into logs, seasoning, shaping the components and finishing the work. Craftsman must have knowledge of style of traditional timber construction. When humidity and temperature changes, shapes of wooden component also change to some extent. So, study of this components or natural balance between all the components must be important.
While preserving timber , preservative should be environment friendly, now a days, modern methods are harmful for environment, so the study of traditional preservation methods are very important.
Linseed oil can also be used as a preservative. 10% of linseed oil when diluted with

90% of organic solvent like methanol when applied to wood. (Binumol Tom, (2007),

Cashew Nut Oil is very poisonous and was found to be very effective as fungicide in preventing

Cashew Nut Oil and Copper, Copper was incorporated into Cashew nut shell liquid (CNSL) and proved to be an eco friendly preservative against fungi and termites wood decay

Copper and Neem Seed Oil

Copper was incorporated into Neem seed oil (contains Azadirachtin) was also proved to be an eco-friendly preservative against fungi and termites (Venmalar, 2005). Neem (Azadirachta indica) is popularly known as village pharmacy, as all parts of this plant are used for several types of diseases since centuries

Lampblack is also used to polish the timber which is one of the type of traditional conservation technique.

Lemon Grass Oil

The main chemical components of lemon grass oil are myrcene, citronellal, Geranyl acetate, nerol, geraniol, neral and traces of limonene and citral. It is used as a good preservative against insect attack. The therapeutic properties of lemongrass oil are antimicrobial, antiseptic, bactericidal, carminative, deodorant, diuretic, febrifuge, fungicidal, insecticidal, nerving, nervous system sedative and tonic
Timber even though has number of strengths, also has its weakness in terms of durability which could be questioned. The vulnerability to decay due to the destructive agents viz: fungi, insects, weathering and fire are major drawback seen in timber. The traditional methods are found to be more eco-friendly and effective. The traditional preservative which was used for centuries and proved effective

CONCLUSION

There is an increasing need and awareness about the diminishing art of Decorative woodwork which was the glory in Martha architecture is disappearing slowly. It is necessary to implement and discovered traditional techniques of conservation of Decorative woodwork because new practices of conservation and use of chemicals for polishing are harmful for the woodwork. It is important to understand the carpentry skill as one of the art form and develop awareness and transfer this skillful art to the younger generation. Documentation and conservation of various structures located in different parts of Maharashtra in which very few artwork elements are in good condition could be protected by using appropriate traditional conservation methods. Now it is the time to conserve the structural and decorative wood work which is exist today from Maratha period and understand the skill of carpentry and artwork and save this valuable tangible heritage for the future generation.

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Traditional Form Interpreted By New Technique

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ABSTRACT

Forms of a building play a very significant role, since it speaks itself about the structure, its history and also about the various stages of development of mankind. Since "to learn something new, refer history" is a very correct notion which gives an idea to create something new, moreover, historical monuments are such forms which when incorporated with new techniques, itself increases the complete value of a structure representing it as a "landmark" and also adding it to the emotional values of respective tradition and culture.

Hence, adopting traditional forms with new technical world helps keep the history alive for the next generations to come, as "history can never be explained completely in script form." This paper focus on Traditional form and their interpretation by new technology.

Keywords: Forms, Traditional forms, Evolution of New technologies, implication of new form in modern era.

1. INTRODUCTION:

The word **tradition** comes from the Latin word "***traditio***" which means "to hand down" or "to hand over". A tradition is a story or a custom that is memorized and passed down from generation to generation, originally without the need for a writing system.

FORM…WHAT IS FORM???

It is the shape given to the architectural feature in the building. There are various forms such as Square, rectangle, triangle, circular which have definite proportion. Forms are much pleasing to human eyes because of proportion like **EQUILATERAL TRIANGLE** is a form of good proportion.

According to the structural appearance, the human perceptions to various forms are like…

- Pyramidal, rectangular, square forms represent stability, firmness and power.
- Curved forms represent more of softness, delicacy and elegance.

A skillful combination of these forms gives a definite shape and character to a structure.

What Are Traditional Forms???

Traditional forms are thus those forms created by mankind at an early stage of development of dwellings, therefore, beginning with the most primitive for the rock-cut caves. Hence, this led to the **THE BEGINNING OF ARCHITECTURE….**

HISTORY OF ARCHITECTURE

If we peep into history, mankind came across three ages, among which the most primitive was the

- Stone age (featuring on stone as the basic material)
- The Egyptian style (most primitive one),
- The West-Asiatic style,
- The Greek style ,
- The roman style and so on…

Architecture may be best understood in terms of two basic aspects: basis of "organization of spaces" and "forms."

FEATURES AND FORMS OF THE PAST…

Some of the forms have created such remarkable effects in history that one gets highly inspired. Introducing some of those according to the history of civilization is…

i.CAVES:The most distinct primitive Form where man stared with his living

ii. TENT: Next step to development…Building up of huts from the reeds and tents from barks, skin of animals With This, Regional Development Came Into Scene, And Then The Beginning Of Civilizations.

iii. MASTABAS:The idea of Egyptian Style Mastabas a rectangular flat roof, with sloping sides. A form used as a tomb.

iv. PYRAMID : The idea of Egyptian Style Pyramids the finest and geometrically pure form, sloping sides concentrated to the top.

v. SPHINX: The idea of Egyptian Style. Sphinx…a colossal monster carved out of a single rock in front of the temple with some mythical beliefs of that time.

vi. ZIGGURATS:The most outstanding Feature of West-Asiatic style artificial mountains made out of clay

vii. ARCHES: A stupendous element found in all civilizations. One of the important form developed at a very early age. Made out of materials like Stone, bricks Gained importance in period of roman style, gothic style, mughal style

viii. DOMES: Another excellent form of all times.Domes.another important form Developed at a very early age, but was recognized later in Mughal style and then, the Byzantine style of architecture.
All the styles developed its own identity. A basic form of understanding was developed among mankind and surrounding…so he can earn his own living. Then, why and how new techniques came into scene And. What is its significance today and in future?

2. EVOLUTION OF NEW TECHNOLOGIES

Population started increasing enormously, with this came the industrial revolution…needs and demands where at its peak …and the old tradition could not meet the demands of population, so large…hence, a revival was necessary.
Architecture is stifled by custom. Marxist Hannes Meyer once said, “Each age demand its new form. It is our mission to give the new world a new shape with the means of today.”
This is what the case, in architectural world is. Hence the revival of new forms, new techniques to create new style out of the traditional forms.

2.1. TRADITIONAL FORM AND THEIR INTERPRETATION BY NEW TECHNIQUE

I.CAVES: CAVES were the first traditional form created in history. Slowly and steadily this form under several undulations, generation after generation, with consequent inventions (technically as well as material wise) got transformed according to the needs and likings of mankind.
The basic shape of these caves altered to what is called THE EARTH BERM STRUCTURES.
Caves in technical era

A) PALIKA BAZAAR…

Type : UNDERGROUND SHOPPING AREA
Site : CANNAUGHT PLACE, NEW DELHI.
Year of const. 1970s-1980s
Purpose It is an underground, air-conditioned market hosting 390 shops. A form looks like a dome from outside with seven gates, but is actually an underground structure with cave-like Features.

Fig 1: UNDERGROUND SHOPPING AREA, CANNAUGHT PLACE, NEW DELHI

II.TENTS: The earliest forms of dwelling of hunters were the rock-cut caves later on he learnt to build huts of reeds and then tents made out of naturally available materials like barks, skin of animals. Hence, this way man started earning his own living learning from the surrounding and using the naturally available materials for his comfortable livelihood. These inventions made man get exposed to materials available in the surrounding and incorporating those for more comfortable living.
Tents in technical era

B) STADIUM
Architect: GUNTER BEHNISCH & FREI OTTO
Type : STADIUM
Site : MUNICH, GERMANY
Year of const.: 1968-1972
Project: Translucent tent roof for the sports building to ensure natural lighting it is described as a hillock instead of a building in its aesthetic form, "roof without shelter."

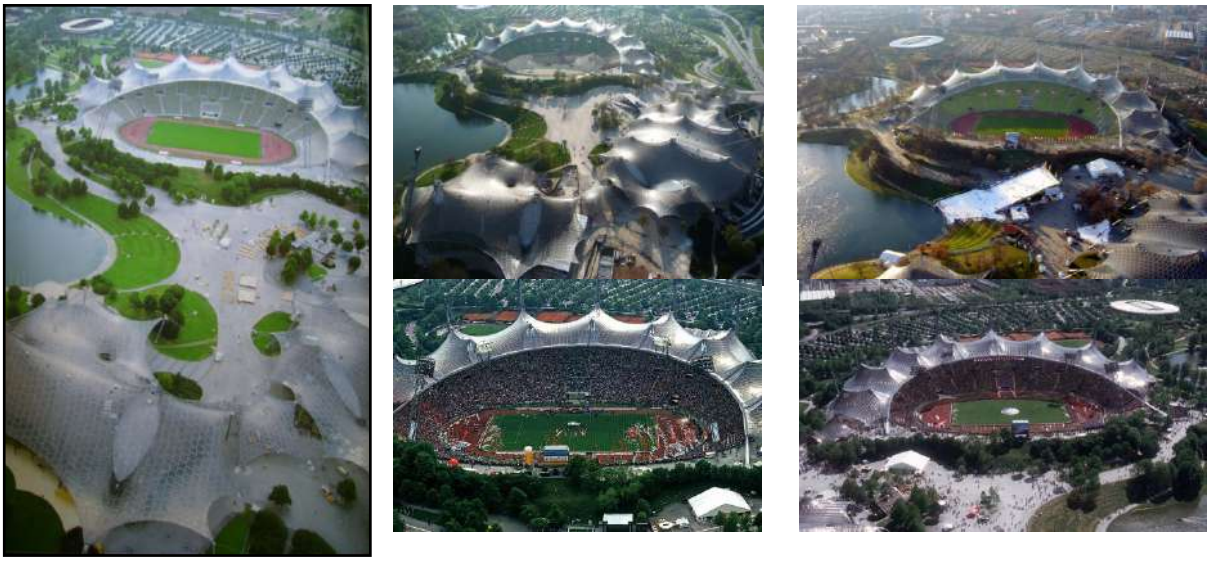

Fig 2: GUNTER BEHNISCH & FREI OTTO STADIUM, MUNICH, GERMANY

III.PYRAMIDS: Pyramid a form symmetric from all sides with four equilateral triangular facades. This form is the most popular in today's technical world… since a completely symmetric form which gives a feeling of asymmetry, dynamism and one tends to get attracted towards the tip…which has its own significance in history. As the name itself speaks are actually Egyptian tombs built for the Pharaohs. The earliest form

developed where the Mastabas, then came the Stepped Pyramid and the next were The Pyramids made out of the chief material Limestone and of Granite for the Kings.

Pyramid in technical era

A) Louvre Museum

Architect : I.M.PEI
Type : LOUVRE MUSEUM
Site : PARIS
Year of const. : 1986-7
Purpose : This glass Pyramid completely made out of Opt white glass is the main entrance for an Underground Museum. The glass pyramid is surrounded by water all around creating an ambience.

Fig 3: I.M.PEI, LOUVRE MUSEUM, PARIS

Mastabas in technical era

Architect : RAJ REWAL
Type : HALL OF NATION AND HALL OF INDUSTRIES
Site : NEW DELHI
Year of const: 1970
Purpose: Since the client was in need of a large uninterrupted space, space frame was the solution. The truncated form or mastaba form was adopted, in order to avoid unnecessary construction.

Fig 4: RAJ REWAL, HALL OF NATION AND HALL OF INDUSTRIES, NEW DELHI

Sphinx in technical era

"Newness is everything in commercial arena and instant sensation rules the reality" was the basic theme of designing of the Resort.

Architect : VELDON SIMPSON
Type : LUXOR RESORT
Site : LAS VEGAS Year of const : 1993
Project : The cartoon like Sphinx in front of the Glass Sided Pyramid at the resort.

Fig 5: VELDON SIMPSON, LUXOR RESORT, LAS VEGAS

Architect : DAR-AL-HANDASSAH
Type : FOUR SEASON HOTEL
Site : DAMASCUS
Purpose: A simple, limestone-clad structure that rises like Ziggurats style over the Tekkiya Suleymaniya It is contrast to the brutalist hotels of 1960s.

Fig 6: DAR-AL-HANDASSAH, FOUR SEASON HOTEL, DAMASCUS

IV. DOMES:
DOMES…form which have a very significant role. Similar to the arches, domes where also introduced at a very early stage that is, during the West-Asiatic style, but came into focus to the world basically in Mughal style and Byzantine style of architecture. With consequent development in styles from the late centuries to the present, lot of changes have took place both technically as well as material-wise, hence new vision of architecture and an interest to explore more out of these.
Architect : SHOBHNA BUILDERS
Type : MULTIPLEX
Site : INFOSYS, MYSORE, INDIA
Project :
The shape evolved from a dome A multiplex complet activity spaces like balling, swimming pool, disco, pubs toge not open for all, but only for the students of Infosys, Mysore.
Arches are one of the important traditional forms wh t from the West-Asiatic civilization to Gothic style of architec r its marvelous use in Roman style, Mughal Style and the

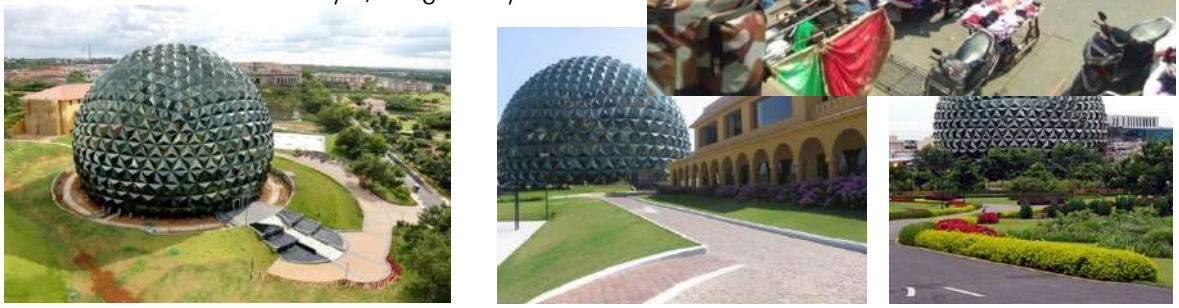

Fig 7: SHOBHNA BUILDERS, MULTIPLEX, INFOSYS, MYSORE, INDIA

V. ARCHES:
In history arches were basically made out of stones and brick and which were either semi-circular or pointed arches. But, with the growth of new technologies and materials arches now play a great role in aesthetics.
With the evolution of new technology, new materials, arches are now used for enormous purposes like…
Architect : SANTIAGO CALATRAVA
Type : SIGNATURE BRIDGE
Site : TRINITY RIVER, DOWNTOWN

Project : The bridge is named as MARGARET HUNT HILL BRIDGE.
The bridge features a parabolic arch reminiscent of Euro Saarinen's Gateway arch in Saint Louis from which gables would descend in a grand spider web form.
The bridge is predicted to be the
"The Eiffel Tower of Dallas." and hence, create an image of the city.

Fig 7: SANTIAGO CALATRAVA, SIGNATURE BRIDGE, TRINITY RIVER, DOWNTOWN

3. CONCLUSION

"Architecture is a learned game, correct and magnificent, of forms assembled in light" said by Le Corbusier.

- Forms of a building play a very significant role, since it speaks itself about the structure, its history and also about the various stages of development of mankind.
- Since "to learn something new, refer history" is a very correct notion which gives an idea to create something new, moreover, historical monuments are such forms which when incorporated with new techniques, itself increases the complete value of a structure representing it as a "landmark" and also adding it to the emotional values of respective tradition and culture.
- Hence, adopting traditional forms with new technical world helps keep the history alive for the next generations to come, as"history can never be explained completely in script form."

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Cultural Urban Forests: For Conservation of Culture

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ABSTRACT

This paper is aiming to study evolution of forest as per chronological order of Indian landscape and Hindu scripts for , deriving guidelines to design Cultural Urban Forest. Objectives of this study are to study chronological order of Indian forest landscapes, to study issues and impacts of deforestation in past, to study Hindu scripts for , understanding concepts of ecology, environment and city planning, to study actions taken against forests during British rule to post independent era and their impacts on forests. Methodology would be conducted through literature review of evolution of forest from agni purana (4000 years ago) to post independent era. Term Cultural forest would also help to revive different terminologies like cultural landscapes , sacred forests and groves, sacred corridors & variety of ethno forestry, monastery forest, sacred trees, biodiversity, environmental, ecology, mass plantation which were coined by our ancestors and incorporated it in city planning. By reviving and implementing all our ancestors concepts of landscape city planning and its correlation with surrounding landscapes could make the cities culturally rich . Indirectly the study would throw light on conservation and enhancement of cultural native species, culture and can rebuilt neighborhood relationships which is been lost now days.

KEYWORDS: Forest, Context, Culture, Chronological order , India, Conservation

1. INTRODUCTION TO THE TOPIC

Tangibly and intangibly, forests feature in all aspects of culture: language, history, art, religion, medicine, politics, and even social structure itself. Forests provide the venue for religious, social, and healing ceremonies. Urban forest is either as a forest within the city or a forest upon which a city relies. These city greens acts as an ecosystem, including not just trees, but their dynamic relationships and interactions with factors biotic and a biotic. Cultural urban Forest could be important element in development of cities for making them culturally rich in terms of culture, ecology, environment.

1.1 SCOPE:

Forests feature in all aspects of culture: language, history, art, religion, medicine, politics, and even social structure.

1.2 LIMITATIONS:

Study is limited to Indian context and Hindu festivals only.

1.3 NEED OF THE TOPIC:

From anthropological, ethno botanical and linguistic studies it is observed that, along with environmental and ecological values, forests has cultural significance in Indian Culture. (fao.org, n.d.) Term Cultural Urban Forest refers to forests in urban areas having planting policy and activities based on Indian festivals, Culture and rituals. Every seasons has some festivals and their association with nature. Nature also displays a distinctive character in every season which keeps changing landscape characters of the city. Hence, Cultural urban forest would be in fact be a forest of celebrating Nature and Culture along with providing the visitors the knowledge about the association of nature in the form of vegetation and other elements with festivals. It would also create awareness and strengthen the association of man with nature and cluster of trees would provide the venue for religious, social, and healing ceremonies. It's

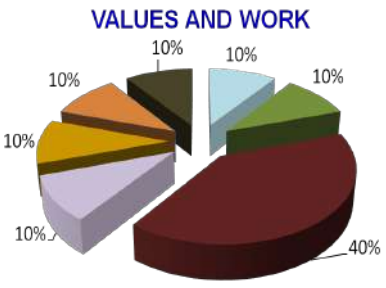
time to rebuilt neighborhood relationships and revival of our culture, through Landscape City Planning by bringing new concepts like CULTURAL URBAN FOREST! Due to westernization we are losing our culture and new generation is unaware of our traditions and culture. Hence developing Cultural Urban Forest areas within city areas will be beneficial for sustaining environment, ecology and conservation of cultural values.

2. OBSERVATIONS AND FINDINGS

2.1 Chronological order of values and work associated with landscapes: (Anon., n.d.)

2.2 FINDINGS:

NO	*Agni purana*	Indus valley	Vedic period - 1200-500 BC				Chandra Gupta Maurya	Ashoka	The Muslim	The Mughals
CHRONOLOGICAL ORDER FOR VALUES AND WORK DONE										
CIVILIZATIONS AS PER ORDER	4000 years ago	3000-2600 BC	Pre Vedic period	Post Vedic period	Manusmruti - Post Vedic period	Caraka-Samhita and Susruta-Samhita	322-185 BC	273-237 BC	1000-1750	1483-1757 A.D
LEGEND	Materialistic Use (Total 10%)	City Planning (Total 10%)	Ecology (Total 40%)	Ecology (Total 40%)	Ecology (Total 40%)	Environment (Total 10%)	Ecology (Total 40%)	Preservation of flora fauna (Total 10%)	Deforestation (Total 10%)	Garden Planning (Total 10%)
	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

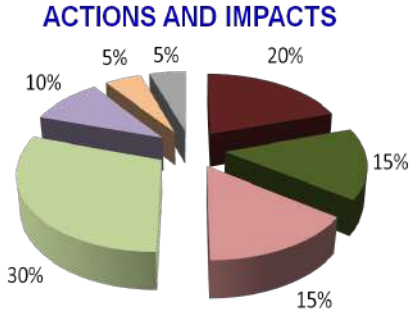


Above chronological study shows that, from Mughal Period Planning, Management And Conservation Of Forest Landscapes got DIMINISHED and trend of Garden Designing and beautification was emerged. Major Contribution in Landscape Planning on Ecological Values (Around 40% from above study) was covered During Pre Vedic period to Chandra Gupta Maurya

2.3Actions taken against forests and their impacts (Shalini Iyengar, n.d.)

2.4 FINDINGS:

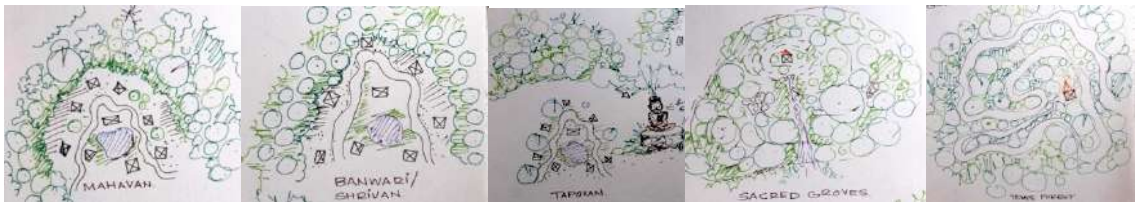
NNO	**British Rule**									**During world war - I**	**Post Independent Era**
	CHRONOLOGICAL ORDER FOR ACTIONS TAKEN										
CHRONOLOGICAL ORDER	11750-1947 A.D	1800	1806	1855	1865 to 1894	From 18th century	Between 1926 and 1947	In the early 1930s	1947	1952	1976
LEGEND	Deforestation (Total 20%)	Deforestation (Total 20%)	Afforastraion Of Monostands (Total 15%)	Afforastraion Of Monostands, Conservation of forest (Total 10%)	Imperial needs/ Revenue Generation (Total 30%)	Techniques for Sustainability of forest (Total 10%)	Imperial needs/ Revenue Generation (Total 30%)	People participation - conservation of wild life. (Total 5%)	Imperial needs/ Revenue generation (Total 20%)	Conservation of forest (Total 15%)	Plans for tribal economy and wildlife reserve (Total 5%)
	10%	10%	10%	5% 5%	10%	5%	10%	5%	10%	10%	5%



In British period large number of forests were cut down (Around 20% from above study) for export of timber. Hence forest areas planted and conserved during Vedic and Indus valley diminished and religious, native species was replaced by monostands of tectona grandice. Major use of forests were for Imperial needs/Revenue generation (Around 30% from above study) from British Rule to Post Independent Era.

3. CONCLUSIONS

1.City Planning and Forest Landscape planning were not separate entities in ancient time, means forest areas were part of city planning itself.
2.Forests were categorized by different activities and use. For example,
i. Mahavan- Forest adjoining to village (Khanna, n.d.)
ii. Banwari/Shrivan- productive Forest, having monostands (Khanna, n.d.)
iii. Tapovan- Forest for religion (Khanna, n.d.)



1.Mahavan **2.Banwari/Shrivan** **3.Tapovan** **4. Sacred Groves** **5. Temple Forest**

3. The concept like Cultural Landscapes , Sacred Forests And Groves, Sacred Corridors & Variety Of Ethno Forestry, Monastery Forest, Sacred Trees, Biodiversity, Environmental, Ecology, Mass Plantation was coined by our ancestors and was incorporated it in city planning.
4. From British era different categories of forests derived by our ancestors got vanished and today also we follow only two categories of forests, those are Reserve Forest and Protected Forest, which is not actually inherent.
5. Britishers destroyed our forests and monoculture, exotic species were planted, which is majorly affected ecology and environment.
6. Tangibly And Intangibly, forests Feature In All Aspects Of Culture: Language, History, Art, Religion, Medicine, Politics, And Even Social Structure Itself.
7. Hence, Holistic Approach Is Needed To Develop Forest Areas And It's Time To Revive And Implement All Our Ancestors Concepts Of City Planning And Its Correlation With Surrounding Landscapes To Make The Cities Culturally Smart And Rich.

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REGIONALISM IN ARCHITECTURE & GLOBALIZATION

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ABSTRACT

When we talk about architecture it is not only about buildings. But it's about the culture, economy, natural & man-made resources, people and it's about the geographical location- Region.
So when we study architecture of various regions at least 100 years before, we can easily understand and observe the impact of regional characters and specialties on architecture like Greek, Roman, Egyptian landmark buildings.
During 1980- 90's 23 developed countries like America, Britain, and Australia took lead for GATT agreement / WTO and almost forced developing countries to accept the same.
They got a huge business market and we got a choice for variety of brands.
That's why in 1980's cars and bikes like Ambassador, Fiat, Rajdoot and Jawa
were traditional brands on Indian roads but today we have brands like BMW, Mercedes and other upscale cars, bikes sharing our roads.
Is it the only side of globalization? Answer is No.
It impacted each & every corner of our life and fields including Architecture.
The focus of this study is to explore the impact of such globalization on Indian architecture, killed the regional touch/ character of architecture in our country and also worldwide.

Keywords: Architecture, Characters, Globalization, Impact, Regionalism.

1. INTRODUCTION: REGIONALISM & GLOBALISATION

An approach to architecture that strives to counter the specific location or region and which has no fascination for International styles called as regionalism in Architecture. This type of architecture also rejects individualism and ornamentation of Post modern Architecture. It is a progressive approach to design that seeks to mediate between the global and the local languages of architecture.

Fig 1: Coliseum at Roma Italy

Fig 2: &FS BKC Mumbai

Vernacular Architecture, which is also called as Architecture without Architects.
It refers to the buildings made by local tradesmen; regional architecture closely follows the developments of vernacular Architecture, but incorporates modern building materials and technologies. The Climate is very important element, which plays a very important role in regionalism.
Regionalism when leads to Critical regionalism, it hold that, both modern and post-modern architecture are "deeply problematic".

The phrase "critical regionalism" was first used by the architectural theorists Alexander Tzonis and Liane Lefaivre and, with a slightly different meaning, by the historian theorist Kenneth Frampton.
Rationality and regionalism in Architecture has been discussed. But the impact of Globalisation on regional Architecture during last 30 years has not been widely studied. This study trying to find out influence of Globalisation on regional architecture in several case studies in India and abroad.
Regionality is a character in the architectural design resulting from the use of the approach or method of regionalism.

2. REGIONAL ARCHITECTURE AND BUILDINGS

Regionalism is also considered as a counter process to Modern or Globalization through which modernism is criticized. A modern expression of regional identity in architecture as also called as critical regionalism

Fig 3: Bunga houses at Kutch, Gujarat

Fig 4: Royal Safari Camp, Surendra nagar

Regionalism in architecture is about the context and customs of making buildings in a particular region. These buildings had to be very performative, relying on specific knowledge of the climate, geology, geography, and topography.
Regionalism- Why are buildings different all over the world? One reason has to do with the availability of building materials, the weather and cultural influences.
Different societies used what they had available and invented ingenious ways to build their accommodations. What they built had to keep them warm in the cold, cool in the heat, and dry in the rain. This may not seem like a challenge, but the techniques employed did so passively, meaning without electricity.
Regionalism in architecture often has a cultural aspect built in, and you can see political structures, family dynamics and societal organization reflected in some buildings. For example, in rural areas of kokan region, houses grow somewhat organically as the family members are added, whereas in tribal parts of Maharashtra-Gujarat border tribal region new structures are built in the community as the family dynamic changes.
Regionalism differs from critical regionalism in that. Critical regionalism was an intellectual construct to counter the modernist and post modernist's lack of identity and disregard of context.

3. GLOBALIZATION:

Developments in transportation, communication and networking technologies in recent decades have instigated unprecedented flow of people, goods, and information across the globe, a phenomenon that has shaped the all-powerful thrust of globalization. This phenomenon led a drive for taking a universal outlook on social, economic, and environmental issues, but at the same time, instigated a wave of criticism. With its tendency to blur the boundaries among nations and cultures, globalization is seen as benevolent and progressive by some, and malevolent and regressive by others.
Though the recent tide of globalization is very strong, it is clear that there is also a countervailing need for regionalism or balanced growth in rural and urban areas. We propose that globalization can only

succeed on the basis of healthy regionalism. It is evident that under strong globalization trends, regional identities did not disappear. On the contrary, they have tenaciously continued to express themselves urbanisitically, architecturally, and behaviorally. This study intends to use this proposition as a point of departure to explore and examine the various issues regarding regionalism, globalization and their impact on the built environment. We should also study:
i.Regional architecture and how it is being (re)defined, interaction(s) between the regional and the global,
ii.The intersection between colonial past and contemporary architectural productions,
iii. The regional dynamics of architectural/cultural flows,
iv. the trends of regionalism and how they coexist, compete or contradict with the process of globalization,
v. The role of architecture in connecting people and cultures across geographical and chronological boundaries,
vi. The role of the state in promoting/constructing various types of cultural identities, bridging the gap between Regionalism and Modernization,
vii.how regional architecture can surmount the limitations of constant forms of the past,
viii. To what level features of contemporary urban development's respond more to global (economic) conditions than to local or national ones,
ix. To what extent regionalism accepts other regions traditions and incorporates and integrates new technological and environmental inventions.

Fig 5: Skyline-Dubai Marina

4. GATT/ WTO - World Trade Organization and India

India is the founding member of the WTO. India was in favor of multilateral trade approach. It enjoys MFN status and allows the same status to all other trading partners. India has joined the WTO in order to integrate the domestic economy with the world economy. Our country had been depending on export and import for coping with the domestic needs of technology, machinery and consumer goods. In the absence of WTO membership, we had to negotiate separately with each and every country and be at a disadvantageous position. Country to country negotiations every year were not only time consuming but also there used to be arm twisting negotiations with developed countries. Thus India joined the WTO membership. India benefited from WTO provisions in which some are as like - firstly, by reducing tariff rates on raw materials components and, capital goods, it was able to import more for meeting her developmental requirements. Secondly, as India is a founder member of WTO with wide membership of the organization, India get market access in several countries without any bilateral trade agreements. Thirdly, advanced technology would be obtained at low cost. Fourthly, because of wide arrangement for resolving trade disputes under WTO, India would be in a better position to get quick redressal of the trade disputes, if any. Fifthly, the scope of creating more jobs would be expanded. Sixthly, the Indian

exporters have deficient market information, this can be removed by the help of WTO and country can get wider market information, and finally, due to increasing competition and exposure the competitive edge and productivity of Indian industry will improve. In order to achieve the gains from WTO the government of India has announced the Export-Import policy 1992-1997 to liberalize trade and boost domestic manufacturing sector. The ministry of commerce of the Government of India expects that by WTO India would benefit by creating 10 million additional jobs annually and India's market share in world exports would improve.

A Federation of Indian Chamber of Commerce and Industry (FICCI)

Task Force reports (March 1996) on WTO, rightly observed that in changing scenario there is no alternative to Indian industry but to gear up itself to raise the efficiency and competitiveness, so that India is able to meet the competition in both, the domestic and external markets.

By, this, under certain areas like agricultural and allied exports, textiles and trade in services India can meet not only the challenges and will be able to exploit opportunities successfully when developed countries will co-operate to share the fruits of growth and openness in the new world trade order.

5. IMPACTS OF GLOBALIZATION IN INDIA AND WORLDWIDE

The developed countries brought the organization WTO into existence, these provision in the agreement have great bearing on the international trade and affect the different countries in different ways. The impact of WTO's various provisions on Indian Economy

The implications are analyzed in their various aspects

It is seen as a result of the search for identity in a modernizing and globalizing world where tensions arise between diversity and superiority and among science, aesthetics, and ideology. The employment of regional forms and concepts is then used as an adaptation strategy, a way to facilitate modernity. Rather than rejecting regionalism as an anti-modern phenomenon, we should interpret regionalism as a striving for continuity within modernity.

Architectural development in India and worldwide is currently in general following the development of a global architecture, can also be named as universality, so that the works produced by the most of the Indian architects almost be said to be a poor reflection of the work to India's identity or reflection of vernacular architecture.

6. CONCLUSIONS

The reasons for this shift from local to Global Architecture may be as listed below,

i. Lack of provision of the discourse and direction of the curriculum in architectural education in India. Less emphasis on the values and potential that belongs to the local natural and cultural richness of India

ii. Less focus of architects on the issue of identity in architecture with regard to the character, nature, characteristics and places, both in view of the Western and Eastern views since post modern architecture

iii. Perspective to see the identity to be conveyed by Western architecture and the architecture was different from the East after a period of modern architecture

iv. Study of the historical development of architecture of the past that have been done by the communities in which they live and the western architects who had worked in India as well as work - local architects) still feel very less.

v. Therefore, it is necessary and required studies on how architects predecessors did not create a work that contradicts the natural potential, environment and local culture. Creative thinking and discourse generated by the predecessors needs to be studied more closely in relation to the potential and the natural environment and cultural barriers

It is undeniable that the architecture as a work produced by humans will always encounter new challenges in line with the changing times. Thus, architectural changes or developments may locality will

leave an identity to the form and function of the building. The term of rationality and regionalism is still needs to be studied more deeply. About this issue has been much discussed and written. But when considered in depth there is still an understanding between the works unfinished. Therefore, look for the essence and nature of the regionality, and regionalism is still necessary

The aim of this study was to find essence of regionalism and regionality more fundamentally, because by understanding the essence of knowledge about the regionalism and regionality will become more apparent, especially for basic architectural design.

ROLE OF STREET VENDORS IN URBAN SPACES

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ABSTRACT

Informal sector like street vending is essential part of every individual's life. These street vendors, which we see in each and every part of prime location of cities, majority of which have low proficiency in their work and are under poverty. The street vending is the only source of income; with job opportunities and livelihood of the poor. In India, it was in 2004, when the Government first recognized the role played by the street vendors in local economy. Some of the government agencies and local bodies have framed the policies. The study shall cover the basic aspects of street vendors, social - economic conditions and analysis of policies framed by government. The aim shall be to identify and implement the strategies in planning process and provide services for Inclusive planning so as it forms an integral part of urban cities which is a major initiative for urban poverty alleviation.

Key Words - Street vendor, space, policies, Society, urban, economy.

1. INTRODUCTION

The role of street vendors as informal development plays a very important role in India's economy, and if supported, helps to reduce poverty and unemployment. Vendor is a person offering for sale for his products on a street. Street Vendor is a person who offers goods and services at large to the public for sale without having a permanent space or a built- up structure, but is provided with a temporary shed or a mobile stall. Street vendor may be stationary, moving which move from one place to other carrying stalls, cycles, push carts, wares on their heads moving in the local passenger trains or buses.
Today street vending in urban cities is the most important source of informal sector economy and employment, as it provides job opportunities for large number of unskilled and poor people below poverty, requires low skills and small financial inputs.1
Informal sector economy helps in building India's economy and offers a cushion during economic crises and hence a brief overview with respect to informal sector economy, context, occupation, working conditions of street vendors, variety of goods, products and services provided, economic policies shall be seen2 .The research paper aims to find the solutions for accommodation of street vendors and use of urban public spaces by all users. Urban public space is a very important concept for this study and shall discuss on how these spaces are allotted for vending and selection of streets for vending, characteristics and challenges faced by vendors.

1.1 Street Vendors in Urban public spaces in city

The total number of street vendors estimated in India is 10 million. As per studies, street vendors constitute about 2% of the total urban population, whereas 34% of the total population lives in urban cities.
There are various factors which need to be taken into consideration before planning to have such facilities for vendors, which the society and the urban governance and authority must think of. For Nagpur city, there are 36 vending zones authorised, 51 proposed vending zones, 15 were categorised

under no vending zones and identified 36 numbers of street vendors. Hence, vending zones on congested roads like Sitabuldi market of Nagpur city was selected for study.

Fig 1:- showing Goods available at convenient locations.

Fig 2:- showing Self - employment for large number of people

1.2. Informal sector

Street vending is one of the major sectors of informal economy, diversified sector of economic activities, enterprises, jobs and has become survival strategy for many users. These street vendors are the workers who are not registered by the state or central government. 61% of all workers are informally employed under informal sector. Street vending plays a vital role in the urban economy, as a source of employment to poor and unskilled labor, creating revenue generation, yet street vending makes situation worse with congestion at busy roads.

Criteria for space reserved for street vendors in urban city.

- 6 shops + 10 street vending stalls.
- 30 % of total public spaces should be for commercial shops - Vendors are allotted in the areas as per draw in lot.
- Space reserved on the pavements for street vendors.

1.3. Design parameters:-

1.3.1. EXAMPLES OF DISPLAY SPACES AS PER VENDING ACTIVITIES:-

Fig 3:-Cots used to display goods by old clothes' vendors (**display space - 2.0 m. X 1.0 m**)

Fig 4 :-Platform tables created with boxes stacked, (**height is modified as per need**)

1. www.wiego.org/informal-economy, Informal sector and urban planning in India.
2. case study of street vendors of Surat city, 'Wiego' organizations, India.

Fig 5:-No storage and structure for vending on ground. (**display space 1.8 m. X1.2 m**)

Fig 6:- Selling fruits on moving cart with temporary shed as weather protection. (**display space 1.8m X 1.05 m**) .

2. AIM & RESEARCH PROBLEM

The aim is to study the socio-economic conditions of street vendors in the city so that they are a part of inclusive planning and also a part of society. The objectives are

a) To study and analyze the socio-economic conditions of street vendors.
b) To identify the street vendors zones.
c) To identify existing concentration of vending zones in the city.

Hence the research problem is to identify and implement the strategies in planning process; policies adopted for Inclusive planning so that these contribute the society and forms important and integral part of urban cities.

3. METHODOLOGY

3.1 Street Vendors In Urban public spaces.

Provision of Reserved spaces for street vendors in the city shall depend upon :-

- Authorization & Notification of vendor zones.
- Issue of Identity cards
- Policies for vendor zones.
- Infrastructure provided.
- Social, economic, wages.

Factors governing street vendors are:-

3.2. Social aspects

Street vendors unlike other government or private jobs try to live their life of their own and do not get involved in any crime, or extortion, and live their lives with self respect through hard work.The mobile

street vendors also face problems for security issues. The lack of toilets has an adverse effect on women's health and other health conditions.

3.3. Wages

The average income of street vendors is between Rs. 40/- to Rs. 80/- per day. On average women vendors earn less than male vendors. As per the study by Sharit Bhowmick; the street vendors have to pay between 10-20 % of their earnings as rent.[4]A large part of street vendors earnings goes into bribes and protection money.[5] On an average, woman vendor earn less than men vendors, the earnings range from Rs. 40 to Rs. 60 per day.

It is estimated that total contribution annually from vendors in Mumbai from 2,00,000 vendors comes around 60 billion rupees[6]. In Kolkata, the annual contribution comes around 30 billion rupees annually. Hence, in spite of good contribution towards countries economic; these vendors are subjected to enormous harassment by the local authorities.

3. social security for street vendors - by Sharit Bhowmick; seminar ; Dec. 2006.
4. Nasvi study of 7 cities, as quoted by Sharit Bhowmick.
5. Ibid
6. Ibid, According to data by Arbind Singh. "cities for all".
7. Case study of street vendors of surat city , Informal sector – C N Raj , Ameen Mishra; Nov. 2011.

Fig 7:- showing Amended street vendors' Act notified, Article by Sweta Goswami, New Delhi:, January 15, 2016.

Street vendors in the Capital have finally got clarity on the rules guiding them, with the Delhi government notifying the amended Rules and Schemes to the Street Vendors' (Protection of Livelihood and Regulation of Street Vending) Act, 2014.

3.4. Criteria to understand Street vending:

3.4.1. LOCATION:-

Convenient locations of vending from customers approach.

3.5.2. TYPE OF VENDING:-

May be stationary or temporary establishments - stalls, ply boxes, steel tables

Fig 8:- above showing Long stretch of road, separated from the main Wardha Road, but approachable from main roads.

Fig 9:- showing Sitabuldi road stationary stalls , steel tables for display , clothes , fruits , vegetables.

3.4.3. COMMODITY:-

Clothes, fruits, vegetables, footwear, kitchen utensils are used as commodities.

3.4.4. PARKING:-

Parking Management and regulation of space provided for parking. Location of street vendors along commercial zones.

Fig 10:- photo(s) illustrating the inconvenience caused due to 2-wheeler parking

3.4.5. TIME OF VENDING:-

Fig 11:- showing street vendors on road at 1pm. on sunday, with parking as well.

Large no of 2- wheelers reaching station are parked, where these spaces shall not be used for parking. Both commercial office parking and station goers parking seen on the road.

3.4.6. PUBLIC SPACES:-

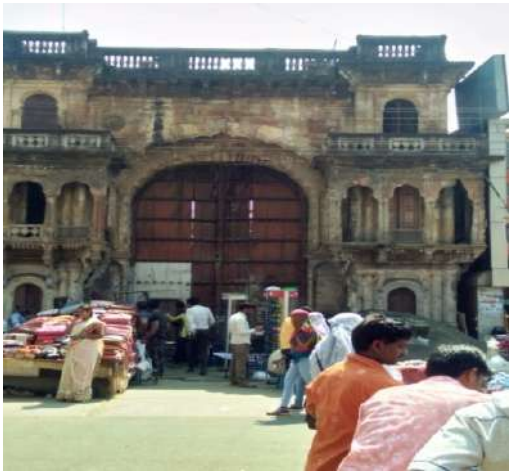
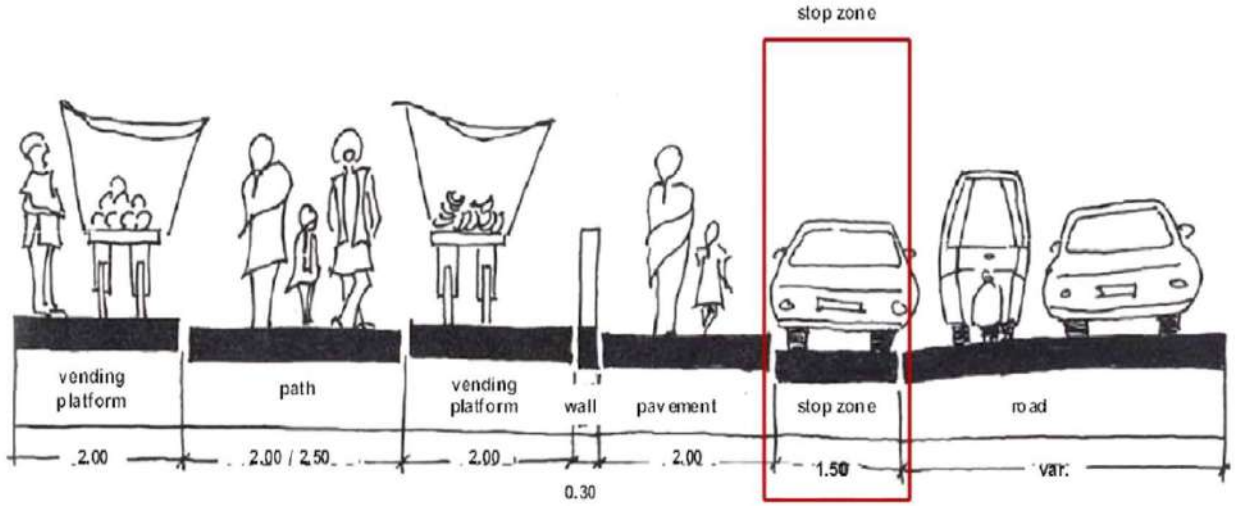


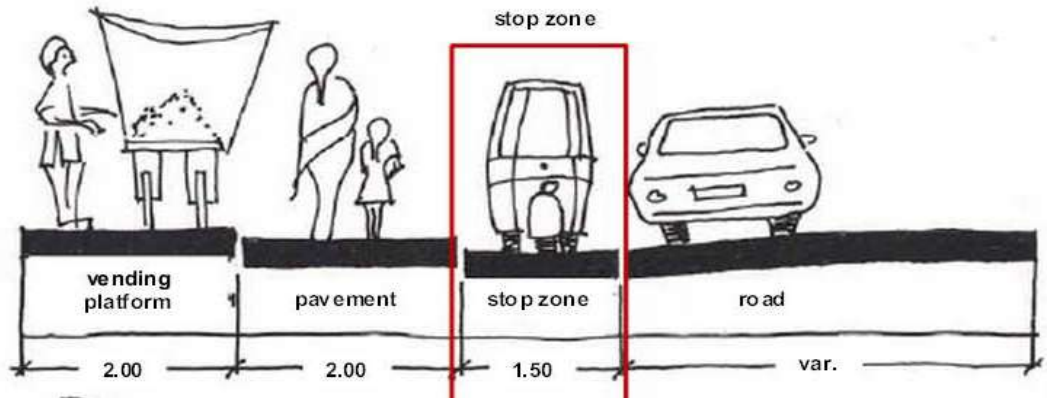
Fig 12:- road at 1pm. on sunday, with parking as well , of location of stationary vendors, compact pushcarts, mobile vendors.

Provision of compact kiosks, stationary vendors, compact pushcarts, mobile vendors

3.5. Urban Street Space Requirements:-



For Broad pavements



For Narrow pavements

Fig 13:- illustrations graphical presentation show **minimum cross-sections of streets used for vending.**Pavement widths should be of 2.0m -2.5m which allows two people to pass. Seated vendors with a stall usually require a further 2.0m to display their goods.

4. MAJOR RESEARCH FINDINGS

Policies and norms related to street vendors of India.

Certain street vending policies are at central level but not implemented at state level. Most municipal corporations provide legal authorized identification cards for these notified street vendors. For example: - Manipur Town and country Planning, 1975; suggests that in residential areas, the provision for street vendors is 46 shops and 10 hawkers for every 100 persons.

NASVI is an organization of street vendors, trade unions, and non-governmental organisations (NGOs) working based in Patna. It started with a network of organisation of street vendors. Nidan, a leading NGO in Bihar was given the responsibility to co-ordinate NASVI.

Fig 14:- shows Sitabuldi vending street.

For example: - Sitabuldi street vending zone is one of the prominent market places of Nagpur, where a large number of citizens visit daily.
However, due to unmanageble, unorderly arranged street vendors, especially on stretch of road from Variety Square to Loha Pul, citizens are preferring other market zones rather than Sitabuldi vending areas13. Sources claimed that street vendors have occupied maximum space on road creating congestion and traffic on roads. NMC has prepared a vending and non-vending zone policy in the year 2001 in which the Act could not overrule the judicial legal orders passed with regards to no vending zone and had provided security to the street vendors.

4.1. Spatial Planning Norms.

There is need for the development plans to be 'inclusive' and fulfill the basic requirements of space for street vending as an important urban activity through norms for reservation of space with their current population, projected growth of street vendors and based on the rate of growth in the previous five years. The average number of customers that generally, visit informal markets in vending zones".

4.2. Provision of Civic Facilities.

Municipal Authorities need to provide basic civic facilities in Vending Zones. Vendors' Markets should include; solid waste disposal, public toilet, electricity, drinking water, storage facilities etc.

4.3. Provision of Street spaces for vending.

Street vending spaces is one of the important visible occupations, few cities manage to support the livelihoods and the policies associated with vending along with the need to manage the space. These street vendors have to focus on day to day evictions and harassments. Parameters of street vending spaces shall be:-

1. Street vendor shall pay vending charges for space location to Municipal Corporation, so that the authority provides infrastructure facilities like water, space (approved by regulatory street zone).and space recognition.
2. Street vendors shall form organizations, so that they can defend their rights to vend in public space and to create a local vending committee which will define clear areas for vending and non-vending zones for developing an integrated street vending plan for the city.

For example: - Ahmadabad municipal corporation (AMC) has included thin strips of spaces along commercial shops for the location of street vending. Also spaces opposite to public parks, gardens, and market areas were selected for vending.
These spaces were demarcated in town planning schemes as vending spaces (0.5% spaces allotted as vending spaces); hence two points can be worked out i.e.
a)Placement of street vending spaces.
b)Revenue generation to Municipal Corporation.

4.4. Urban public Spaces allotted for vending.

Urban public spaces are defined as social spaces that are open and accessible to all. Type of space allotted for street vendors shall be governed by two main factors:-

a) Type of commodity.
b) Availability of space w.r.t. no. of vendors in the market. Average size of vending unit is 2.3 sq.mt. for all natural markets.

4.5. Selection of Street spaces for vending.

a) Street vending mostly carried on streets, hence roads selected for vending are along commercial zones, separated but approachable from main roads and located within convenient locations for the customers approach14.
b) The street vending locations selected had to be safe and at the same time busy, hence market areas were selected which help in gathering by creating such interesting zones from nearby areas of city.
c) The vending zones are located in prime locations accessible from all the parts of the city.
d) Public spaces shall be made approachable, which gathers, integrates large number of people from different locations of the city.
e) Removal of unwanted obstructions on the road like garbage.
f) Parking Management – regulation of space provided for parking.
g) Responsible inspection to be carried by the municipal authorities.
h) Creation of sufficient, demarcated spaces of vending on broad roads.
i) Provision of compact kiosks, to stationary vendors; and compact pushcarts to mobile vendors. Integration of street vending spaces with organized retail shops in their existing location.
j) Such vending spaces can be provided with retail shops, shopping centers and commercial complexes by planning the shops and the vending units maintained by distance from each other so as to avoid conflicts. Vending units and retail shops shall maintain a distance of 2 meters for 4 pedestrians to sufficiently walk through.

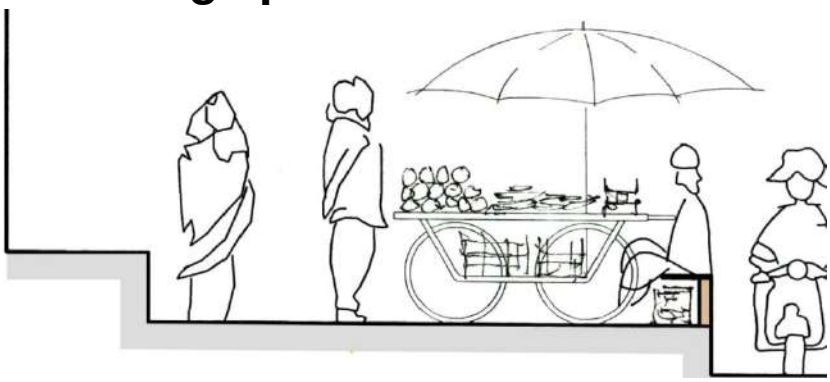
Fig 15: showing street vendors zone from Sitabuldi road to Loha pul Nagpur with congested road at peak hrs. 5pm.

Fig 16: showing Sitabuldi road vending zone, Nagpur with congested road.

5. INCLUSIVE PLANNING PARAMETERS FOR STREET VENDORS

1) It is necessary to include space requirements for street vending in local development plans and to include street vending norms as an important urban activity in accordance with the current and the projected population growth of street vendors, rate of growth in 5 years and no. of customers visiting the vending zones.
2) To include basic infrastructure facilities by local municipal corporation like provision of electricity, water supply, solid waste disposal, maintain cleanliness and each vendor shall possess vending identification for vending activities as determined by municipal authorities15.
3) Demarcation of vending zones in weekly markets, on vacant or left-over spaces in cities, housing schemes, local plans , planning schemes, wasted spaces like space under flyovers, bridges shall be included in vending which will be included in landuse zoning.

5.1. Design parameters:-



Stall with shade umbrella and seating area for vegetables or household goods.

Fig 17: showing the sketches below show different ways in which a 4m pavement width can accommodate vending, with or without fixed structures

Snacks or food display with seating area, shade, and storage space for utensils and ingredients.
Inclusive design often means making the best use of existing space through better space management or time-sharing (eg : for an evening or Sunday market).

6. CONCLUSIONS

Inclusive design helps making the best existing use of vending spaces, demarcation of vending and non-vending spaces through better space management in development plans and helps explores the challenges of managing street vending in modern India. The local municipal authorities shall adopt policy measures and infrastructure services for vending zones in these natural growing market places which shall be conserved as heritage rather than encroachments.

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Reflection of Culture and Context in Indian Architecture -An Analysis of South Indian Houses

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ABSTRACT

Culture is a set of beliefs, knowledge, education, customs and values that society has developed them based on their own beliefs and in the process. The physical manifestation of the architectural space type takes different connotations as culture and context varies from place to place. This paper studies the causal relations exist between cultural values, context and the physical form of Indian housing. The study mainly focused on south Indian houses of Kerala, Karnataka and Tamilnadu. The south Indian traditional homes are a clear reflection of what they value the most – open central places for opening conversations, the pillars that strengthen the family, the elevated verandah that rise above petty issues and the elaborately designed entrance door to welcome all with open hearts. The method of data collection includes literature reviews of houses, interview with the people and case studies. Culturally sensitive architecture respects local social conditions and can respond to global influences and changing needs.

Key Words: Context, Culture, Physical Form, Social Condition, Traditional Homes

1. INTRODUCTION

"Architecture as a matter of human life reflects the culture in every society interacting closely with structural, historical, political, economic and social features of society. Elaborating the expression of culture on the built form is usually the unconscious effort of every designer. In fact, culture plays a dominant role at the very out set of any design process. This is because, any design when conceptualized to perform a desired function, is directly or indirectly derived from or synchronized with the cultural identity of the user. It is what frames our thought processes. It defines individual identity and helps to recollect past memories. culture and architecture are two sides of the same coin. Architecture never deviates from culture, it adapts and merges with the layers of abstraction and sometimes exist in transition when there are dramatic paradigm shifts in the way people live

Changing the cultural and social attitudes in communities has the greatest impact on the architecture. The role of culture and context is very essential for promoting architectural identity. "Architecture is the portray of a nation's culture integrated with all aspects of human life and has a profound impact on it. Architecture is the results of the culture of the society" (Parvizi, 2009). In some places we can understand the culture of its people from their buildings. Other places the architecture of buildings create the culture of the city. Because of this culture is concerned with more than a collection of values, it is a system or complex of distinctive attainments and traditions. Culture should be understood as a system of interconnected beliefs and values." (KENNEY, 1994)

Architecture expresses the cultural context in which it is built. Analysis of the culture can reveal those aspects which most influenced the architectural form. In fact, the built form is similar to a map of the past which can be read as a manifestation and expression of the culture. Looking closely at what has been built in the past aggregations of plan and structure, materials and details, and most important of scale and space in private and public realms-we see a virtual blueprint of the culture, revealing not only inherent values but workable design solutions that are often beyond improvement. Over the years cultural influences have moulded the way spaces have been designed in India. Not only in areas of ritualistic and

religious importance such as temples and mosques, but also the design of residences has been a direct result of the cultural practises prevalent during the time.

Fig.2a-Decorating the Front Yard with Rangoli Patterns After Morning Bath In South India

2. TRADITIONAL HOMES OF SOUTH INDIA

Homes of southern India have always been the landmarks of a joint family system, a concept that has been and in many ways is still an integral part of Indian culture. The very essence of every built form or built up environments is the manifestation of culture masked behind its layers of abstraction. The manifestation may be royal and imposing like those of the mighty empires, or may be simple and yet powerful to create an identity for those who adhere to it.

Almost every house had a simple pillared verandah comprising of raised platforms. The outsiders travelling in the hot sun could take rest in this open space. During functions, these platforms were used to seat guests. Courtyards, which are located in the centre of the house were perfect hubs for family bonding, kids' play area and a place which was most likely utilised by grandmothers and ladies of the house for drying papads, pickles or simply for relaxation. The most of the courtyards located in the centre of the residence as a sacred place with tulsi plant in the middle to give the feel of divinity. The courtyard also acts as climatic responsive feature in the south Indian houses by allowing proper light and ventilation. Many of the houses in the south India had red oxide floors that had the ability to maintain the room temperature, by keeping interiors cool during summers and warm in winters. Wood or metal swings were an integral component of south Indian home décor. The proper segregation between the private and public spaces can be seen in south Indian houses. Here in the paper we discussed the residences of Tamilnadu, Kerala and Karnataka with case studies.

Fig.2b-To Spend Evenings in This Outer Verandah, Chatting with The Neighbours

The culture surrounding beautiful houses of South India was communal as most of the village was involved in the construction. Trees outside the owner's property y could not be felled without the village elders' permission. Carpenters were involved the creation of ornamental pillars, ceilings and doors etc. The local blacksmiths were involved in making or supplying hinges and other implements and the potters are called for flooring tiles. The coolaborateion of different people would result in beautiful architecture which inspiring to the future generations

The rich and vibrant culture of South India is reflected in the festival of each states which brings brings its unique flavour to the diversity of the southern culture. These festivals have their histories and legends associated with them along with the varied ways in which they are celebrated.They celebrate exclusively Ugadi or Vishu, Pongal, Onam in the homes as well as temples or community place. The family members get together to celebrate these festivals. The ritual of performing pooja and having lunch together is a main intension of celebration.

Fig.2c- View of Entrance Door with Segregation of Public & Semi Public Space

The built space in the house plays a major role during the festival celebrations. The front yard will be decorated with rangoli or poculum as a part celebration of festival and also welcome the guests. The verandah occupied with guests where kitchen will be extended to courtyard or dining space where all the women get involved in the preparation of foods. For pooja usually in pooja room or hall where the space for the family members to sit together to get involved in rituals. During the festival time family members have lunch together sitting on the floor. Usually the hall and verandah occupies for the lunch where maximum people sit together for lunch. During Navaratri the dolls will be kept in hall or verandah for Pooja. During any

Fig.2d- Inner courtyards are hubs for family bonding

festival or functions big halls, verandah, courtyards acts as a multipurpose space.

3. AGRAHARAM -THE HOUSE OF SOUTH INDIAN BRAHMINS

Fig.3a -A View Of Agraharam

Agrahara-style neighbourhoods is a very essential part of South India's traditional architecture. Agrahara, or Agraharam, Brahmin houses, considered a staple example of their architecture. The houses are laid out in a village like a garland. Here the houses constructed along the both sides of street leading to the village's primary temple at the one end or either end with different deities. This distinct form of planning is found in many areas of Tamilnadu ,Karnataka and Kerala. The Agraharam homes are usually single or double storied.

Traditionally, an Agraharam was a cluster or row of houses that bordered the temple wall, and served as a colony for the temple priests and their families. Life revolved around the community, which comfortably practised its unique rituals. A typical Agraharam house comprises a stone bench in the verandah and an open courtyard in the middle of the house with a good ventilation, red oxide flooring and sloped roof that is adapted to the current scenario in the gated communities with wooden beams for ventilation and red oxide flooring replaced by terracotta tiles or wooden flooring, bringing it an ethnic look.

All traditional houses are valued for their Architectural Features. Same is the case of an Agraharam house. An Agraharam is planned by the position of the main temple. All streets are in the east-west direction with residences on both the sides of the street. The backyards of these houses opened to alleys that are narrower than the front street. Rivers were the main source of water. Houses were built above the area sloping toward the rivers. This way, the flooded river never affected the inhabitants of these community houses. The front portion is used as a community centre for meeting people. The streets were used as space for vendors, play area for kids, get-togethers for all ladies and men. It was also the place where religious processions took place.

Houses were divided by common walls. The front space had a veranda called Mudhal Kattu, which is sheltered by a raised sloping roof. There is a veranda inside as well which acts as a place for receiving guests. It also had steps to reach the upper floor. The Rezhi was a place for storage and ceremonies. The central Courtyard or the Mitham had an opening in the roof for allowing sunlight to seep inside. The openings were covered with parallel Iron rods to stop thieves or monkeys from entering inside. Here was the personal area for family get-togethers, family ceremonies, for lunch, for dinner and the like. Potable Wells were a common feature. The third portion had the kitchen and the living personal quarters of all the individuals. All the houses had Thinnais, large platforms of sheltered space, where even outsiders and unknown strangers would take rest from the hot sun. Entrances were always welcoming what with decorative patterns of Rangoli called Kolam in the local language.

Agraharam houses were characterized by Thick pillars, lime plastering, red oxide country tile flooring and Madras terraces. Symmetry and decorative flooring were regular features in these houses. The flooring and the open central place kept the residential quarters cool as compared to the hot exteriors. The houses were built such that water in any part of the house sloped easily towards the drain. The whole area was spacious, neat and tidy.

Agraharam Settlements were found in all the four states of the South India, Andhra Pradesh, Kerala, Tamil Nadu and Karnataka. Now they are found in only few temple towns. They are the precursors to the present housing communities that are coming up in big cities. Their community model constituted sharing civic problems, sharing amenities and social interaction. Agraharam housing model

represented Housing structures that protected residents from the vagaries of Nature and also served as a centre of healthy community Interaction.

Fig.4.1.1c-A View Of inner Verandah or Thinnai In Chettiar House

4. CASE STUDIES

4.1 Traditional Houses of Tamilnadu

The state of Tamil Nadu covers a large area, as well as, finds itself home to different geographies. Hence the architecture of its traditional homes also vary across the board. The basic structure does not alter much, though Tamil Nadu homes can be distinguished or classified further into sub parts based on the regional, class and culture variations. A rich, prosperous traditional home looks different from that of a poor man. Where the poor used mud and rice husk the rich used sundried and mud bricks. But construction materials like lime plaster on the walls to reflect the sunlight remains the constant material in the building of the homes. Some other features in Tamil Nadu homes that are same almost everywhere is courtyard in the interior of the house, as well as the raised verandah called the Thinnai in the front or at times all around the house, used for social functions as well as family gatherings. Another feature of all traditional house plans includes the red oxide coated floors, which are known to retain coolness even in the warmer seasons

Fig.4.1.1a-A View Of Front Verandah In Chettiars House

Fig.4.1.1b-A View of Courtyard Surrounded with Pillars in Chettiars House

4.1.1 CHETTIAR HOUSES

The architecture of the Chettiar houses very grandeur and unique in terms of construction . The houses of the Chettiars are built to accommodate every event that happens during the life of a person; from birth to marriage to death. It explains why the houses have such incredibly large halls, rooms and courtyards. Another aspect that was considered while building the house was the characteristics of the arid-place they lived in. To make sure that the house has enough air movement, large doors and windows are built.

Ingenious and indigenous methods are used to plaster these walls and these walls are one of many noteworthy characteristics of the houses in Chettinad. It is believed that the walls are plastered by limestone and then are polished using a paste made from egg white, cement and limestone along with other ingredients to make it look shiny and glittering.

Another distinctive feature of the houses in Chettinad is the local made Athangudi tiles used to floor the houses. There are elevated platforms on either side of the main entrance to the house and these platforms act as a place for socialization for the guests and members of the family.

Every Chettinad house is distinguished by an affluent and striking. Elaborately carver front door

The courtyards are created for the children to play, the women of the houses and to celebrate festivals, the large courtyards are constantly used where the members of the family need not to go outside for anything. The series of open-air courtyards of varying sizes with rooms flanking them on all four sides. A Chettinad mansion transcends from a public to a private realm of functions from the main door. The Grandeur of main hall which accommodates a greater number of people to organise functions like Marriage, naming ceremony or any festival celebrations.

The big public veranda in the beginning of the house and courtyard meant to entertain the male visitors by the men in the house, the house graduates to a slightly smaller courtyard with rooms and storerooms around it. The smaller courtyard also acts as meeting place for the women of the house who cook and socialize in its wake where they can spend time after their routine work ,dry pickles and papads

Each member in the family would get a room and his name would be carved on the door. Many houses could accommodate up to 80 members of an extended family at a time. One of the other courtyards is meant for dining, which could seat about 250 people at a time. The women's quarters and the kitchen with the servants' rooms are at the very end. The houses painted predominantly white on the outside, get protected from the heat and interior will be colourful.

The doors of the different halls are aligned in straight line with the entrance gate which helps ladies of the house to watch from inner court yard anyone coming to house. Some other typical features of homes in Tamil Nadu include the rangoli design on the red oxide floors, an uruli, a shallow pot kept outside the entrance filled with water and floating flowers, swings known as oonjal as well as Tanjore paintings and a Puja room.

Fig.4.2.1b-A Classic Central Open Courtyard or Nadumuttom With Holy Thulsi(Basil plant) in Center

Fig.4.2.1a-A View of Nalukettu House

4.2 Courtyard houses of Kerala

Kerala known for its comfortable sprawling traditional homes. In spite of covering a large area and surrounded by its very own garden. The neighbouring houses are not too clustered, and in fact are placed from each other at considerable distance. Called the Parambu or Thodi the surrounding land around the houses grow fruits, vegetables and coconut trees fluttering at the periphery. The layout of the homes thus reflects the way Kerala is – fertile, vegetative and always with an abundance of water. Some houses also have a well within their premise.

Kerala houses also have two courtyards, one inner and the other outer. The gabled roof and the clay roof shingles are much more resistant in the wet weather. The usage of wood as a construction material is evident, the poomukham or elevated entrance of the house is used to greet guests and outsiders. The pillared verandah leads to the main beautifully carved main door. Many homes also have the granary, cowshed as well as, prayer room or practice room for martial arts such as Kalarippayattu.

Granary-based. single living -multi-functional hall made of the combination of wooden-laterite or pure wooden construction, standing on an elevated ground is the most common typology of the residential structure found in Kerala. The practice of agriculturist culture and paddy farming estates by the bulk of the society made paddy-storage a main structural concept of Kerala's living space. The matrilineal society of Kerala and Minangkabau has space especially dedicated to the god mother of the family. The Hindu society of Kerala and Baliaga acknowledge in Keral they believe the North-East corner of the house is most auspicious for storing their family and religious relic. The functional-spatial importance given for women like position of kitchen and backyard along with dedicated room for elderly women in the house.

4.2.1 NALUKETTU HOUSE

Nalukettu or the traditional homestead where generations of family lived together is an essential feature of Kerala. The four walls joined together with an open central courtyard, these homes have a simple layout with excellent ventilation. In some of the homes of Calicut, where a section of the inner courtyard is kept open to allow sunlight and rain to hit the floor directly leading to some of the best childhood

memories of playing in the rain. In the portico wooden benches with carved decorative resting wooden pieces for resting the back are provided. This is called Charupady. Traditionally the family members or visitors used to sit on these Charupady to talk.
Nalukettu architecture is basically a rectangular shaped structure wherein four halls are joined together with an inner courtyard called 'Nadumuttam' which faces the open sky.
The central room is used as prayer room and grain store and the two side rooms are used as living rooms. The core unit may be raised to an upper storey with a steep stair located in the front passage. The building may also be extended horizontally on all the four sides adding or side rooms for activities such as cooking, dining, additional sleeping rooms, and a front hall for receiving guests. If needed single houses may also be provided with separate buildings for cattle keeping, barn, bathing rooms near tanks, outhouse for guests, gate house etc. By such extension the building may become much larger than a Nalukettu in space, but it is still categorised as Ekasala with reference to its core unit.

Fig.4.3.1c- The Courtyard of Guttu House

Almost every Nalukettu has its own Pond or Kulam for bathing of its members. At the end of small verandah there used to be a small pond built with rubble on sides where lotus or Ambal used to be planted. The water bodies are maintained to synthesised energy flow inside.
Nadumuttom or courtyard will be normally open to sky, allowing sunshine and rains to pour in through which natural energies to circulate within the house and allow positive vibrance within the house. A thulsi (basil) plant or tree will be normally planted in centre of Nadumuttom, which is used to worship.
Architecturally the logic is allowed tree to act as a natural air purifier. Pooja room should preferably be in the North East corner of the house. Idols can be placed facing east or west and the person praying can face west or east respectively. At present, wooden panelling is done on Pooja room walls and there is a standard design for Pooja room which can be given to clients interested in having traditional Pooja room the whole being protected with a compound wall or fence. An entrance structure may also be constructed like the gopuram of a temple. This may contain one or two rooms for guests or occasional visitors who are not entertained in the main house.

Fig.4.3.1a-View of Guttu house in Managalore

The weddings of the girls in the extended family are celebrated in the raise platform in front of the house. Guests used gathered around the inner open verandas and inside the courtyard. After the ceremony, the inner verandas become a dining area. People will be seated on rattan mats and food was served on banana leaves. The inner veranda around the nadumittam easily seated fifty people for wedding feasts.
It is not just on these happy occasions that the family gathered here. The sad and somber occasion of death of the elders in the family was also observed here with various religious rites. The number of people will gather here around 200 -600 for any occasion.

Fig.4.3.1b-Entrance Portico with Decorative Wooden Pillars

In Nalukettu houses they used locally available building materials like red bricks, mud and wood .Nalukettu was a typical feature of the Tharavadu houses in Kerala where most of the joint families lived under one roof in such homes. This architecture concept was purely based on Thatchu Shasthra, the Science of Carpentry and Traditional Vasthu.
4.3 The Prestigious Houses of Karnataka
4.3.1 Guttu House Of Coastal Karnataka

Guttu houses mean homes of prestige. These beautiful houses are the traditional manor houses of Dakshina Kannada, built to fit the requirements of matrilineal joint families. The Gutthu Houses are of landlords of the coastal region of Karnataka which is very large, inward looking Hindu Mansions. The typical Guttu house has a typical Mangalore tile pitched roof, and single & double storeyed structure around a courtyard. The façade is usually symmetrical with large overhangs. The principal building material is wood.

The architecture of these homes followed Vastu principles. Guttu houses look like a mini temple from the outside. Characterised by sloping roofs with Mangalore tiles and huge courtyards that overlook paddy fields. They symbolised the wealth and prestige of the wealthy landlords who built these houses. Exquisite care was taken to ensure that not only to look grandeur but also built keeping in mind the climate of coastal region.

Fig.4.3.1c- Verandah of a Guttu House

The open space in front of the house beyond the main gate, which was called jaal, would typically have a shelter made from woven dried coconut leaves that would serve as protection from the extreme heat which also a space conduct ritual during marriage functions at home. A square complex with ample space for storage all around. There are usually 4 doors, one on each side of the square complex. The roof is of Mangalore tiles. All Guttu houses had a veranda that acted as a sit-out and discuss the day's affairs. Every house has a big hall or chavadi which also used as a worship space where puja and daily prayers are offered. The inner square is an open area always used to dry stuff clothes, papads, grains etc. The central portion of the house was reserved for the women of the house. Elaborate rooms were constructed to house deities, and large, spacious bedrooms were typically accessed by a flight of stairs on the first floor. Guttu houses usually featured a lot of woodwork. Wooden swings where the head of the house sat, chests, cabinets, shelves, chairs, writing desks, reclining chairs and the quintessential vakil bench were all part of these homes.

Fig.4.3.2a -View of Ain Mane in Coorg

Guttu houses were designed and constructed with a delicate balance between functionality and aesthetics. Using locally available resources and expertise to reflect their cultural identity, the Bunt community homes were instances of pragmatic planning and eye for detail. The traditional Bunt houses can still be seen across the Tulu Nadu region. One of the well preserved houses, Kodial Guttu, stands at the centre of Mangalore city. Royal houses of the Bunts are called Aramane.

4.3.2 KODAVA HOUSESOF KARNATAKA

Kodagu (Coorg) district in Karnataka is where Every Kodava belongs to a clan or Vokka and they are considered to be very brave and most of them servered in Indian army. There are more than 300 clans within the community. Every clan lived in a Ain-Mane an Ancestral house. Several family units put together comprise a Vokka. Each Vokka owns an Ain mane. The granaries were always filled with stocks of rice throughout the year. Firewood was chopped and stocked to see them through the long monsoon.

Fig.4.3.2c-The sacred pillar or kanni komba, in the south west corner of the courtyard.

As families grew bigger Usually the younger sons move away and built their own houses. In mane house has 2 massive columns at the entrance and has a central open courtyard. Men and women cultivated paddy on their land under the guidance of head of the family. The Ain mane has

always been a mirror reflecting the Kodava culture. This ancestral abode is a remarkable structure and a place of unique bonding. The structure of this building is thought to be symbolic of the unity in the family. The Ain house which known for joint family, always will be filled with shouts of grand-children, the clatter of horse carriages, bullocks, pigs, chickens and the barking of hunting dogs. On festivals and important occasions. Typically, the Ain Mane stands on a hillock surrounded by paddy fields, swaying areca nut trees and coffee plantations. The Ain Mane, depending on the wealth of the clan stands surrounded by the huts of the farm workers and animal sheds. A well provides fresh water. It has a sloping tiled roof as per the climatic condition. There is a central courtyard which is open to the sky. A narrow passage runs all around the courtyard connecting to the rooms. Usually the kitchen is at the rear side of the house or even a little away to keep the smoke away after that the toilet and bathing area are placed. Two massive wooden poles adorn the entrance. The central Nadubaade would consist of three wooden poles. The first pole is called as Kannikamba—it supports the whole roof of Ain mane.
The kannikamba is as significant as the hanging lamp lit every day at the prayer room. At Ainmane, the prime position is given to karona, the head of that particular family. During ceremonies, family members would seek blessings by touching the base of kannikamba and then the feet of elders. Images of sun, moon, flowers etc. adorn Kannikamba and main doors, signifying that Kodavas were nature worshippers. The pillars in the verandah has a finger like projection, which curves upwards at two levels, midway and higher up, serving as hooks. In earlier times, in keeping with the martial heritage of the Kodavas, these hooks served a specific purpose. Women of the clan would hang up parcels of cooked rice and curd with dried meat or fish, wrapped in banana leaves. This was convenient for men to pick up quickly, if they were called to war at short notice. An integral part of Ainmane is Kaimada—an important structure built in memory of the founder of that family or Vokka which is a prayer place during happy or sad ceremonies. In Kodava culture the men and women share same kind of respect, status and position.
Kitchen considered as a sacred where the mud oven/stove should face east.

Fig.4.3.2b- Detail of a pillar in the verandah with the wooden hooks

5. PRESENT SCENARIO OF TRADITIONAL HOUSES IN SOUTH INDIA

All These above outstanding houses are vanishing by the day as the present owners are either not interested to maintain them or they are unable to do so due to their financial condition. Because of sentiment about their family and the pride some are continue to live in these houses but are unable to maintain and they are renovating the houses as for the present situation. It is very Important to give a glimpse of our rich traditional culture and architecture to our future generations. The socio-cultural changes were a major cause behind it. With the emergence of nuclear family system either the house demolished to the erect modern type of construction or renovation as per present trend ignoing the value of family bonding or interactivity to each other. Also, most of the many houses were converted to museums, ayurvedic health care centres and home stays.

5.CONCLUSION

These case studies demonstrate that reviewing how culture influences architecture involves more than simply categorizing aspects of culture. I would conclude that one cannot break culture down into a neat package of aspects an architect should consider. Rather, these case studies demonstrate that each culture should be analysed on its own merits on a case-by-case basis. these traditional houses of different region give for ideas to make sustainable and comfortable future living places on this Earth. There are several other examples that validate the presence of culture in every form of architecture, and vice versa. Even in the modern day, culture plays a vital role. Despite the strong impact of westernization in architecture in India, local culture continues to inspire architects to design by adopting and merging the elements of both worlds together. There is no architecture without culture, and culture always establishes itself in

design, regardless of time and space.

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Warli House : Vernacular Vs Contemporary

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ABSTRACT

Warli, one of the tribes in Western Maharashtra and North Western Gujarat, construct typical houses known as Warli house. These houses had developed in response to the culture, tradition and climate of the region. Based on the status in the society and ability to spend, there are three types of houses. Use of materials and quality of construction also differ with size. This paper discusses the role of culture, traditions and climate in the formation of vernacular House form. It also explores the current market trends and development in houses in terms of form, materials and shapes.

The data collected through literature survey and field visit to Dhabon village in Dhahanu Taluka of Thane District. The documentation done is through; on field measurements, interactions and questionnaire survey conducted. Based on data collected, paper discusses the changes in the Warli house in terms of forms, materials and shapes. Paper concludes stating the best practices that can be adopted in practice in Contemporary structures with major learning from Vernacular structures.

Keywords: Climate, Contemporary structures, Culture, Tradition, Vernacular structures, Warli house

1. INTRODUCTION:

The word 'WARLI' derived from the word 'WARLA', is synonym to 'Piece of Land or field', which depicts dependency of WARLI's on the Jungles for their day today life. All their personal life, family life, religious life revolve around the Jungle. Mostly resident of North Eastern part of Maharashtra and South Eastern part of the Gujarat; popularly known for their art called as 'Warli Art'

Typical vernacular Warli houses are reflection of prominently Jungle, Nature and Environment. The square house form, with pyramidal overhanging Thatch and Dried leave roof protects the walls made up of Karvi (Strobilantes callosus Nees) sticks. WARLI houses are been constructed without windows, in response to protection against strong winds prevalent in the region. Small slits between the overhanging roof and the wall are the only opening to facilitate necessary air changes within houses. This House, is not only shelter for WARLI's but also for all living beings like goats, cows, dogs etc. which are important part of WARLI life, with no possessions and minimal furniture. The existence of Faith and Belief on the Jungle-God known as 'VAGHDEV' is been felt at every corner of the house, making it a sacred place to reside.

The methodology used is through on field measurements, interactions with locals and questionnaire survey conducted at the location understating various aspects related to settlement.

2. WARLI HAMLETS / SETTLEMENTS:

WARLI's lives in a small settlements or clusters, located on the flat lands on the high lands within the Jungle. These clusters are known as PADA, and number of such PADAs will create a village. The type of work undertaken by the WARLI's residing in the PADA's govern its name like PATILPADA, NAIKPADA, SUTARPADA, PAWAR PADA etc. and also types and shapes of formal, informal spaces created within them. In all the cases, majority of the houses within one PADA belongs to a single family, as addition of

house will happen only if someone from the family is getting married and newly married couple will have new house next to their family house. The PADA is generally an extended family of one family. All the houses constructed will be at some distance and will not share a common wall; where as these PADA's will be located in the periphery of 0.75 to 1 km from their farms.

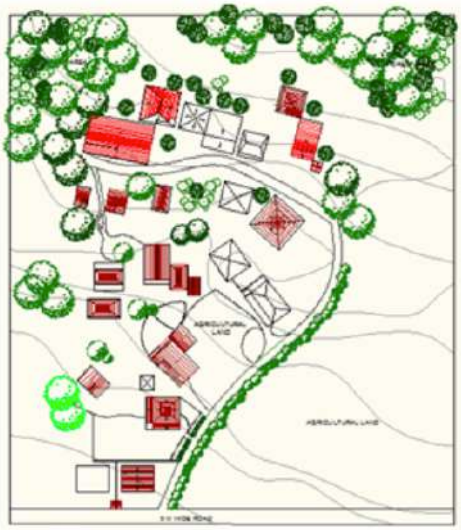

Fig 1: Layout of Ohalipada.

Fig 2: Village level informal open space put to various uses as needed.

The PADA's will be located on the higher lands with slope on one side for the easy drain off for the rainwater during heavy rains without much of the destruction to the structures. Typically, a PADA would have 20 – 35 houses. Every house in the PADA have extended space around the structure to store grass, wood, carts etc. which they store to feed the animals or to replace few dilapidated elements of their house. During rainy seasons, they add lean to roofs on the rain fed side to protect the house from pouring rain. After Rainy season, these areas may be used to keep their animals. Sometimes a Platform called, as 'MACH' (Photo 4) could be constructed for keeping the animals within lean to roof above to protect them from weather conditions. Many Houses will have Private kitchen Gardens, whereas front door and Veranda will always face the pathway or the road. Warli Houses will not have high plinths.

Fig 3 & 4 : Storage Space in Private Kitchen Garden.

Fig 5 : Small House extensions - bathing & for animals.

With the change is occupation over the years, many WARLI's are moving to Thane or Mumbai for earning livelihood during off seasons. WARLI's have now started replacing their traditional houses with more permanent houses. Many evolutionary changes are visible in houses. In most of the cases, WARLI's have retain the form of the structures, replacing Karvi walls to Brick walls, Thatch roof with Country or Mangalore tiles, Plinth with more robust materials and Mud flooring with Shahabad or Kotah stone flooring. Financially rich people have replaced all their structures into Brick or RCC structures and has deviated in plan form from Square plans to more rectangular forms and flat roofs.

3. WARLI HOUSE:

Fig 6 : Traditional Warli House.

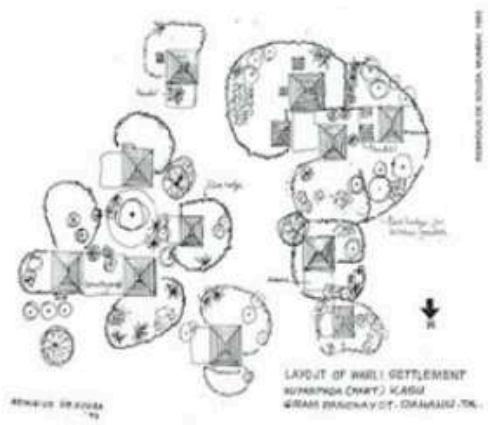

Fig 7 : Typical layout of Warli settlement 10.

Typically square in shape, WARLI house consists of Veranda, Attic, open room with space for tying animals as unavoidable features. Veranda is a semi-enclosed space with roof above located within the pyramid roof above. Vernacular structures are been constructed out of karvi Sticks, dried leaves gathered from jungle, mostly coconut/Tadi leaves, tree trunks, Bamboo. WARLI's prefer the front door towards East. The houses are been surrounded by space mainly used to store goods and used as a kitchen garden. For many houses, these spaces/private gardens are been enclosed by planting shrubs or putting dried Karvi sticks or Bamboo. WARLI houses are generally with one or two doors and no windows. The Karvi Walls will generally do not touch the roof creating a continuous opening, which is not sufficient enough to lit up the indoor spaces, resulting in dark interior spaces. The roof is sloping with 30° slope, with attic for storage of possessions they have.

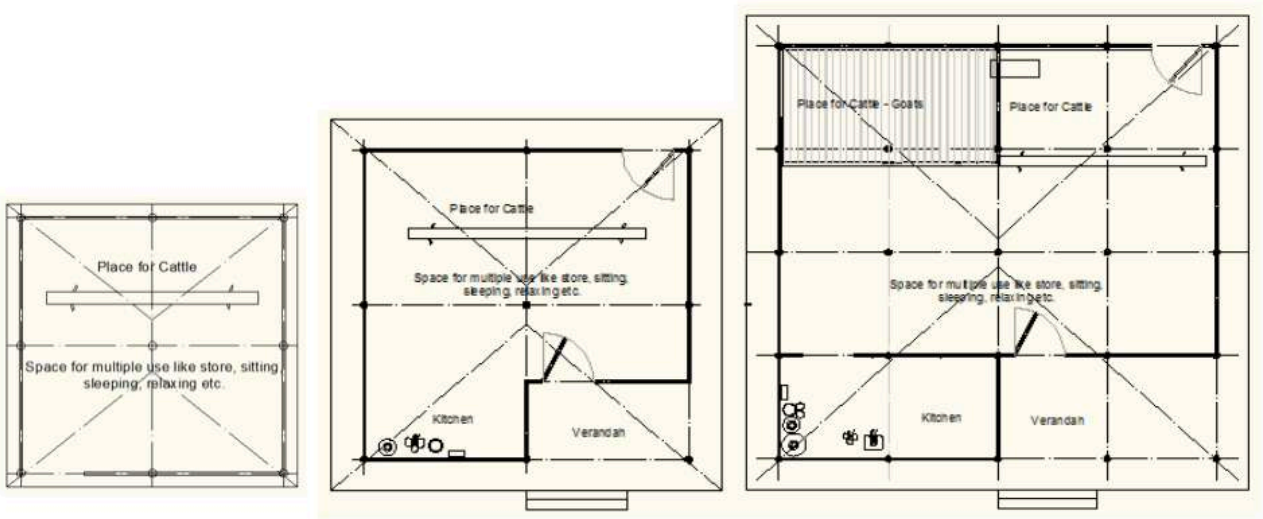

Fig 8 : Plans of Different House Types.

During the study, three type of WARLI houses that is been observed are with areas from 40 Sq. Mt to 150 Sq. Mt. The Smallest unit is not more than 40 Sq. Mt. with no space left as Veranda, one corner of the house is been used as kitchen whereas rest of the space is occupied by the animals. Attic, which is not been fully partitioned, is used for storing few goods. These houses are stand-alone without any space for

[10] (Source: remidesouza.blogspot.in)

storing or used as a kitchen garden. These units will have only one door. These structures are constructed using nine posts. Bigger houses typically belongs to a higher income group people, which will comprise of Veranda, Kitchenette and small cattle shed within the house. These houses consist of two doors with no windows, finished with good quality of materials and double layer of khuttas (posts) to support the house. These houses are more than 55 Sq. Mt up to 150 Sq. Mt.

Contemporary structure retaining the form have retained the areas of traditional structures. The posts and roof members are similar to vernacular structures, whereas the walls are constructed using bricks with no mortar, in majority of the cases or mud mortar. The walls are exposed brick walls with concrete flooring and Mangalore tiles as roof covering. Few structures seen with complete modern influence on them and constructed with rectangular form, brick walls with cement mortar, plaster, and flat roofs. The cattle is shifted to cattle shed outside the house and ceramic tiles used as flooring. Interestingly, these people have retained their vernacular structures and use them during summer seasons.

4. TRADITIONAL BUILDING COMPONENTS:

WARLI house is simple plan with framed structure, with building components like foundation, Plinth, posts (Khuttas), beam (Bahal), rafters (Saara), battens (Ripat), Karvi walls (Kudachi Bhint), roofing material with Karvi wood, dried Tadi leaves, Mud and Cow dung plaster. Wood gathered from the Jungle; used as structural members for construction of house. The building materials traditionally used in the construction are paddy straw, thatch grasses, fibres of Sisal or Ambadi (Hibiscus cannabinus - Kenaf), bamboo, Karvi, wood, mud, cow dung, stones etc. Now a days there are other materials like bricks, cement, AC sheet roofing, RCC precast posts, Steel, lime. The roof with sloping angle of 30° is pyramid supported by Central post called as 'Dharan'.

Fig 9: Arrangement of structural members in a typical Warli house:

For Larger houses, a second layer of posts or khuttas are eight in number and laid around Dharan at a distance of about 1.5m to 2.1m, with height of about 2.1m to 2.25m. Khuttas support a grid of wooden beams called as Bahal (Bahal is a terminology used by the people for horizontal spanning tie beam/member). Smaller khuttas of height of 0.15m to 0.9m high is been supported on 'Bahal' supported around the 'Dharan' as required for the slope of 30° for the roof above.

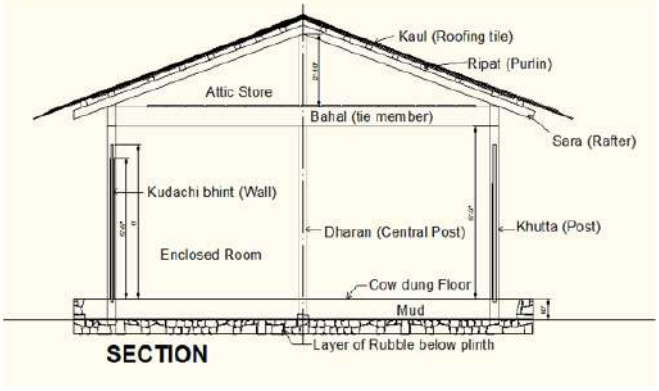

Fig 10 : Section showing various building components (Typically for Type 2 House)

The 'Saara' (Incline member that acts as a rafter) are been then laid on the 'Bahal', which are laid on the Outer 'Khuttas'. 'Saara will Span from Central Khutta called Dharan to Bahal located as tying member of the outer khuttas, with an angle of 30° and usually placed 0.3m to 0.45m distance on the Bahal. The Saara projects beyond the line of Khutta so that it becomes a roof projection. The Ripat (Ripat is a member which is similar to purlins in a truss) are supported by Saara, and supports roofing material above. Thatch is a traditional roof covering material and is getting replaced by Clay, Mangalore tiles GI sheets or AC sheets.
The height of the core is usually five hands (2.25m or 7'–6") on the top is an attic used for storage. For the larger houses, the house expands on the sides of the core, adding a frame of wooden beams (Bahal) and short posts (Khutta) raises the height of the core. The two posts over a beam that spans across the central post of the core carry the ridge.

4.1. PLINTH:

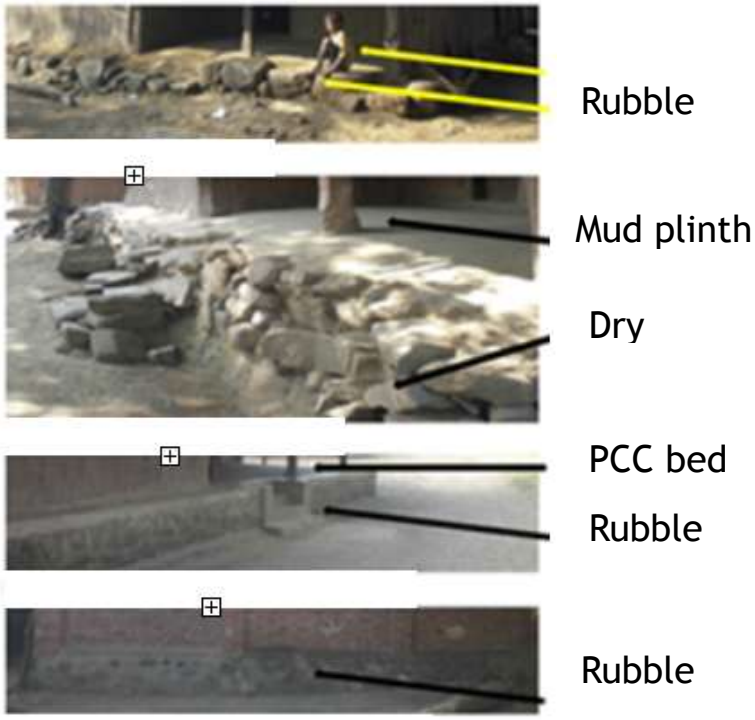

Fig 11, 12, 13 & 14 : Different Plinths for Warli structures

Typical WARLI houses have a low plinth of 0.3m (12") to 0.45m (18"), of soil with stones placed to retain the soil. Plinths is projected out of the external walls by 0.3m to .45m to protect the external walls from flowing water, dampening of walls and splashing of rainwater onto the wall. The quality of construction and the materials used as a mortar and joints depend on the size and economic conditions of the house owner. Plinth retaining wall, constructed in stone would be dry rubble soling or with mud mortar.
Plinths of contemporary houses constructed in stone retaining wall with cement mortar and in few cases cement plaster and PCC floor; which replaces the traditional mud and cow-dung flooring. Some houses also constructed with Shahabad and Kotah stone flooring. Flooring generally constructed with 1:7 slope, where animals stay within the house. Recently, structures with external brick walls do not have plinth projections. The height of plinth retains the same height as the vernacular structures.

4.2. VERANDAH:

A typical feature of WARLI house is a rectangular Veranda, which is been seen in all the structures except smallest unit. These Verandas are part of the square plinth constructed for the house. Typically, these verandas will be located on the right side of the person viewing the structure. Veranda is been covered by sloping roof, which is supported by one or two posts (Khuttas) depending on the size of the veranda.

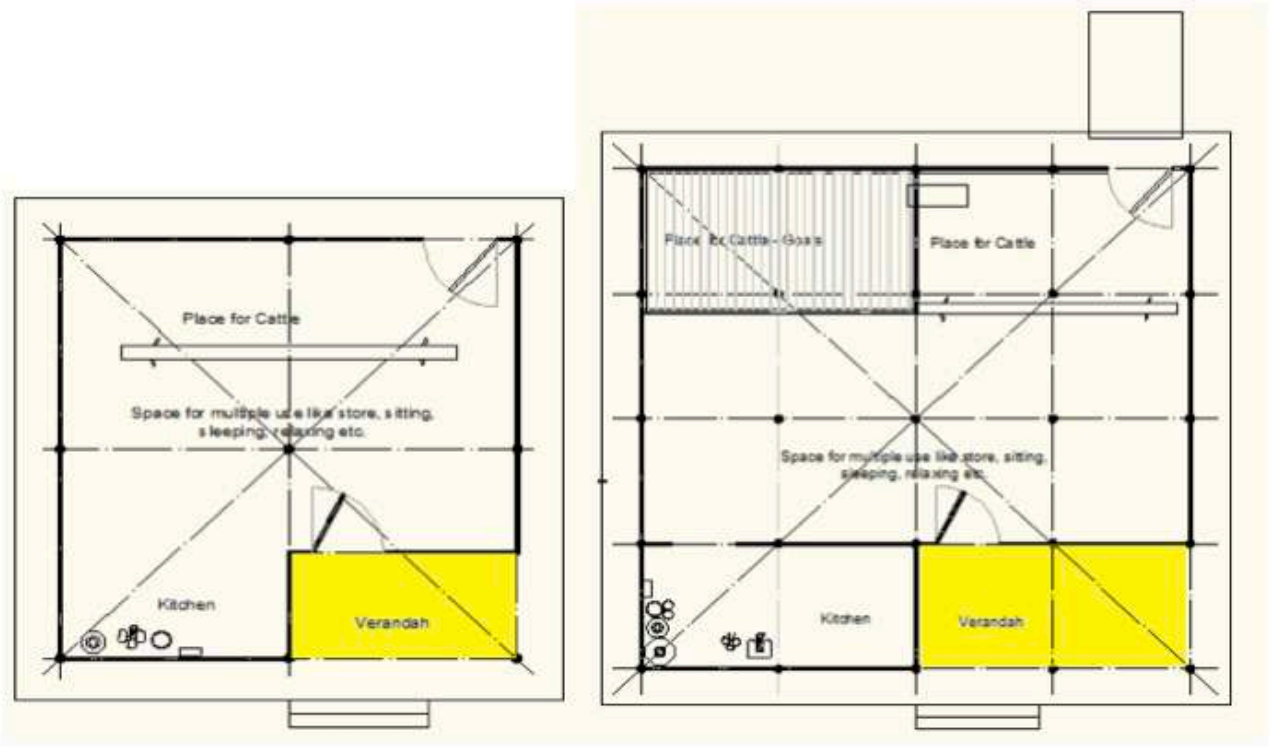

Fig 15 : Veranda for Medium and Large House.

In contemporary structures, people are still constructing the veranda, but these are not necessarily carves out from the square plinth, but is rectangle in shape. These plinths runs along the full length of the width of house.

Fig 16 : Veranda of new houses breaks from traditional veranda.

4.3. WALLS:

In vernacular WARLI house, walls known as 'Kudachi Bhint' constructed out of sticks of Karvi plant. These are thin panels of 0.035m (1-1/2") to 0.05m (2") thick, connected to the khuttas by binding with thread taken out from karvi sticks or bamboo. The sticks are tied together next to one another using local weeds

or creepers usually Ambadi. Panels of 1.5m to 1.8m are prepared and then tied to the posts on the external side and coated with mud and cow dung plaster.

Photo 17: Woman applying cow dung plaster on wall.

Photo 18-26: Walls with different materials from forest.

Source: Photo 24: www. Dinodia.com

Cow dung plaster is mostly preferred due to its water proofing qualities, and other advantages like less weight and more plasticity over mud. These panels can last for almost 10 years if protected from moisture. This is taken care by the plinth and apron as mentioned above and additional protection of 'Zod' in rainy season.

In contemporary structures, these Karvi panels and walls are been modified with panels constructed out of bamboo and wood. Recent constructions use red-burnt bricks, most of which are exposed brick construction whereas others are plastered with sand face plaster. Expose brickwork is outcome of financial constraints in majority of the cases.

Fig 27, 28, 29 & 30: External walls and opening

Fig 31- 38 : Different Materials used for door

Traditional slit openings above 2.1m height (typically to avoid direct draught of cold or hot air at the body level) are now replaced by the small window opening kept in the external walls. These windows not wide enough to give necessary air changes required for warm and humid climate and do not lit the

internal spaces. WARLI's staying in these building though are proud owners of modern structures confronted that they use vernacular structures during extreme weather conditions.
The direction of the doors are maintained to east side even in the vernacular structures, even though the materials such as Plywood, Flush doors, fibre doors used for doors replaced traditional wooden and karvi doors.

4.3. ROOF AND ROOFING MATERIALS:

Sloping roofs with inclination of 300 is a typical outlook of any structure with large overhanging roofs is a direct response to the climate of the region. The height of these overhangs from the ground level will be 2.1m to 2.25m. So that there will be less impact of the strong wind current prevalent in the region.

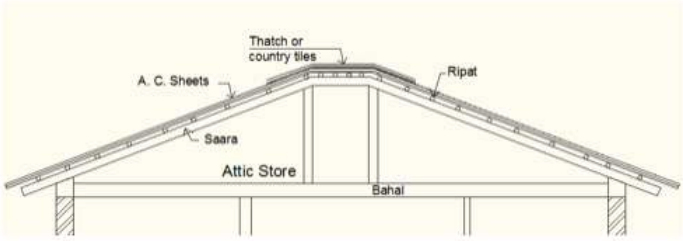

Fig 39 : Structural Members of roof for long span

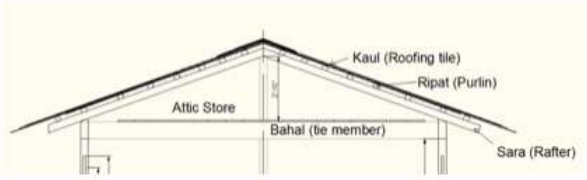

Fig 40 : Structural members of roof for short span

Fig 41 : Small Khuttas placed on Bahal to support top of the sloping roof.

Mostly all the members are wooden found in the jungle, dried and used without refinement, but now a days they have started using precast concrete members. While discussing with the residents, they narrated one incidence in which one of the villagers have used steel M. S. Angles instead of traditional wooden members. Eventually, within couple of years, these members became rusty and the whole structure fell down causing serious injury to residents. Since then, steel is been banned from that particular village.

For roofing, traditionally, thatch and country tiles were been used. The old straws were been replaced every year and used in farm as manure. This material dose not leak in spite of heavy rains if laid neatly. It gives good thermal insulation. This roof breathing adds comfort of the residents when compared to any other roofing system. In contemporary structures these traditional materials are been replaced by Mangalore tiles, AC sheets, GI sheets, RCC slabs.

4.3. ALTERATIONS:

WARLI's even though follow a strict technical geometry, which they have evolved through the traditional knowledge; they still have freedom in allocating various spaces with variations in it, which is spontaneous. With the introduction of country tiles and Mangalore tiles, nearly 70% of the houses have changed the roofing system to opt for more robust and less maintenance system, which has more life than the thatch roof. The tribal or WARLI houses are more like action and process rather than somewhat static structures of the urban houses as these structures could be easily modified and altered. The exposure to metropolitan areas has influenced WARLI's, which is been seen in use of more robust materials in building construction.

The exposure to the modern construction material and techniques have tempted few well-to-do people to shift from use of traditional materials to new materials such as Bricks, Pre cast RCC posts, Cement Concrete, A. C. Sheet, Mangalore tiles, M. S. steel members, G. I. sheets, Concrete jali's etc. This has resulted in construction of a permanent structure to which maintenance is not required very often, but it has reduced the comfort level for the people staying in the built form. This has prompted people to do a house extension, which are been built traditionally. Therefore, the house form is now becoming an interesting combination of modern structure with traditionally built structures. This might be the reason why people are not using the houses provided by the Government under Indira Awas Yojana & Gharkul Yojana.

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Track 4:
Habitat

Lessons From Traditional Indian Housing

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ABSTRACT

Planning and Housing design in India date back to Indus Valley Civilization of 3000 B.C. Settlements had evolved in various parts of country since then with different characteristics everywhere. Housing had been an integral part of these settlements. Author has visited and studied the traditional housing in various parts of country. These traditional Housing designs or evolved forms are not mere group of buildings, but in integration they have various forms and typologies. They are success stories of chemistry of built and un-built spaces, human interaction, and spatial experiences. They have much scope of personalization and adaptation and have sustained since long time. This paper gives light on several such traditional housing forms and the specific points that can be learning for timeless and sustainable design of housing.

Keywords: Housing Form, Personalization, Socio-cultural characteristics, Spatial Experience, Traditional Housing

1. Introduction

The distinctive character of housing can be seen in India. Ar. Yatin Pandya11 says that Indian architecture is all about Resilience, Caring and Sharing, Pluralism of existence, vitality and response to climate. Every part of India has such character of architecture in housing. The rural and urban both types of areas have such characteristics. The architecture of Wadas of Maharashtra, and Mandya Pradesh, Mohallas of Madhya Pradesh and Uttarpradesh, Havelis of Rajasthan and Gujarat, Kothis of all north Indian states, Pols of Gujarat, Chetiar houses of Chettinad or in Portuguese and Brahmin colonies of Goa are some examples to observe all these qualities. These typologies have been studied as background for this paper and the learning has been listed down.

2. Observations in traditional housing forms

This portion of this paper throws light on the differences that present day housing and the above mentioned housing types in general. The studied typologies have been called as traditional housing form and present day housing refers to high density, medium rise apartment housing coming in fringe areas of growing Indian cities in this paper. Following are the distinct characteristics that are gradually disappearing from present day housing. The different characteristics have been observed under following headings.

2.1. Sense of security

Right from the Prehistoric time, man has understood his social nature, and his sense of security was strengthened by society. The housing was in the form of inward looking Ephemeral of Transient dwellings (Schoenauer, 2000). They had built it and later abandoned however with inward layout people had sense of belonging with each other. The Harappan civilization also had inward planning (Singh, 2006) where the dwellings surrounded a courtyard and acted as common part between single and multiple family units.

[11] Notes taken from Ar. Yatin Pandya's workshop during 3-days workshop on Housing at Brick School of Architecture, June 2018

The Wadas of Maharashra (Gupta, 2013) or Pols of Gujarat are similar cases where housing has functioned as sense of togetherness. Like gated communities of present they had one common gate for the premises. In spite of not having locks, security checking, or CCTV cameras the crimes like suicides, theft, murders were less in these areas. Also there were no cases of depression or mental illness.

2.2. Architectural language and respect to the surroundings

The language used by traditional housing form lies in use of locally available materials, construction technologies, structural system, ornamentation and climatic responsiveness. The architecture never dominated nature, but had become integral part of it. The selection of mud, thatch, wood, stone or bricks in these typologies was based on availability in the location. The rock cut architecture12 is one such example, where monks stayed in caves that were beautifully carved with ornamentation and settled in their origin. The natural topography was taken care and respected by design.

2.3. Human scale, and modular design

The spaces have been worked out to fit the human scale. The Vedic villages (Korotskaya, 1980) were based on modular system. Human height, i.e., measurement of 180 cm has been called as Danda, and Human hand, i.e., measurement of 45 cm has been called as Hasta. The length and breadth of streets, plots, rooms and open spaces, all are based on these two units of measurements. Dwelling units of all ancient settlements are not more than 2-3 storied heights. The sizes of doors, windows and openings also have proportional relation with each other. These modules were not restricted till one house but the area had followed the same modules and proportions.

2.4. Transition spaces

The gradual transition through spaces has been given utmost importance at housing cluster level and also at dwelling unit level. The transition through outdoor areas to semi-covered and then to enclosed areas help in giving time to human body to get conditioned gradually from extreme climate of outdoors to comfortable climate of indoors. The design of openings with shading devices like Jharokha etc, are also similar examples.

2.5. Experiential architecture

The architecture of these areas is expressive and inclusive for all the activities and people. These housing types create experiences in throughout its lengths and breads. The pauses and human interaction in terms of walking through the streets, and courtyards and then entering13 to a house are the unique experiences that one can sense in these housing. There are multiple common areas where spaces give opportunity to people to pause, talk, and work together for common reasons. All human senses to experience the space, i.e., hearing, vision, smell, and texture have been thoughtfully considered in the traditional housing. The tradition of washing the feet right at the entrance of house and then walking bare feet in court is very common culture in most of the parts of India. Every flooring material in various areas can be experienced by touch of feet in these areas. The visual tour is an experience, as the spaces are combination of open, semi-open and covered areas, and transparency is maintained through semi-open spaces. Similarly, the hearing environment is governed by the placing the activities in vicinity, sounds of people, bells of temple or Azans in mosques, etc. The attempts were made to respect the activities happening in housing instead of hiding them with architectural barriers. The buildings and spaces can be identified by sounds and aroma of the places like kitchens, or place of worship or work places etc.

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[12] Observations done in Ajanta Caves, Pandav Leni at Nashik and Karla caves on Mumbai Pune Expresss highway

[13] As experienced by Author in the ancient housing of Jodhpur city

2.6. Spaces for domestic animals

Animals have been domesticated since ages, and the housing in traditional areas had specific areas for them. Even in the prehistoric time, a dog was essential member of group (Schoenauer, 2000). The pattern of domestication is changed now. Cattle or horses are not domesticated nowadays. But human nature is to love pets, and in the present day the housing may take lessons to be pet friendly architecture.

2.7. Scope for personalization and Aesthetic sense

The traditional housing forms had adopted a language, but there were no repetition and every house had scope of personalization. The door designs, design of Tulsi planter in front of house14, the plants at the doorstep, color selection, everything had a unique character and define the space as per personalization. The present day housing is missing upon this area and hence there is risk of loss of direction for the people visiting the area. Figure 1 shows an example of such personalization done in a house in Tryambakeshwar, Nashik.

The Vedic villages are known for use of sculpture as essential element of architecture. The art in the architecture can be observed also in the ornamentation of steps, balconies, capitals, ceilings and also in wall paintings. Perhaps this is the reason why these buildings still act like a set for a number of cultural activities.

Figure 1: A house in Tryambakeshwar, Nashik

3. FINDINGS AND DISCUSSIONS

The housing in these areas follows some architectural language, and the built environment is settled in the surrounding landscape and nearby buildings. The human scale has been given utmost importance and hence they are comfortable to eyes of people of all age groups. The use of local materials and technologies are the primary means of sustainability. Modernization of such use to suit today's climatic conditions and changing lifestyle is the area where profession of architecture may help. Housing must be designed with sense of belonging and inclusiveness. Though there were some private areas, but the life of community has been imagined at dwelling level and also at community level. The gated communities of the present have brought a culture where the privacy has been given utmost priority. In order to maintain privacy, sometimes human interaction is just ignored and it raises sense of loneliness and metal diseases governed by it. The up gradation of the housing in terms of advanced services, technologies is need of the hour, but not at cost of physical and mental health of people. The common part between the past, present and future housing are human beings, comfort conditions, and community. The design considerations for human nature and feelings can be learned from past and incorporated in the present.

[14] As observed by author, that every house in Ponda area of Goa have different design of Tulsi Planter

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Changing Housing Trends & Political Influences

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ABSTRACT

It's all about political decisions, agendas, policies which impacted the housing and its overall fabric during last 70 years, which divided country into Bharat and India. It's a clear vertical split in society, their housing and economic zones, like Rural, Rurban, Urban and Metro. Everything changed worldwide during the last 50 years. Housing, which is also not untouched? So many trends originated from social, cultural, economical impacts and majorly influenced by Political policies, vote bank politics or due to election agenda. Decisions taken under political influences ruined rural India, changing its fabric and distributing it in many ways.

It also impacted the character of vernacular architecture in different regions, and changed housing trends bringing in cheap quality, mediocre planning & questionable Material quality and type. Our policies are creating smart cities and also poor villages, slums within city. Gandhiji said," Go to villages."

But unfortunately, the political agenda of past governments unknowingly promoted rural to urban migration this study focused on,

Changing housing trends in Gaon, Shahar and Mahanagar due to political influences.

It is also resulting into ruined Bharat & uncontrollable Urbanization in India with poor infrastructural support.

Key words: Change, Housing, Impact, Polities, Trends.

1. INTRODUCTION:

Political willpower or decisions always influences various sectors and the overall growth of region. Housing is one of the sectors which always influenced in good and bad ways due to political influences. There are so many examples in history like Nalanda, Fatehpur Skirl, Jaipur, Aurangabad, Chandigarh, Amravati (New).The decisions taken by rulers developed or destroyed the cities and housing. Most of the time the decisions were politically motivated or sometime reasons beyond their control forced them to take such decisions. Due to such political decisions only there is a clear split in Rural and Urban India. All facilities like good roads, hospitals, schools, markets, Industries, employment were focused/concentrated in urban areas, so Population migration was always from Rural to Urban. That migration also impacted these housing trends in all the eras. There are so many factors, which influenced these housing trends but I am focusing only on Housing trends influenced by politically motivated decisions.

2. HOUSING & HOUSING TRENDS

As per Oxford Dictionary, Houses and flats considered collectively. As a housing development'

As per Business dairy - Buildings or structures that individuals and their family may live in that meet certain federal regulations. Different housing situations vary for individuals and may depend on age, family, and geographic location.

As per Wikipedia Housing, or more generally living spaces, refers to the construction and assigned usage of houses or buildings collectively, for the purpose of sheltering people —the planning or provision delivered by an authority, with related meanings. The social issue is of ensuring that members of society have a home in which to live, whether this is a house, or some other kind of dwelling, lodging, or shelter

Housing Trends-

Housing trends are nothing but type of housing . Housing trends are also related to style, elements, features, characters, aesthetical qualities, areas, Materials, technology used for the development of housing. These are the factors which always influence the housing trends. While studying housing, we can understand the shift in trends by analyzing these factors.

3. POLITICAL INFLUENCE:

As discussed before, in almost all the eras, kings, rulers or politicians were the one who took decisions for betterment of people or decisions as per their personal or political will.

3.1 Political influence in pre Independence period: In 12th Century, Mohammad Tughlaq shifted his capital from Delhi to Daulatabad with his total population and again back to Delhi with tremendous loss of property and manpower. Planning and development of Nalanda, Fatehpur skirl, Jaipur and Aurangabad are some of such examples. We also observed the destructions of these cities by other rulers during or after wars and Shifting of Cities due to scarcity of water or Political shift of capital, like Fatehpur skirl, Amer to Jaipur etc.

3.2 Political Influences in post Intendance period:

3.2.1 Pandit Nehru's policies for Urbanizations:

Prime Minister Pandit Nehru & Chandigarh: Though French architect Le Corbusier designed the city, it was Prime Minister Pandit Nehru's idea to build a planned city as a capital for Punjab and Haryana states. He made sure that Chandigarh is built to be a model city for the rest of the world.

The city shares a close bond with Pandit Jawaharlal Nehru, India's first Prime Minister. ... The city shares a close bond with Pandit Jawaharlal Nehru, It was thanks to his vision and foresight that the City Beautiful was born in and looks the way it does today.

Dr PC Sharma (53), eminent museologist, says, "Chandigarh was Nehru's dream. Le Corbusier has undoubtedly done a great job but is important to realise that Nehru was the one who backed him. Nehru himself took deep interest in Chandigarh; he was instrumental in choosing this site for the city. All that we see today in the city, the roads, the parks, the ecology, Nehru had a part to play in it all. He made sure that Chandigarh is built to be a model city for the rest of the world."

Nehru's imprints are all over the city though one seldom notices them.

"As Corbusier had a very distinctive sense of style, even architects were not able to understand those designs. Nehru just looked at the designs and approved them. He said 'Yes'. One can imagine the amount of vision he had and how supportive he was," he says. The renowned architect goes on to say, "Le Corbusier had constant support and patronage from Nehru, it is only due to this support that he could do what he has done. Corbusier had very new and innovative ideas which seemed strange to most people but Nehru always supported him. Today, we see those very ideas work wonders."

3.2.2 Indira Gandhi's Garibi Hatao slogan in 1971: Garibi Hatao & Indira Awaas Yojana, was the theme and slogan of Indira Gandhi's 1971 election campaign and later also used by her son Rajiv Gandhi and later by her Grandson Rahul Gandhi during his campaign for 2019 General election. The slogan and the proposed anti-poverty programs that came with it were designed to give Gandhi an independent national support, based on rural and urban poor, which would allow her to by-pass the dominant rural castes both in and out of state and local government; likewise the urban

commercial class. And, for their part, the previously voiceless poor would at last gain both political worth and political weight. The programs created through garibi hatao, though carried out locally, were funded, developed, supervised, and staffed by Government officials in New Delhi and Congress Party officials. All in all, garibi hatao did little and accomplished less: only about 4% of all funds allocated for economic development went to the three main anti-poverty programs, and precious few of these ever reached the 'poorest of the poor', but it did help secure Gandhi's election It was part of the 5th Five-Year Plan.

3.2.3 Barrister Antule's Cement scam: On 13th Jan 1982, Chief Minister of Maharashtra was forced to resign after being convicted by the Bombay High court on charges that, he had extorted money for the trust fund he managed. The court also ruled that Mr. Antulay had illegally required Mumbai area builders to make donations to Indira Gandhi Pratibha Pratisthan trust. one of the several trust funds he had established and controlled in exchange for receiving more cement than the quota allotted to them by the Government.

3.2.4. Dr. Datta Samant's Mill strick in 1982 which changed skyline of Mumbai:

Dr Datta Samant whose strike call on January 18, 1982, brought 62 mills and their work-force of 2.32 lakh to a standstill, the owners were working on plans that would bring the mills back to work at full swing. Broken from the crippling effects of long-term unemployment, textile workers have, in the last three months, been pouring in more quickly than they can be absorbed. By early July, over 1.17 lakh workers were showing up daily for work in 51 of the city's mills, compared to daily attendance of around 1.75 lakh in October 1981, before they had shut down. Of the 62 mills, 47 were being run on a three-shift basis although in many the machines were only partially employed.

This strike changed the entire skyline of Mumbai. Most of the mill owners shut down the mills and Govt also changed their policies which were in favour of Mill owners with huge land parcel in the middle of city. With extra benefits, TDR and FSI within next few years Mills are scrapped and huge skyscrapers; towers were planned and constructed in South Mumbai, Lalbagh, Parel, and Dadar.
Today we can see High-rise towers and Malls in Bombay dyeing mill, Phinex, Kamala mill, Century mill, Kohinoor mill etc.

3.2.5. Shiv Sena-BJP Govt. Slum rehabilitation scheme

During Shivsena- BJP govt. in 1995, Slum rehabilitation scheme was one of the most ambitious dream project proposed by Shivsena Chief Bal Thakre. Initially Housing unit of 225 Sq.ft. was given to the habitants. Then the size increased up to 269 Sq. ft.
In 2014, Newly Elected Prime minister Mr. Narendra Modi launched his extremely ambitious project, "Housing for All". The size of housing units allotted in this scheme is 325 sq.ft.
In 2016, just before BMC elections it is announced by Shivsena, as a political agenda that the size of housing units will be increased from 269 sq.ft. Up to 325 sq.ft. Shivsena compared their SRA scheme with Prime ministers housing scheme and announced the increase in area. This decision was politically motivated to win BMC, richest Municipal Corporation in the country this benefit will be given only to new proposed schemes.

3.2.6. Slum Regularization scheme by BJP Sena in 1995.

Shivsena chief declared in his 1995 election manifesto itself about the Slum rehabilitation scheme and regularization of slums in Mumbai till year1995, than that deadline shifted to 2000 then 2010 by Congress. Such announcements lead to extensive migration of labor class and unemployed people from all over the country, majorly from UP, Bihar to Mumbai. Such major migration is impacting on Housing needs, conditions, Infrastructure and quality of living in Mumbai.

4. RESULTS

4.1. Gaon: After Independence during last 70 years the focus of government slowly shifted from agriculture to Industrialization and now towards IT sectors. All the public amenities, good infrastructure, Quality Education, Healthcare facilities are concentrated in Urban areas, in cities. Most important need of Agriculture sector was Electricity, Water and quality seeds/ fertilizers. But even after 70 years Govt. could not satisfy them with sufficient water and electricity and value to agri products. So young population shifted to Towns, cities, urban areas for education and then for employments. These people never turned back to rural area of their roots. For infrastructure, good healthcare facilities also this rural population is still depend on urban areas. Water for agriculture and drinking water scarcity and continuous droughts totally spoiled the Agriculture sector and rural housing. Farmers lost their confidence in farming and the count of suicides is still increasing. Government is giving grands of 12000/- for toilets but due to scarcity of water such schemes are not getting success and we are missing priorities.

4.2. Shahar: Governments all schemes, All Educational, Healthcare institutes are located in cities/ Urban areas, Industrial sector is also located near urban areas. So there is a major migration from rural to urban areas during last 3-4 decades. These poor unemployed people cannot afford proper housing in Cities. So they start developing illegal slums and living in them with favor of local corporators, gundas and officials. This is spoiling the overall cityscape and increasing load on city infrastructure. Day by day this type of illegal developments and schemes like Gunthewari and political supports to such schemes majorly affecting the living conditions in Shahar/ cities as well.

4.3. Mahanagar: Mahanagars like Mumbai, Delhi, and Kolkata are the most affected cities due to the major shift of population or migration from all over the rural and poor areas, states in search of employment. This phenomenon gave rise to illegal slum developments and underworld crime. Even after the declaration and execution of SRA Schemes. These people are giving their houses on rent and they are shifting to slum areas with the confidence that may be due to Govt. decisions or election plans they may get more free houses in Mumbai.

5. CONCLUSIONS:

Considering all these case studies and the overall migration scenarios supported by Political leaders or strategies just for short term political gain, they are doing a major crime as far as Developments in Rural and urban areas are concern. Agriculture sector and traditional rural housing is getting destroyed due to lack of vision and support by government, natural calamities and unplanned developments with poor long term vision and planning. So it is the fact that, you cannot think of development only in Urban areas and neglecting rural areas. It is going to impact your proposals and plans. So Smart cities will be possible hand in hand with smart villages and with less political interference for short term vote bank politics but Long term vision can only develop Bharat and India together.

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Lessons From Traditional Indian Housing

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ABSTRACT

Over the past years, it is seen that housing and habitat pattern has changed due to various factors such as climate, socio-cultural economical, land availability, natural calamities, government policies etc. Also besides these factors, there has been a continuous change in people's lifestyle and living condition in order to improve the quality of life. These changes in housing trends often lead to transformation of urban morphology of an urban area/city.
In regard to this, the paper tries to compare the change in housing trends taking various surveys of housing patterns in the city of Mumbai. It will further focus on the socio-economic factors influencing the housing trends taking examples of occupational based housing such as Koliwadas, kumbharwadas etc. and government policy based builder housing such as SRA, MHADA etc. and it further will show a comparative analysis between the traditional pattern of occupation based housing and the present and future scenario of these housing typologies.

Keywords - Housing trends, Socio-economic factors, Quality of life, urban morphology

1. INTRODUCTION

There are many aspects of living conditions, amongst them the basic and important one is housing and it is equally important in all countries and communities. Since the time of early age and Stone Age, man has always been developing his living conditions as per various factors and situations such as climate change, environmental factors, change in social behaviour/culture, increase in population, occupation and economy etc. With respect to this, these factors play an important role in the evolution of housing pattern or housing typology. On the other hand, with the advent of time, there is also a change in the housing typology or housing trends. The change in housing trends may vary from place to place due to geographical aspects, increase in population, change in occupational pattern, land availability, government policies, economic factors, and affordability etc. The paper tries to focus on the study of occupational based housing typology of Mumbai city, taking examples of Kumbharwada (potter's community) and Koliwada (fisherman community) settlements with respect with their occupation pattern, cultural context, evolution, govt. policies under which it took shapes, economical factors etc. and understand the change in pattern in the present day situation.

2. METHODOLOGY

For the purpose of the study two occupation based housing typology was selected. Kumbharwada housing typology situated in Dharavi and Koliwada housing typology along the coastline of Mumbai. Literature studies through secondary data were done to understand and analyse the change in housing typology. Further a comparison is done with the traditional and present day housing typology and the change in housing trends.

3. STUDY OF THE HOUSING TYPOLOGY

As any other urban area with a dense history, Mumbai has several kinds of house types developed over various stages of its history. However, unlike in the case of many other cities all over the world, each one of its residences is invariably occupied by the city dwellers of this metropolis (CRIT 2007). Various communities are spread in parts of the city as per their income, kind of occupation and provisions of state government. In today's condition it is very difficult to buy a house in these areas for the lower middle income group family. Most of the fisherman, potters, broom makers, show maker etc. communities live in the village settlements which are constructed by their forefathers these settlements are organically formed as per requirement from many years also some of the houses are built as per rules provided by government and private sectors. These housing structures are mainly of three types which consist of Pucca houses, semi Pucca houses and kutcha houses.

3.1. Kumbharwada Dharavi

Kumbharwada is a potters settlement it's a home of the pottery industry which is one of the most famous local craft. It is located in the southern tip of Dharavi and occupies 5 hectares of land. This settlement is one of the first formed settlements in Dharavi with others like tanners, masons, blacksmiths etc.

Migrated potters from Gujarat started settling in this area in late 1900. (Cameron 2018) They brought their family trade with them like many others in the city initially Dharavi was the outside part of city limits between two railway lines, the land of marshes with no agricultural value today attracts highest property prices in the city. As Mumbai started expanding on northern side Dharavi became the central location. Increasing population and property prices in the city attracted government and private sector to the piece of land of Dharavi. Government proposed Dharavi redevelopment project where slum houses and settlements like kumbharwadas to rehabilitate in the high risers with apartment of 25 square meters for future. As mentioned in the Down to earth magazine Dharavi's most of the land is owned by Mumbai Corporation, Railways, Maharashtra housing and area redevelopment authority, state government, kabarastan and private land owner. Land of Kumbharwada was given vacant land tenure by the MCGM15 to carry out pottery related activities in 1930s.At present there 120 small kilns which still carry out pottery related activities in the houses with workshops. (Architecture 2010)

The housing structures are single and double storied with workspace below and residential space above. These housing has spaces for workshops, raw material storage, finished product and tools, kitchen and resting area etc. Central courtyard generally has kilns and drying space. The kiln is a low platform of bricks and clay where pots are fired. Houses have road side shops to sell finished products. Ground structure of houses built with bricks and upper storey built with wooden or steel members covered with metal sheet.

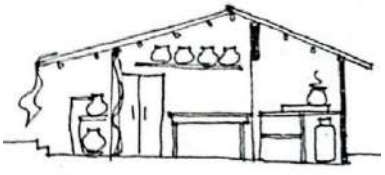

Figure 1 Kutcha house section

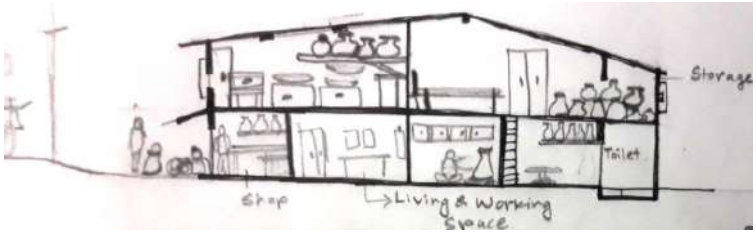

Figure 2 Pucca house section

15 Municipal Corporation of Greater Mumbai

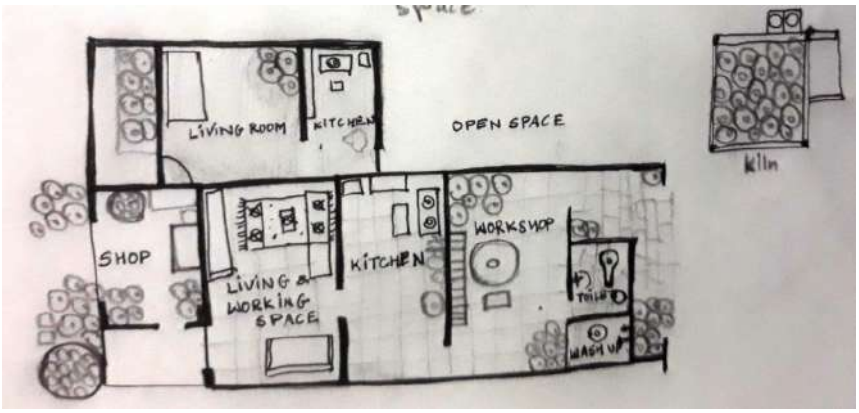

Figure 3 Plans of kutcha and Pucca houses

The lanes become smoky because of the kilns they have built near their houses or in between space of two houses. This smoke chokes the houses and lanes creating nuisance16 which is unhealthy for the community. (Cameron 2018) Waste material from textile and plastic industry is generally used to fire the kiln. In the proposals of Dharavi redevelopment it is not seem to understand the linkage between economy and culture where a single dwelling works as an enterprise itself. It is difficult to imagine such informally settled enterprises in the formally developed high rise structures. Many proposals are inclined towards knock down of existing kilns and rebuilding them into separate industrial areas outside the city limits. Such projects are problematic for self-made settlements like Dharavi.

3.2.Koliwada Worli

The Koli's were the first inhabitants to live on the islands of Mumbai. Their traditional occupation is fishing. (CRIT 2007) Men and women of this community equally contributes, as men go out in small or big boats for fishing and women sell those fishes in the market also they both participate in auctioning process of fish early in the morning and evening. There are various working groups in the community for different activities like street selling, auctioning, fish drying sorting etc. These activities are done communally.

The fishing village has central road which ends in the sea shore and small alleys connecting this road leads to the residential blocks, small restaurants markets glossary shops and another amenities. These villages have typical characteristics: Space for boats / jetties, space for drying fish, sorting and storing space net repairing and drying space, place for worship community gathering space etc.

The built form has traditional and modern structures, traditional house type contains ground storey structures with walls built in bricks and Mangalore tiled sloping roofs the other type of housing is apartment or double/ triple storey buildings with one or two flats on each floor which are built by demolishing traditional structure and given on rental basis. Each house contains living room may be used for multifunctional activities, small room, kitchen toilets wash-up and veranda which plays a very important role for storage of tools and fishing nets. In some cases there are fish drying areas immediately behind the house on the cost side.

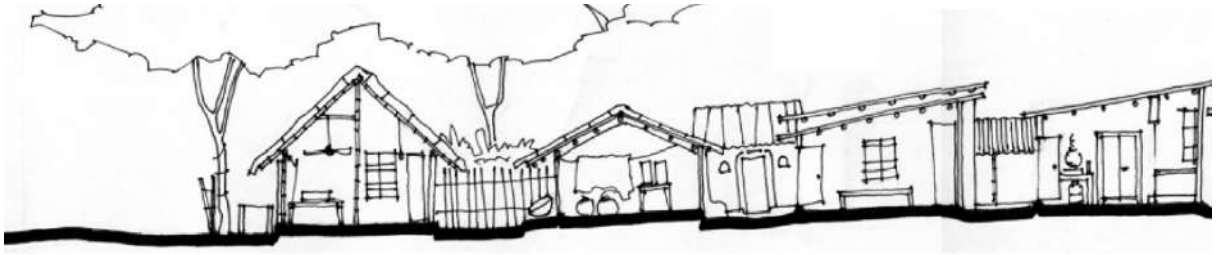

Figure 4 Koliwada settlement section

16 something or someone that annoys you or causes trouble for you

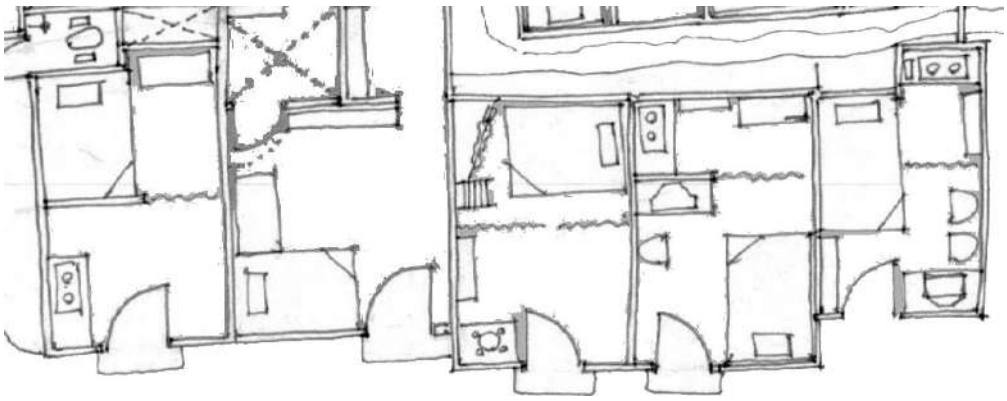

Figure 5 Koliwada settlement plan

4. Comparison with traditional and present

4.1 Kumbharwada

Traditional- land was provided on tenure basis to build houses and workspaces for pottery. Common spaces for kilns, drying spaces, shared courtyards.

Present - number of kilns decreased still carries out pottery related works.

- Open spaces and vacant land transformed as slums and used as residential or commercial activities.
- Houses has separate water electricity and toilet facilities
- Government and private sector are proposing high rise slum housing for this Kumbharwadas to get profit from the land with high prices.

4.2 Koliwada

Traditional- mud houses with small sloping roof structures.

- Single ground structures with kitchen, room and veranda.
- Source of income is fishing

Present-RCC structures found mostly with extension as required.

- Double triple storey structures with one or two flats on each floor
- Source of income fishing, renting and selling houses etc.
- Due to improved standard of living fisherman's are redeveloping their residential and commercial spaces

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AFFORDABLE HOUSING THROUGH MATERIAL MANAGEMENT

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ABSTRACT

Affordable housing is the buzzing word in today's real estate market. Housing plays a central role in improving the quality of people's lives. Safe and affordable housing provides personal, social and economic benefits; also it contributes to the health of individual inhabitant. It is seen in the studies that poverty is increasing with the growth of urbanization, the demand for housing in India is also increasing with it, which majorly caters to the low income group & below poverty line people. A low cost housing project can be an answer for one of the problem of poverty. Low cost housing can be achieved by use of efficient planning and project management, low cost materials, economical construction technologies and use of alternate construction methods available. The approach of this study is to scientifically and objectively evaluate construction material on the basis of cost effectiveness, seismic safety, energy efficiency & sustainability in order to address the range of housing needs in the country.

Keywords – Affordable housing, material management, sustainability.

1. INTRODUCTION

Affordable housing is a term used to describe dwelling units whose total housing cost are deemed "Affordable" to a group of people within a specified income range. (www, n.d.) Housing plays a central role in improving the quality of people's lives in both developing and developed countries. Safe and affordable housing provides personal, social, and economic benefits. Most directly, housing contributes to the health and safety of individual inhabitants. Housing also offers families a platform for economic recovery and is a means of employment generation. (J. A. Lee 1, 2013) In the 70 years of democratic existence, our government is still struggling to provide adequate housing to all. This is mainly because of cost of house building. The high cost of construction is not only because of the high cost of the materials and the high rates of wages, it is also because of the craze for the new fashion in house building which the large majority of our engineers are advocating and persuading their client to adopt. The shortage of housing in developing countries motivates the search for low cost materials that can be applied in the construction of affordable houses for poor people.

2. URBANIZATION & POVERTY

The demand for housing in India is increasing with growth in population & urbanization, which majorly caters to the low income group (LIG) and below poverty line (BPL) people. The Government of India (GOI) had estimated a shortage of more than 18.78 million homes at the beginning of 2012, of which 95% were in the EWS (Economically Weaker Sections) and LIG (Low Income Group) segments. Further, the country's total urban housing shortage is projected to be about 30 million by 2022. The Indian Government currently faces an uphill task of providing for more than 2 crore dwellings by the year 2022, which translated to almost 3 million units per year to fulfill its electoral promise of 'Housing for All by

2022'. (Sethi, 2018) Urbanization reflects the migration of rural population to urban areas. In 2020, nearly 40 % of India's population will be living in cities and urban areas and it is predicted that by 2051 the population of India would be almost equal in urban and rural areas thus aggravating demand for urban housing. (1Kishor P.Rewatkar, 2016) The poverty is increasing with the growth of urbanization which needs the special attention.

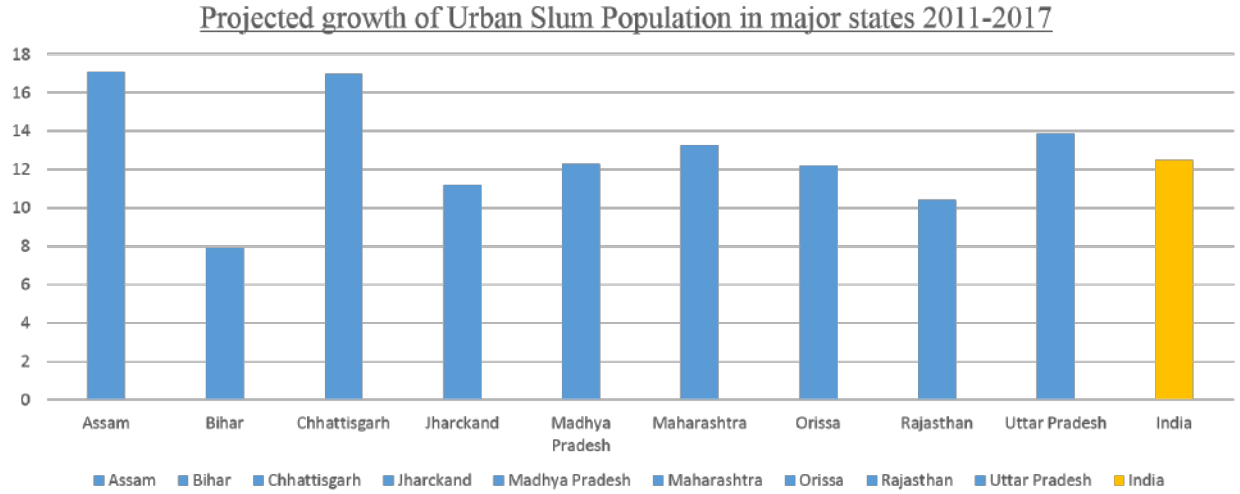

Chart 01 – Projected growth of urban slum population in major states expressed in %

3. ACHIEVING AFFORDABILITY

Affordability can be achieved through the matrix of:

3.1 Appropriate technology

- Use of renewable resources for building materials.
- Use of material resources based on waste products.
- Efficient use of existing materials by producing factory made (precast) building components.
- Industrialization of housing sector
- Affordability and sustainability.

3.2 Public private partnership (PPP)

- Timely delivery by developers.
- Ease of working by government.
- Transparency by both parties.

3.3 Project management

Most of the affordable housing projects of government lack in completing the projects in time due to various factors. To complete the planned or sanctioned projects on time is to achieve Time Value of money. This could be achieved by following the Project Management Process.

4. STRUCTURAL AND NON STRUCTURAL ELEMENTS IN CONSTRUCTION

The actual construction part has two different aspects of construction:

- Structural elements

- Non-structural elements

Structural portion of any building construction consists of RCC framed structure i.e. beams, columns and slabs. Non-structural part consists of non-load bearing walls, door- windows, plaster, flooring, electrification, plumbing, painting etc. These together constitute a building system. The structural members have very limited alternative systems to optimize construction cost. The Non-structural elements give a wide variety of alternatives which could be adopted to optimize construction cost and therefore Alternative material for Non Structural element like infill walls along with internal and external plaster is taken into consideration for the study which constitutes 23% of total project cost.

5. MATERIAL SELECTION FOR AFFORDABLE HOUSING

We are on the verge of a technology and materials revolution that promises lower construction costs and a solution to problem such as global warming, waste and housing for the masses. The first step to low cost housing material selection is to select eco-friendly building materials. This also enhances the sustainable design principle. The life cycle of building is Prebuilding, building and post-building stages. Each stage of building should be such that they help conserve the energy. These three stages indicate flow of building materials through different stages of a building. Pre-building stage mainly consists of manufacture which is subdivided in processing, packing and transport. The building phase mainly consists of construction, operation and maintenance whilst as the last stage would be disposal where the material can be recycled or reused. In Manufacturing of low cost building materials (G.VINAY KUMAR1, 2017)

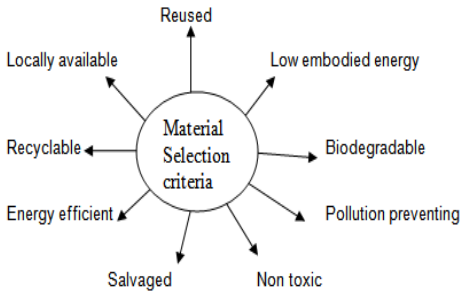

Figure 01 - Qualities of Material

- Manufacturing of building materials should be environment friendly.
- The total energy required to produce a material is called embodied energy. The greater a materials embodied energy; it requires a greater usage of non-renewable sources. It is therefore advantageous to use materials or composite materials prepared from the wastages.
- A use of locally available building materials not only reduces the construction cost but also is suitable for the local environmental conditions.
- Energy efficiently of a building material can be measured through various factors as its R value, shading coefficient, luminous efficiency or fuel efficiency.
- Use of toxic building materials can significantly impact the health of construction people and the occupants of the building. Thus it is advisable to use the non-toxic building materials for construction.
- The lower maintenance costs naturally save a lot of building operating cost. The materials used in buildings determine the long term costs of an operating.
- A material should be available in form which can be recyclable or reusable. A material should be able to decompose naturally when discarded. Natural materials or organic materials would decompose very easily.
- It is also a very important consideration whether a material decomposes naturally or produces some toxic gases.

6. WALL SYSTEMS USED IN HOUSING

Conventionally burnt clay bricks, hollow concrete blocks were largely used for constructing affordable houses. But these methods are time consuming and also they put pressure on the natural resources like soil and sand. BMTPC has promoted range of materials tried and tested as the cost effective material for walls in mass housing. In addition to the conventionally used materials there are various alternative technologies and materials developed by various research organizations, innovators and manufacturers

in India that are beneficial in the housing construction. As part of this study these alternatives were researched and the information collected has been provided in the subsequent sections.

Materials Parameters	Brick Masonry	Brick with Rat trap bond	Compressed Stabilized Earth Blocks (CSEB)	Aerocon Panels	EPS Panel	Autoclaved Aerated Concrete blocks
Easy availability of material	Available	Available	Available	No, since factories are located in metro cities	No, since factories are located in metro cities	Available
Period of construction	More as compared to panels	More as compared to panels	More as compared to panels	Less as compared to brick masonry	Less as compared to brick masonry	More as compared to panels
Saving of natural resources	Less, as brick earth is used	Less, as brick earth is used	More, as biodegradable raw materials used	More, as fly ash is used which is waste product of thermal power plants	More, as the panels are sandwich of expanded polystyrene and wire mesh.	More, as fly ash is used which is waste product of thermal power plants
Durability of material	Average	Good	Good	Good	Good	Good
Earthquake resistance of material	Average, as bricks are prone to collapse	Average, as bricks are prone to collapse	Average, as bricks are prone to collapse	Good as panels can carry earthquake load	Good as panels can carry earthquake load	Average, as bricks are prone to collapse
Indoor thermal comfort material	Less, as the bricks get heated quickly	More, due to presence of thermal insulated cavity	More, due to presence of soil	More, due to heat absorbing raw materials	More, due to heat absorbing raw materials	More, due to heat absorbing raw materials
Wastage material on site	Yes	Yes	Yes	Yes, but only door and window deduction material	Minimum	Yes
Reuse of material on site	Yes	Yes	Yes	No	Yes	Yes

CONCLUSION

Affordable housing schemes will not only reduce poverty but also it fulfills the dreams of a common man of having an own shelter. This study presents a comparative analysis of some of the materials that can be used as most suitable alternative for providing affordable housing. The approach of this study is to scientifically and objectively evaluate walling material on the basis of cost effectiveness, seismic safety, energy efficiency and sustainability in order to address the range of housing needs throughout the country.

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Rapporteur To The Conference

1. Welcome by Student of DYPSOA, Ambi
2. Invitation of guests to Dias
3. Theme description by Parnika and Nidhi (Students of DYPSOA, Ambi)
4. Introduction to Narendra Dengle
5. Narendra Dengle's Note:
    1. Present is an insight of past and future - Time, patronage and entropy
    2. How do we create patronage
    3. Nature - habitation - recreation - resources
    4. Human Sustenance
    5. Human Scale
    6. Time - Chronological, Transcendental
6. Shabbir Unwala's Note
    1. Actions that are abusive to nature
    2. Eco Design
    3. Biomimicry - Organism, Behavioural, Ecosystem
    4. His Works

Session 1:

Session Chair : Ar. Rahul Nawale

4.5. Green Facade

- Scarcity of land and resources
- High density, Lack of green spaces
- Aids in Waste management, Reduces Pollution
- Hypothesis: thermal comfort and wet garbage - with addressed by green facade
- URBAN HEAT ISLAND EFFECT is minimised using vegetation
- Add to aesthetics, supports biodiversity, noise reduction, etc
- Green Facade Systems
- Shade Effect, Energy Savings
- Wet Garbage issue - solved at source - Microbial consortium
- Green wall is a good solution as it caters two issues - provide vegetation and manage wet waste

Q. Can it be used in high rise structures?

Q. Are there any construction guidelines?

Q. Do you feel that the green facades are more affective in heat island or in heat gains?

Q. What roles do road networks play?

Comment - Limit your research to one of the aspects

4.6 Urban Agriculture: Multi-Dimensional tool for Smart Cities.

- Smart Agriculture, Smart city wont be complete without smart agriculture
- Starvation as a global issue, Food Security
- Sustainable food production systems
- Symbiotic Relationship between agriculture and urban environment
- Growing of crops and agriculture in and around cities
- History around landscapes that have practiced urban agriculture
- Juxtaposition of nature and built form
- Urban planning theories by experts - Garden city movement, etc

- Vegetation must not be thought of in isolation to the rest of urban design and planning theories
- Green roof, green facade, vertical Farming
- Highly recommended for smart cities

Q. What should be the limit of urban farming? Resources required?

Scarcity of land. more stress on urban areas. Hence it should be promoted as much as possible If neighbourhoods can produce their own food

Q. Can urban planning only happen in residential area?

Through laws we can manage each project to dedicate some space to urban agriculture. Laws can be generated according to demographics

Q. Would pollution affect the food produce badly?

Rather the opposite. Reduces the carbon footprint.

Comment - Abandoned areas in urban fabric can be incorporated with this theory
Research must be taken forward.

4.7 Pollution Absorbing Facades: An Ammunition For Healthy City Atmosphere

- Air Pollution - Main adverse effect of industrialisation
- Impacts and consequences of air pollution
- Vehicular pollution - Issue in India
- Air pollution related diseases increase
- Green Facade
- Facade performances
- Survey done in Talegaon
- Photo Catalysis - benefits

Q. How much cost will it increase

Q. Can the coating be used in other things like cars etc

No. it needs rough surfaces

Q. Can this be used on glass?

Yes.

Comment - Your focus is more on mitigating pollution and not reducing the pollution. You can research further to understand the application. Relate energy consumption and pollution control.

5.2. Properties and Applicability of EPS Panels

- Bricks are being used since years - but it's manufacture is not eco friendly
- EPS - Fabrication
- Examples of projects that have used EPS panels
- Load bearing in new material
- Characteristics of EPS Panels
  - Load carrying capacity
  - Monolithic
  - Seismic Performance - Light and rigid
  - Acoustic behaviour
  - Thermal Behaviour
  - Sustainability
  - Fire Resistivity
  - Cost Effective
  - Rapid Installation
  - Lightness, ease of transport and handling
  - Versatility
  - Design Flexibility
  - Adaptivity

- Restriction - not easily available, recyclable but only at the manufacturing plant

Q. Can it be used in foundation?

Q. Can you make some readings of the projects that use EPS panels.

Q. Capability to take live load.

6.1. Ayodhya, Interpretation of the Other

- Worked with heritage and conversation
- Similar situation to Jerusalem
- Interpretation of sensitive sites has to be done very carefully as a sentiments of a huge population are attached to them.
- Babri mosque as background
- Interpretation of contestation
- The chief aim of interpretation is not instruction, but provocation.
- relationship between visitor and interpretation
- necessity of "Good" interpretation
- Dark tourism - places which are related to death
- Tilden's(1957) principles of interpretation

Q. How is this the role of an Architect?

At present its necessary to increase public awareness first and then we can move upon restoration. I am talking from the capacity also of a Heritage Manager

Q2: Feelings of visitors, experience or information - which comes first?

Information and the story becomes the whole experience. If any scope to build on that site, we should go on for something like the Ground Zero design.

Q: Jalliyanwala baugh comes under this category?

Yes. Definitely.

Q: Whats your opinion on commercialisation of heritage sites?

Buildings are meant to be used.

Final Comments on the session:

- Researcher should focus on research part of information collection, collection data, verifying data, etc
- Conference in colleges are good to happen.
- Thanks to D.Y. Patil school of architecture.

Session 2:

Session Chair: Dr. Ravindra Deshmukh

6.4. Cultural Urban Forests: For Conservation of Culture

- What is an Urban Forest
- Cultural forest has community spaces installed in a green space
- Need of study and context, Losing tradition because of changing lifestyles
- how to revive old traditions using urban design
- Intensive research methods, Agnipurana - ancient planning guidelines
- Vedic architecture promoted eco planning
- Mughal period landscapes diminished
- British completely diminished religion and forests for land and timber
- Forests were used as context to build around
- How forests and ecology was used in ancient architecture
- Implementation of cultural forest - regional, macro and micro
- Holistic approach is needed using traditional teachings by ancestors

Q. Would you say the vast landscapes that the british got in also helped us?

Q. Pollution controlling plants are from abroad too, would you say that's a bad thing?

Q. To what extent can cultural forest be implemented in the haphazard growth?

It's very easy to do in small backyards and and other small abandoned spaces.

Q. In an age where people are moving away from culture and tradition how as architects can we promote this?

6.5. Regionalism in Architecture & Globalization

- Regional Architecture
- Factors that influence Regional Architecture
- Cities are losing Face
- Globalisation
- Architectural elements, material, technology, Characters
- Architecture that evolves in response to local needs
- More people should opt for regional architecture looking at the global scenario

Q. Why don't people accept globalisation with all its consequences?

Q. How can one promote regional architecture more?

6.6. Role of Street vendors in Urban Spaces

- Definition of vendor, street vendor
- Urban Spaces have street vendors - registered and non registered
- Self employment sector
- adds value to the economy
- in case of crisis it provides cushioning
- provides cheaper goods
- Scope for policy development
- Source of revenue generation
- types of street vendors
- no infrastructure available to accommodate their needs
- Street vendors are a big part of the urban population
- government has started providing infrastructure or "Vending Zones"
- Street parking
- we must find ways to include street vendors without isolating them
- inclusive planning as a solution
- role of street vendors is an important one and must be included

Q. How can we intervene in a way that they make more profits?

6.8. Warli House - Vernacular Vs Contemporary

- Warli Tribe - Context and location
- Agriculture is their main occupation
- Work all year round
- Warli traditions and culture associated to built form
- About the Warli People
- Zamindaari systems and its impacts on the tribe
- Village layouts
- Tribe wise villages
- Typical features of a Warli house
- Superstitions practiced by Warlis
- Warli house in response to climate

- Sustainability of the house
- Building components
- Karvi Hut
- Design principals of the warily people should be used to design the new structures in the area

Q. How Warli house have something to take from regionalism?

Q. How can the vernacular architecture respond to global warming?

7.2. Changing Housing Trends & Political Influences

- Housing trends are changing
- Political influence on changing trends
- Pre independence area - Jaipur, Fatehpur Sikri, Aurangabad
- post independence - Chandigarh
- Cement scams in the 1980s
- Mill strike - 1982
- Shiv Sena - BJP Slum rehabilitation
- Gaon, Shahar

Q. Would you say architects should get involved in politics?

7.3. Lessons from Traditional forms of Indian Housing

- What is real estate, What is the nature of current housing
- No Character of the housing
- Work- Home Commute
- The state of roads makes it difficult for people to commute
- Mental Health and Suicides
- Due to change in lifestyle and family dynamics - students develop mental health issues.
- Designing in response to climate
- Old housings were aesthetically strong, Sense of security
- compact planning, architectural language and respect to the surroundings
- Human scale and modular design
- Transition spaces
- Identity to people

Q. Does Vastu fit into traditional? is that a good way to go?

Q. Does traditional forms of architecture confine with the current requirements of the population?

7.4. Affordable Housing through material management

- Cost effectiveness, seismic safety, energy efficiency, sustainability
- Urbanisation and poverty
- How to achieve affordability - technology, PPP, Project Management
- Qualities of materials - Should be selected consciously
- Walling systems used in housing - using new materials and criteria
- Comparative analysis of different materials in housing

About D Y Patil School of Architecture Ambi, Pune

The campus stands in a sprawling 40 acre aiming to carry forward the legacy of the D Y Patil Group and the Padmashree Dr. D Y Patil University, Navi Mumbai and has over the past few years been taking steps in that direction.

D.Y. Patil School of Architecture (DYPSOA, Ambi) established by Dr. D. Y. Patil Education Academy in 2014. Architecture also addressed as **'Mother of All Arts'** is a multi-disciplinary field with many facets like Art, Psychology, Sociology, anthropometry, Anthology, Building sciences, Services, Construction, Town Planning, Meteorology, Geology, History, Geography, etc. This makes the entire journey of Architecture education interesting, adventurous, happening and meaningful, and demands one to be very sincere, dedicated, outspoken, energetic, logical, and abstract.

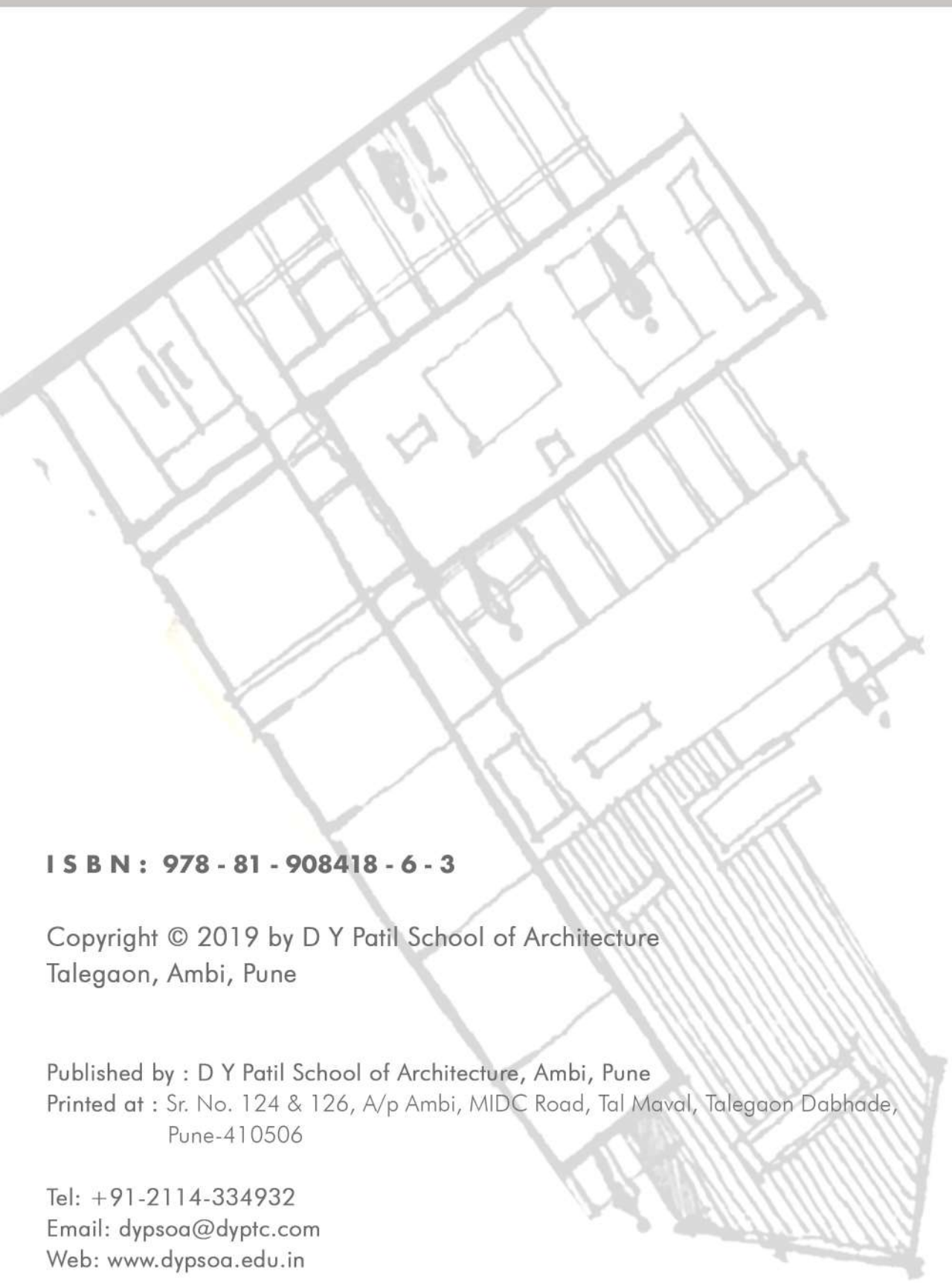
OUR VISION

D. Y. Patil School of Architecture, Ambi has started with the vision to provide sustainable and accessible environment to support and encourage student's potentials to make them technological competent and socially responsible individual by building on the enthusiasm with guided principles of inclusiveness, innovation, creativity, empathy, respect, integrity, excellence and research.

In this pursuit of individual educational goals, students will improve their critical thinking, information competency, communication skills, ethical reasoning, and cultural, social, environmental, and personal awareness and responsibility, through participatory practices. Veteran, skilled and proficient faculty members, all-inclusive syllabus and all-embracing amenities add remarkable value in enhancing the student's understanding and inventive flamboyance to guarantee all-round progress of students by organizing seminars, workshops and tours all year round.

The group strongly believes that leadership positions drive growth, serves customers better, attract partners and intellectual capital, and lead to large savings that benefits all stakeholders.

Notes



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