

## Impediments to sustenance and revival of vernacular architecture in rural Madhya Pradesh, India

Anurag Tamhankar<sup>1</sup>, Vidushi Gupta<sup>2</sup>

<sup>1</sup>Biome Environmental Solutions, Bangalore, India, [anurag@biome-solutions.com](mailto:anurag@biome-solutions.com); <sup>2</sup>vidushi@biome-solutions.com

**Topic:** T4.3. Difficulties and possibilities of using traditional crafts in conservation

### Abstract

*Over the past couple of decades, building typology in rural India has seen an unprecedented shift away from vernacular material and construction techniques. The substitute - replicable, mass-produced, concrete structures fail to respond to the climatic and cultural context. In addition to being carbon intensive, inadequate knowledge about form and function of new construction methods and materials have led to poor quality construction, that has a shorter life span. Compared to the existing vernacular buildings, such concrete structures are found to be uninhabitable by many end users. Studies done in the past on vernacular architecture of India focus on climate responsive design and execution, and traditional materials. However, there is insufficient research investigating the factors affecting the decline of vernacular practices. This paper assesses the reasons behind change in rural fabric of Madhya Pradesh, India, through primary focused group discussions, key informant interviews & field observations. The study identifies diverse factors, ranging from individual preferences to policies and laws governing access to resources. It also uncovers unexpected factors such as changing food habits leading to lack of traditional construction materials. These wide-ranging factors are classified under social, technical, financial, and legal categories. The study develops a framework to analyse patterns emerging across different agro-climatic and geographic regions. Based on the findings, the paper also recommends potential interventions for reviving sustainable vernacular architecture in the region.*

**Keywords:** vernacular; architecture; rural; India.

### 1. Introduction

India is a fast-developing economy with a rapidly growing population. Despite a high urban migration rate, more than half the country is still rural population. (Thakkar and Routh 2016) Given the geographic, climatic, and cultural diversity of India, there has been a variety of vernacular-buildings that have seen adaptation and transference through generations. Diverse materials, construction technologies and spatial arrangements are seen across the country. However, there is an increasing reluctance among rural population to use vernacular building practices and

eagerness to replace them with global materials. (Thakkar and Routh 2016) This paper studies the decline in use of vernacular materials in villages in Madhya Pradesh. Formerly the largest state of India, Madhya Pradesh lies across 3 climatic zones, 4 cultural zones and has diverse geographical features. It also has one of the highest rural population percentages and the largest tribal population in India. (MHA 2021) Madhya Pradesh still retains a wide variety of vernacular architecture. However, as the state with the largest number of new *pucca* (permanent) houses constructed in the last 10 years (Ministry of Rural Development, India 2021), it is also



Fig. 1. Material based categorization of subregions.

understood that the state is seeing rapid transformation in rural areas. For the ongoing rapid development to be sustainable, it will have to be carried out with an adaptive management framework, backed by constant research.

## 2. Background study

A study of the existing literature reveals that beneficial aspects of vernacular architecture such as passive design features, spatial arrangement, disaster resilience (Sharma, et al. 2019), material footprint, characteristic elements, and skills involved are widely researched. (Nguyen, et al. 2019) Detailed studies document the features specific to different cultures, measure thermal comfort, (Singh, Mahapatra and S.K. 2010) analyse structural performance and disaster resilience of vernacular buildings across various states of India. Beyond the scope of academic research, the government has also commissioned studies to inform policies or schemes. Recognising the need for region specific response, studies have been undertaken to formulate and encourage appropriate regional construction.

A study conducted by UNDP in 18 states of India has helped in developing 130 zone-specific comfortable, affordable, green and multi-hazard safe design typologies aims to inform construction under government

welfare scheme Pradhan Mantri Awas Yojana (Gramin) (Prime Minister Housing Scheme (Rural) (PMAYG). (MORD 2016). Despite of these efforts, the vernacular building practices continue to see a steep downward trend. Increasing trend in use of materials such as cement, steel in Indian villages, encouraged by government schemes (programs) and realized by aspirations of rural population is seen in new *pucca* (permanent) houses. However, many of these units are not used for the original purpose.

A typical design without consideration to its context, coupled with selection of poor-quality construction materials, renders some of these new buildings uninhabitable. Compared to the local materials with minimal processing, the newly introduced materials have significantly higher embodied energy and carbon footprint. Construction sector already contributes to 22% of total annual emissions of the Indian economy. With the change in typology of rural housing this could exacerbate further (GGGI 2022).

## 3. Aim & Objective

The paper aims to study various reasons for decline in the use of vernacular material in villages in Madhya Pradesh and to understand interlinkages between different factors affecting the decision making of users.



Fig. 2. Vernacular Architecture.

#### 4. Scope of study

This paper is part of a larger action research undertaken by the Technical Support Organization of an ongoing rural tourism project with Madhya Pradesh Tourism Board. The study is conducted in villages of Morena, Bhind, Gwalior, Niwari, Chhatarpur, Panna, Rewa, Sidhi, Umaria, Balaghat & Chhindwara districts of Madhya Pradesh. This is a compilation of findings from over 3 years of ground surveys. The scope of this paper is limited to the materials and techniques aspect

of vernacular architecture, aspects of spatial planning are not addressed in this study.

#### 5. Methodology

The study is done along with the local, on-ground NGO partners. Initial qualitative data is collected through primary focused group discussions with large community (number of people, sex aggregation), key personal interviews and field observations through reconnaissance survey and transect walks. The secondary literature study

conducted, informs the extent of available data and existing research on the region under study, as well as the trends in vernacular practices across the country. The study develops a framework to understand and present the interdependency of various challenges. Challenges are studied on parameters such as materials used, sub-regions, socio-economic groups to identify the root cause. Villages under study have been broadly categorised based on the prevalent vernacular materials and practices observed therein.

## 6. Observations

Vernacular structures across the studied villages are predominantly load-bearing. Walls are made of stone (with or without mud mortar), brick masonry with mud mortar, mud walls built using cob or in very few cases with wattle and daub technique. In Group 4, random rubble stone masonry walls are left exposed, while in Group 6, they are plastered with layer of soil mixed with husk. Cob walls in most regions have a core of straw or rice/wheat husk mixed with mud. Plaster made of mud, cow dung and Kodo millet is used in Group 6 & 7. Foundations, across most regions of the study have stone or brick masonry, while a few have mud walls with mix of hay and soil for foundations as well. Roof structures across most regions are made of various local wood and bamboo. For ancillary structures, use of thatch was also observed. The covering is made with kiln fired, country clay tiles. Broadly three variations of these can be seen across all regions - flattish tiles, partially overlapping each other in a sloping roof, alternating flat and half round tiles, and interlocking half round tiles. An additional roof layer creating attic space of wood joists, closely packed bamboo, packed with mud can be found in multiple regions. Stone slab flat roofs, supported by either stone beams or steel girders, with a top layer of mud terracotta pieces and mud are found in Group 1. Regional variation in materials is seen in Annexure1 gives an overview of the

materials used for different components of the houses with the associated challenges across different regions. Several reasons identified through focused group discussions and key personnel interviews for the decline in interest to build using vernacular building materials and construction techniques were compiled and studied based on recurrence across the materials and regions. Some of these reasons are specific to a certain region or a technique but some reasons cut across all these regions, materials, and techniques.

## 7. Analysis

The findings have broadly been categorized as social, legal, material availability, technical issues and economic reasons **Table 1** shows challenges affecting the use of various materials across different regions.

### *Social*

Vernacular building practices have been sustained by entire households participating in, not just the original construction, but the annual maintenance as well. Regular practices like cleaning and replacing of roof tiles, renewal of mud and cow dung plaster on floors and walls have been culturally embedded in rituals associated with festivals. With changing livelihoods, away from agriculture, sometimes in nearby cities, the time and involvement of the residents in the upkeep and maintenance has decreased significantly. And outsourcing the job to labour adds to the overall maintenance cost. Traditional building typologies with open and semi-open spaces, in the forms of courtyards and verandas, become multifunctional spaces used for living, dining, cooking, and sleeping during summers. With changing family structures and redefined needs of privacy, these spaces are becoming increasingly incompatible for some households.

In a particular instance, changing food habits have led to the loss of a crucial fibre in the composition of final layer of wall plaster.

Groups		1	2	3	4	5	6	7	8	9	10																																			
Category		S	L	A	T	E	S	L	A	T	E	S	L	A	T	E	S	L	A	T	E	S	L	A	T	E	S	L	A	T	E	S	L	A	T	E	S	L	A	T	E	S	L	A	T	E
Foundation	Mud walls Cob	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
	Stone coursed masonry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
	Brick walls mud mortar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
Walls	(W1) Mud walls Cob	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
	Mud walls adobe	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
	Stone coursed masonry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
	Stone random masonry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
	Brick walls mud mortar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
Roof covering	Clay tiles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
	Thatch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
	Stone slabs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
Roof structure	Wood & Bamboo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
	Stone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
	Metal girder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
		S-	L-	A-	T-	E-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
		S- Social		L- Legal		A- Availability		T- Technical		E- Economical		- NA		Usable		Challenge																														

Table 1. Material based challenges.

Husk of Kodo (a variety of millet) used to be in the final layer of mud walls in Group 7. Over the years paddy and wheat have replaced millets, by reduced market demand of millets. Consequent lower prices and profits have discouraged the farmers from cultivating millets, leading to low or no availability of its husk.

A correlation can also be drawn between the proximity of a village to the nearest city and the extent of decline in vernacular practices, observed in the said village. Villages closer to a city have access to global materials, replacing the vernacular at a much faster pace. Acceptance of vernacular architecture in Group 2, 3 & 4 villages is low. Villages in remote locations of Group 7, 9, 10 have retained a lot of their vernacular practices. The tribal population and their own set of customs and outlooks are a point of further study.

**Economic**

Low-income groups predominantly are observed to have greater acceptance of vernacular materials due to their affordability, as opposed to financially well-off respondents with better purchasing power. However, it is also observed that both groups share the same aspiration to global materials.

Some of the construction techniques face the problem of widespread negative societal perception, especially the mud houses i.e., the cob houses. These are widely seen as the choice of the poor; therefore, the current residents'

upward mobility also aspires to go for concrete, or even brick houses. In regions where stone is the predominant single vernacular material, the reason is reversed. Group 2 & 4 show that the prices of stone have gone up tremendously due to legal reasons and demand from cities. Here economic reasons deter low-income group even more from using the local stone.

**Legal**

**Restrictive/Prohibitive Laws**

Legislation induced unavailability of materials is found to be a commonly cited reason across regions under study. Restrictions/ complete ban on stone mining has caused Group 1 & 4 villages to deem stone as unavailable despite its abundant local availability. Restrictions/Prohibitions created for resource conservation are restrictions created through legal frameworks for mining. Mining is allowed only in the areas auctioned by the government and only the agency to which the blocks are allotted can mine and sell these resources. Profit-driven mining agencies maximize their earnings by selling to the highest bidding buyers from nearby cities, sometimes even across the country. Group 5 & 7 villages are located in a reserved forest core where the Forest Protection Act prohibits native tribals from collecting and harvesting timber for firewood and building materials. Forest department harvests and auctions wood in a structured manner. Even though the process is democratic, it does

not consider the disparity in purchasing power of locals and city dwellers. This drives the prices of materials, essential to vernacular ways of building, higher, creating an artificial scarcity.

#### **Low awareness and implementation on ground**

Over the years, newer laws (The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006) have been introduced and provisions for marking village and forests in existing laws have been brought in to ensure the rights of communities. However, grassroots awareness of the same is low, leaving implementation at the

discretion of local authorities, creating routine tensions among the forest officials and tribals.

#### **Welfare Schemes - Incentives**

Government housing schemes such as Awas Yojana (Housing schemes), which are focused on building houses for the rural poor, have seen maximum implementation in the state of Madhya Pradesh. However, due to lack of complete information of the scheme, use of outside material is not only encouraged, but communicated as the only alternative for receiving the financial incentives. An in-depth study conducted by UNDP in 18 states of

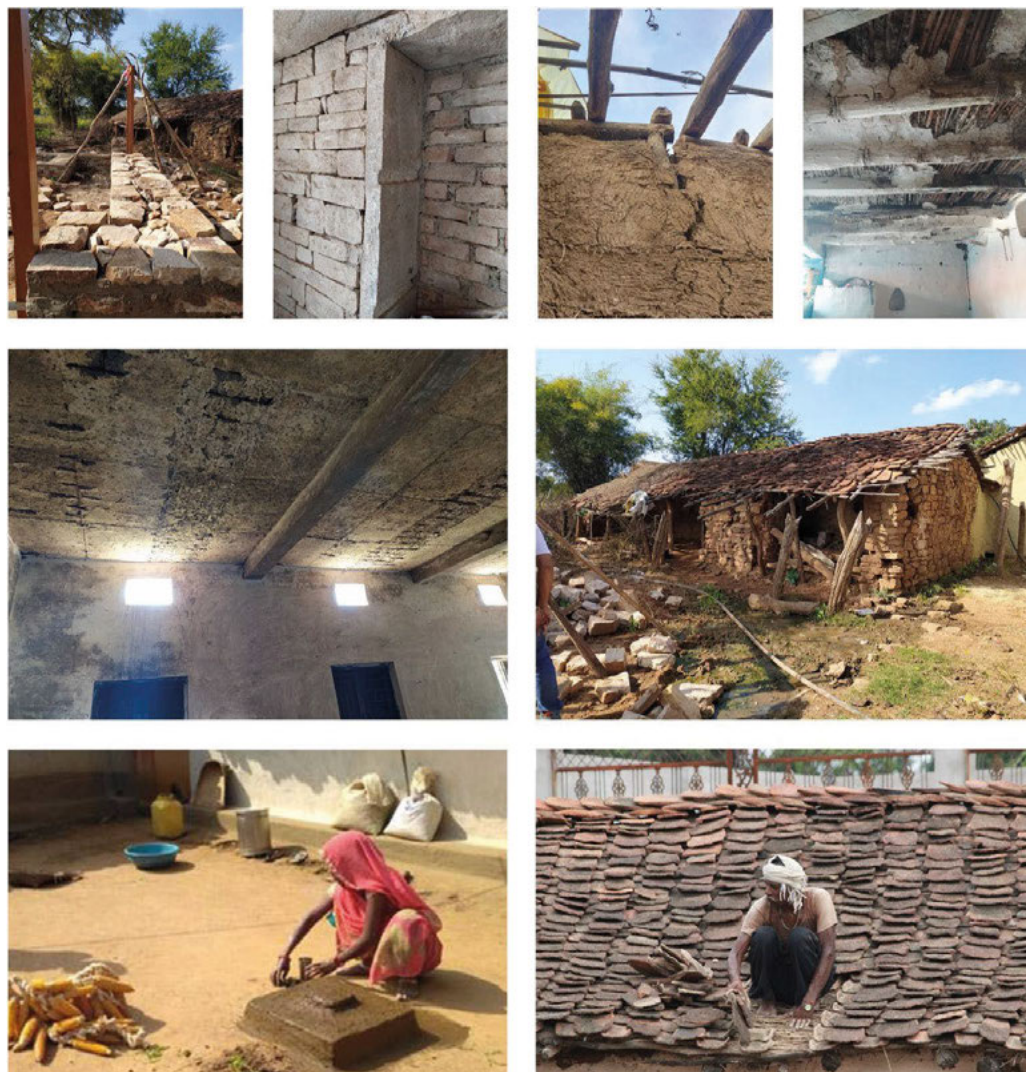


Fig. 3. Challenges in vernacular construction.

India has helped in developing 130 zone-specific comfortable, affordable, green, and multi-hazard safe design typologies to encourage appropriate regional construction. This was done to incentivize regional vernacular construction. Despite this, lack of awareness at the implementing bodies' level has resulted in only a single standard typology using concrete being used in all regions. Additionally, pressure on meeting large quantity targets pushes single modular designs for quick execution, monitoring, and assessment.

### Technical

Across all regions, varying degrees of technical issues are observed for different materials some of the issues can be seen in Fig. 3 above. Lack of strong and higher plinth results in multiple issues across Groups 3,4,7. Damage caused by rain, particularly in low height cob plinths, leads to weakening of structure and requires annual maintenance. Gaps in random rubble masonry harbour critters such as scorpions, snakes. Roof structures constructed using untreated wood are found to be susceptible to termite. Irregular sizes of wooden logs, joined together create an undulated surface for the county roofing tiles leading to leakages. Country roof tiles are damaged by monkeys in areas closer to forests and unattended gaps permit entry of snakes and insects. These issues get exacerbated due to the changing lifestyles and reduced involvement in regular upkeep. Vernacular practices have evolved over generations of use and incremental technical innovation. Rapidly changing lifestyle and availability of standard materials are providing an easy quick-fix. With lack of material and demand for vernacular techniques, traditional embedded knowledge systems are fast disappearing, creating a vicious cycle of decline in vernacular practices.

## 8. Conclusion

Decline in vernacular architecture is caused by multi-dimensional reasons, the decision making is influenced by factors ranging from social acceptance, challenges faced in the upkeep, increasing costs, government policies and depleting resources.

Efforts in order to revive or conserve have to be multi sectoral and multi-agency. Awareness about the benefits of using local materials is necessary to change the perception of local materials. This will need the involvement of local agencies, government, and technical organizations. Policies need to be more equitable to bridge the social and financial disparity, giving an easy access of materials to the locals. Incentivizing use of local resources is needed. Vernacular technique and materials need to be evolved through further research by technical institutes, research outputs can play an important role in appropriating these for the contemporary needs to conserve vernacular ways of building.

## References

- GGGI. 2022. *Global Green Growth Institute*. Último acceso: 10 de January de 2022. <https://gggi.org/project/greening-rural-housing-in-india-through-pmay-g/>.
- MHA. 2021. *Office of the Registrar General & Census Commissioner, India*. Último acceso: 15 de Jan de 2022. <https://censusindia.gov.in/2011-common/censusdata2011.html>.
- Ministry of Rural Development, India. 2021. <https://rural.nic.in/>. 16 de Dec. <https://rural.nic.in/en/press-release/houses-sanctioned-under-pmay-gramin>.
- MORD. 2016. *A Compendium of Rural Housing Typologies*. New Delhi: Ministry of Rural Development.
- Nguyen, Anh Tuan, Nguyen Song Ha Truong, David Rockwood, y Anh Dung Tran Le. 2019. «Studies on sustainable features of vernacular architecture in different regions across the world: A comprehensive synthesis and evaluation.» *Frontiers of Architectural Research*, pp. 535-548.
- Sharma, Plabita, Ruchi Singhal, Bhagyashree Sisode, y Dr. Krupesh Chauhan. 2019. «Study of Climate Responsive Building form for Kutch Region.» *GRD Journal*, pp. 105-112.
- Singh, Manoj Kumar, Sadhan Mahapatra, y Atreya S.K. 2010. «Thermal performance study and evaluation of comfort temperatures in vernacular buildings of North-East India.» *Building and Environment*, pp. 320-329.
- Thakkar, Jay, y Rajdeep Routh. 2016. «Re-engaging Vernacular Building Practices