

LOCAL BUILDING CULTURES IN RECONSTRUCTION

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Abstract

The National Reconstruction Authority (NRA) reported 93% completion of private house reconstruction after Nepal's 2015 earthquake, but this achievement largely ignored local building cultures and community needs. Uniform enforcement of building codes and "Build Back Better" guidelines led to standardized concrete "grant houses" that often failed to reflect climate adaptation, livelihoods, social organization, economic capacity, or cultural practices. Many households view these houses as temporary and are modifying them informally, often without technical support. With the end of NRA, ongoing reconstruction relies heavily on untrained masons and informal practices, increasing vulnerability. The 2023 Jajarkot earthquake exposed persistent construction flaws, limited code compliance, and weak dissemination of earthquake-resistant knowledge. Traditional stone-and-mud housing was mistakenly blamed for failures, accelerating inappropriate adoption of industrial materials. Poor land-use governance and unresolved land ownership further compounded risks. Drawing on a decade of experience, ASF Nepal highlights lessons from community-based, socio-technical reconstruction programs that integrate local knowledge, skills, and livelihoods to achieve safer, culturally rooted, and sustainable housing outcomes.

Keywords: Local building culture; Reconstruction; Socio technical support; Construction practice; Code compliance

1. Introduction

Nepal's diverse geography and cultural landscape have fostered rich traditions of vernacular architecture that are well adapted to environmental conditions and social needs. However, post-disaster reconstruction programs often marginalize local building practices (Vernacular architecture and local building practices may not always be synonyms) in favor of standardized, top-down solutions that may not align with community realities.

Architecture Sans Frontières Nepal (ASF Nepal) has implemented housing and reconstruction programs that consciously integrate local building cultures, leveraging community knowledge, materials, and skills. This paper presents key lessons from these experiences, demonstrating how reconstruction efforts that respect and enhance local building practices can lead to safer, more sustainable, and socially acceptable housing solutions.

The National Reconstruction Authority (NRA) claimed 93 percent progress in the reconstruction of private houses towards the end of its tenure post 2015 earthquake. This

number is definitely commendable, but have contextual construction practices been considered in this quest to achieve this result? All the codes and guidelines including but not limited to National Building Code, Build Back Better and Safer (BBBS) guidelines have been enforced to all the buildings to make them para seismic, however, hardly any regard has been given to major habitat components including : peoples specific needs in term of spaces, adaptation of architecture to local climate, impact on public health by massive use of industrial materials, cost of construction systems and affected population's economic condition, use of land related to livelihood, social organization related to construction, specific skills and knowledge of communities. As a result, the reconstruction process gave rise to similar concrete structures from the valley's urban centers even to the most remote corners of the country and people are calling these houses "grant houses" since they neither fulfill their specific needs nor their requirement but comply with the criteria imposed to obtain the government grant. After reconstruction phase they are hoping to construct new houses or extend these "grant houses" in future in order to have a more adapted house, one that will feel like a real home. Many of them have already begun to make the necessary changes, but this

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is not without its challenges.

It is thus evident that technical support provided to the people for the reconstruction has largely failed to ensure the safety of the buildings for future earthquakes or other disasters. Since this support came to an end with the end of NRA, the fact remains that people are still reconstructing and will need technical support throughout not only for reconstruction but also to remedy the wrong construction practices they have been following. The fact that people mostly rely on informal construction practices by unskilled and untrained masons in the rural areas further makes the situation worst. These masons, though experienced, have received limited or no formal training at all and rely on personal judgment, field experience, and guidance from their seniors (which has been skewed after being passed down through generations) which might not be code compliant or technically sound.

This has further come to light after the Jajarkot earthquake in 2023. Many of the houses in these districts are constructed using traditional methods with little or no reinforcement lacking construction quality and noncompliance to building codes like irregular bonding systems, weak mortar, size and type of stone, absence of tie beams, weakly connected corners, insufficient connections of wall-roof and wall-floor systems, differing internal wall systems and lack of earthquake resistant measures propagated after 2015 earthquake. Thus, causing extensive damage to the buildings in the area which proves that the lessons learnt from the previous earthquakes have failed to reach this part of the country bringing forth the issues like lack of preparedness, inter-agency collaboration and ineffective governance of the government and lack of community awareness. Moreover, after these earthquakes, traditional style housing construction with stones and mud was identified as the main reason for large scale house collapse. This misconception is largely prevalent amongst the people post-earthquake leading to wide spread adoption of modern material and technology which essentially needs rectification. Further, delays in identifying risk areas and enforcing land-use policies inadvertently led to the construction of houses in high-risk areas. Displaced and Landless Populations are also struggling with land ownership issues.

In this document, we propose to share lessons learned from reconstruction programs that take greater account of local building practices or cultures. These lessons are based on a series of housing programs involving socio-technical support for reconstruction, sharing key messages based on a community approach, or enhancing livelihood opportunities carried out over the past 10 years. Observations are based on our point of view and on testimonials from participating communities.

Reconstruction programs following disasters have

historically overlooked the significance of local building cultures, often favoring standardized, externally driven approaches. However, the integration of local knowledge, materials, and construction practices can greatly enhance the sustainability, cultural relevance, and community ownership of reconstruction efforts. This paper shares lessons learned by ASF Nepal over the past decade from a series of housing programs that combined socio-technical support, community-driven approaches, and livelihood enhancement to promote resilient reconstruction rooted in local building cultures.

2. Understanding Local Building Cultures

Adopting Local Building Culture practices (LBC) in housing programs ensures the traditional identity of a local building is preserved and strengthening of structure using modern techniques is done. In other term in local building cultures - A building culture results from the adaptation of a community to the environmental conditions of the territory in which it is established - physical, climatic, social, economic and cultural as well as rules from any governance. It encompasses the traditional knowledge, construction techniques, materials, and architectural expressions developed over generations through knowledge transfer, social organization in the building process of cooperation, mutual support like Parma System (Free labor lending system). They reflect:

- Adaptation to environmental risks (e.g., earthquakes, landslides, floods)
- Use of locally available materials
- Social structures and cultural identities
- Economically viable construction methods

Ignoring these factors in reconstruction can lead to social resistance, unsustainable buildings, and missed opportunities for community empowerment.

3. ASF Nepal's Approach to Reconstruction

1. Community-centered Socio-technical support

ASF Nepal combines technical expertise with community participation to ensure that reconstruction is:

- Technically sound: incorporating disaster-resilient features
- Culturally appropriate: respecting local architectural styles and practices
- Economically viable: utilizing local resources (material, labor etc.)

2. Enhancing Livelihoods through Reconstruction
Reconstruction programs are linked to livelihood opportunities by:

- Training local masons and artisans in improved construction techniques
- Promoting micro-enterprises related to housing (e.g., brick production, carpentry)
- Supporting skills certification to enhance employment prospects

4. Key Lessons Learned

1. Local knowledge as foundation for resilience
Communities possess extensive knowledge of materials, site selection, and risk mitigation embedded in traditional construction. Though some of this traditional knowledge seem to have been lost and/or forgotten along the way, recognizing and building upon this knowledge enhances both structural safety and community acceptance.
2. Community ownership ensures sustainability
Participatory processes that engage communities in decision-making foster a sense of ownership. This leads to better maintenance, adaptation, and long-term sustainability of housing solutions.
3. Cultural identity must be preserved
Houses are more than physical structures—they reflect cultural identity and social cohesion. Incorporating traditional designs and aesthetics enhances the acceptability and emotional well-being of residents.
4. Blending tradition with innovation yields optimal results
Rather than rejecting traditional practices, combining them with modern engineering knowledge results in houses that are both culturally rooted and structurally resilient.
5. Livelihood integration strengthens reconstruction outcomes
Linking reconstruction with livelihood enhancement ensures economic resilience and empowers communities to sustain improvements beyond the project period.

5. Case Examples from ASF Nepal's Work

5.1. Post-earthquake Reconstruction in Gatlang, Rasuwa (Figure 1)

Policy provisions, including I/NGO resource mobilization guidelines and guidelines on grant distribution for reconstruction of private houses damaged by the earthquakes, did not specifically address the

restoration of houses in traditional ways and though locals lobbied for special consideration with the local, district level government agencies and the NRA (National Reconstruction Committee), to help preserve Gatlang's uniquely traditional settlement, their plies could not be addressed.

In addition, there are no standards and code provisions for this type of building in the Nepal Building code which made it difficult for the people to reconstruct their houses or even repair or retrofit their existing damaged houses as they would be non-compliant and lacking three earthquake resistant components which was mandatory to receive government grant for reconstruction. As such, to be eligible for the grant, people were forced to follow standard prototype building construction technology which was non contextual and against local building culture. With the introduction of CGI, RCC and brick, the village faced a grave danger of losing its vital connection to its heritage and traditions. It once used to be "the gem" of the Tamang Heritage Trail but without its black roofs and its originality and uniformity, it would not be a choice of destination for travelers anymore. This not only resulted in the loss of livelihoods for the people of Gatlang but also a huge loss to the architectural heritage of the country. This insensitivity to local traditions for reconstruction is thus slowly eroding the cultural identity of entire communities not just in Gatlang but in all the earthquake affected areas.

To preserve existing practices and building cultures with reduction of existing risks and vulnerabilities, it is necessary to study building typology and systems thoroughly and develop some guidelines which are not too different from existing one and even acceptable to the government bodies. Most of the damaged buildings in Gatlang were partially damaged but did not collapse during the earthquake, some were still intact. With some modification or improvement of some parts of the structure, we could restore them in its original habitable condition but the major challenge is making them resilient to the future earthquakes. These structures are very unique and previously unstudied, so identification of damaged part of the structure by past earthquakes, assessment of the structural capacity of existing buildings and expected performance of the building for the different intensity of the earthquake is necessary before carrying out any further steps. By doing this we could identify insufficiency of these structures and hence their traditional techniques of construction can be preserved and strengthened for the safer construction.

Interventions initiated by ASF Nepal

Further, in this project which was funded by Caritas Luxembourg and locally partnered by Pourakhi and the

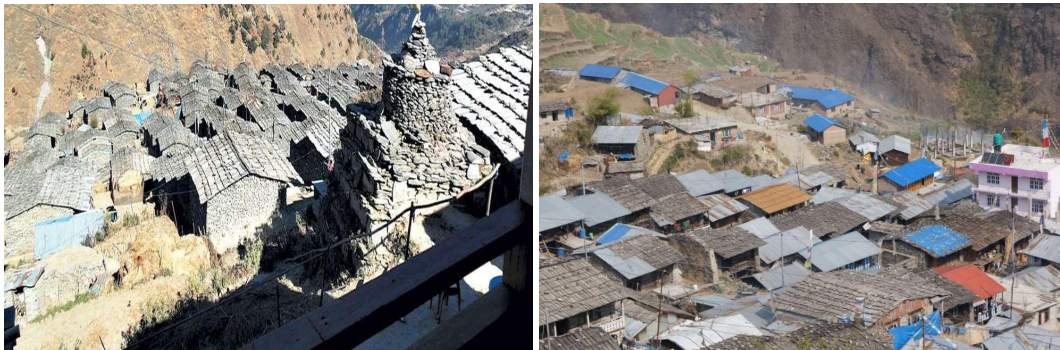


Figure 1: Pre- and Post- 2015 Gorkha earthquake condition of Gatlang, Rasuwa- Black slate roofs of pre-earthquake (Photo: Umesh Pokharel, The Kathmandu Post) and CGI roofs of post-earthquake (Photo: ASF Nepal)

technical support of CRAterre (International Center for Earthen construction), ASF conducted assessment in the area for the identification of vulnerability factors of local structures and evaluation of structural deficiencies and damages of existing buildings during the recent earthquake. The assessment was based on the visual observation of the buildings and checklists of the seismic vulnerability based on FEMA 310 with some modification. These assessments clearly demonstrated earthquake resistant quality: the experimented use of these elements enabled a good behavior of the structure and very limited consequences on the life (very less complete collapse of the buildings in the earthquake). But still there was a need to improve understanding and the behavior of these houses and their interactions with the built and natural environment to ensure improved and safer living conditions.

Moreover, people clearly expressed their will to preserve their old Tamang heritage: an architecture built out of dry-stone masonry wall combined with wooden structures, wooden carved façades, and black wooden roofs. Hence, it is imperative to adopt repair and retrofit solutions for these specific situations but these need to be validated scientifically so that they can be endorsed by NRA and included in the National Building Code. Then, guidelines could also be developed to benefit to many more HHs in Nepal. Repair and retrofit practices have already been identified and tested based on experiences and started to be applied at a small scale, focusing on affordable solutions such as:

- Appropriate dismantling of damaged parts
- Improvement on wooden structure (connection between post and beams, fitting of posts, etc.)
- Improvement on stone masonry
- Improvement of connections / disconnection between wooden structure and stone masonry

- Improvement on roof structures, conserving the planks roofing

In order to reach the affected population, there is a need to promote repair and retrofit strategies (instead of just pulling down or dismantling buildings), to train professionals in the diagnosis of damaged constructions and good practices of repair and retrofit. Retrofitting a rural house tends to protect families and their livestock from future earthquake, address their need to simply return to their pre-earthquake level of economic productivity, but also to enable families to develop their resilience capacities, thus restoring livelihoods (including agriculture and / or tourism).

This will not only support the population impacted by the 2015 Gorkha's earthquake but also to better prepare the population against future seismic events by involving and reinforcing the capacities of the population, the local builders and the institutions, while considering the cultural specificities.

Hence, ASF Nepal with CRAterre has been mainly focusing on providing technical assistance to the community for retrofit and repair in reconstruction purposes utilizing local human resource, materials and their requirement. However, in the absence of adequate technical expertise, guidelines and government standards it has been challenging for us to provide any appropriate solutions to the earthquake affected population even after 10 years of the 2015 Gorkha earthquake. Till date no such solutions to the people, which is cost efficient, affordable and contextual has been provided. As such people have been forced to resort to other options for reconstructing their houses which has resulted in the loss of their traditional architecture and heritage. In addition, even after building new houses as per government provided designs with the grant amount, people found them inadequate and inappropriate contrary to their traditional houses. This forced them to use the new building as storage building or cattle shed which rendered

the effort and resources used to build these ineffective and pointless.

5.2. Post-earthquake Reconstruction in Panchpokhari Thangpal Rural Municipality, Sindhupalchowk (Figure 2)

Post reconstruction, it could be observed that people were building on their own without technical advice or following Government of Nepal guidelines and were adopting wrong construction practices. Lack of technical assistance at the local level especially after the tenure of NRA was also one of the major reasons for such constructions. Including this and other reasons like lack of skilled workers and technical supervision, this is putting these Households (HHs) at greater risk making them more vulnerable than before. Most of these houses were non-engineered and pose a major safety concern. Instead of local construction technologies, they have opted for modern and foreign technology without appropriate guidance and total disregard to the detailing required which has made these new constructions highly vulnerable to earthquake and other hazards.

In addition, it was observed that after the reconstruction of housing units following building catalogs and built according to the necessary quality, these houses turned out to be inadequate such that HHs extended the construction, to respond to their housing and livelihood needs. In many cases, they have mixed technologies without proper connections nor considering the construction as a whole. This results in unstable constructions in seismic prone areas.

To address this issue, a Build Back Better and Safer (BBBS) campaign was initiated in 2019 AD by Association for Rural Social Welfare (ARSOW-Nepal) and Triangle Génération Humanitaire (TGH) to raise awareness in the community regarding the ongoing wrong construction practices, how unsafe they are and what are the good and safe practices in construction. Under this campaign BBBS IEC material was developed by CRAterre in collaboration with ASF Nepal. It was disseminated by BBBS mobilizers to the community after going through a short training. Further, to ensure that this awareness campaign is effective and has a wider reach, there is urgent need of appropriate technical advice to improve the construction qualities and structural elements of the building. Moreover, BBBS awareness is the need of the hour to avoid such erroneous construction practices. Capacity building at various levels like local engineers, masons, community leaders, and even individual HHs would go a long way for overall safety of the entire community.

5.3. Post-earthquake Reconstruction in Magapauwa, Dolakha (Figure 3)

Even one year after the 2015 earthquake, people were still living in the fear of other earthquakes, government guidelines on reconstruction were unclear and there was lack of technical assistance, lack of resources as well as lack of skilled labor for earthquake resistant house construction. Majority of these houses prior to the earthquake were made of mud-bonded bricks or stone. As many other parts of Nepal, Dolakha has its own Local Building Culture based on its topography, climate, temperature and other factors. Although the building culture varies itself within Dolakha too, the typical building typology in overall Dolakha consists of two and a half storey stone masonry houses.

These distinctive features of these buildings are mud floor, four pitched thatched roof (now almost replaced by CGI sheets) and diagonal struts (tudal) supporting the roof projection on all four sides. Nearly half of the houses had roofs made of tile or slate, 36% had houses made of galvanized iron according to CBS (2011). All these were damaged by the earthquake and in need of reconstruction. It was also seen that local masons and carpenters were in need of more awareness, knowledge and skills for disaster resistant construction and repair. Although good local building practices existed, they needed improvement as it was observed that recent buildings/houses lacked quality and technological soundness as compared to the older ones.

Hence, in order to preserve the local building culture of the area, ASF Nepal along with social partner Pourakhi Nepal, technical partner CRAterre, and financial support from Caritas Luxembourg started a reconstruction project at Magapauwa – 7, Dolakha which included On-the-Job Training (OJT), sensitization in the community, model house construction and technical supervision. The training conducted was primarily aimed in teaching the local masons on improving their inherent skills and construction techniques to build better earthquake resistant houses preserving their originality.

Local builders (masons, carpenters and other building professionals) were thus given Training of trainers for which they underwent OJT by constructing a prototype building. Here, they were able to understand the proposed design and material use, could improve their theoretical and practical knowledge for disaster resistant house construction and repair and were able to supervise on-site construction and train the other local builders and their workers in full capacity. As such, there was increased local capacity enhancement and people began to realize the mistakes that they were making in the construction and agreed not to repeat them. They further learned that the process and technology which was being taught in the training was not completely new but only an improvement of their own old construction practices.



(a) Two dwellings merged without an appropriate technical solution (b) Reinforcing bars exposed to corrosion for future vertical extension (c) Risk of damage to the newly built house unit due to the addition of toilet without recommended gap/technical solution

Figure 2: Dangerous adaptations and extensions after reconstruction, Sindhupalchowk (Photo: CRAterre)

Getting to know how some of the earthquake resistant construction technologies were very similar to their traditional construction methods, which was discontinued by the locals, gave them additional confidence to once again adopt those technologies for reconstruction. Replication of the model house design thus extended beyond the project area with 193 households receiving social and technical assistance for reconstruction, 113 houses constructed under technical supervision, 11 households received top up support for house construction, 20 local artisans received On the Job Training and 82 people received vocational training to enhance their skill and livelihood options. As such many constructions in the region were able to benefit from these examples and the skill of the trained builders, who adopted the approach.

6. Challenges and Considerations

Despite the benefits, integrating local building cultures presents following challenges:

- Perceptions that traditional practices are 'backward' or unsafe
- Limited documentation of vernacular knowledge or local building practices (Hosta and Timsina, 2023)
- Market pressures favoring industrial materials over local ones
- Policy gaps in recognizing alternative, community-driven construction approaches

ASF Nepal's experience underscores the need for continuous advocacy, technical support, and collaboration with authorities and educational institutions to overcome these barriers.

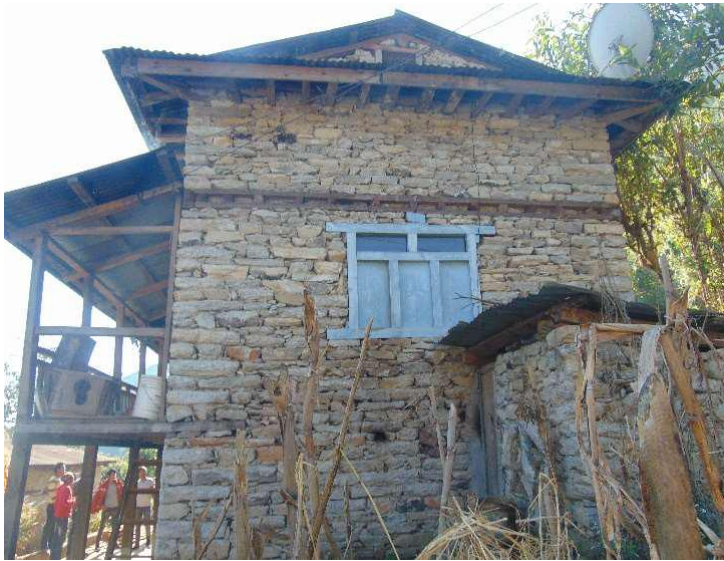
7. Policy Recommendations

To promote reconstruction that respects and enhances local building cultures following points are recommended.

- Institutional Recognition: National reconstruction policies should formally recognize and support local building practices.
- Capacity Building: Invest in training programs for local artisans and masons on integrating disaster-resilient techniques with traditional methods.
- Knowledge Documentation: Systematically document and disseminate traditional construction knowledge.
- Community Engagement: Ensure genuine participation of affected communities in all stages of reconstruction.
- Livelihood Linkages: Design reconstruction programs that enhance local economic opportunities.

8. Conclusion

ASF Nepal's decade-long experience demonstrates that reconstruction rooted in local building cultures is not only



(a) Pre-Earthquake house, Magapauwa, Dolakha (Photo: ASF Nepal)



(b) Post-earthquake demo house (Photo: ASF Nepal)



(c) Post-earthquake demo house replication (Source: ASF Nepal)



(d) Post-earthquake demo house replication (Source: ASF Nepal)

Figure 3: Pre and post-2015 Gorkha earthquake demo houses, Magapauwa, Dolakha

possible but essential for creating resilient, sustainable, and culturally meaningful housing. By respecting community knowledge, blending tradition with innovation, and integrating livelihoods, reconstruction efforts can build not just houses, but stronger, more empowered communities.

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