

Physical, Social and Economic Transformations in Post-Disaster Context of a Settlement: Case-Study Post-Earthquake Rural Village Ratankot, Nepal

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Abstract— Redevelopment in disaster affected areas is in one way or another limited to the physical infrastructure in most of the places. Of course, with the huge volumes of destruction it is almost impossible to provide physically and socially just environment to everybody as an immediate relief. But the social, cultural and economic aspects of a settlement that provide an identity to the people of the settlement is somehow lost in the long term post-disaster redevelopment practices. Over a decade, built environment professionals working on disaster and development issues have noted concerns on the cultural issues in post disaster recovery processes. In humanitarian shelter practice, development organizations have developed different participatory approaches involving communities in order to address cultural concerns in the post disaster development processes.

The focus of creating built environments without recognizing what is appropriate to a particular settlement is a common and frequent failure in many post disaster development projects. This paper has been developed to address the issues related to culture-space dynamics in post-earthquake recovery process in a rural village of Nepal. This paper tries to capture the transformations in social, physical and economic terms of a rural village in Nepal after the 2015 earthquake. A brief study on the settlement before earthquake and how they are managing the development after it, the metamorphosis of the settlement with the help of Nepal government and more importantly INGO's active in that area is the focal point of this paper.

This study concludes by highlighting the importance of 'social, cultural and economic aspects' as a construct for redevelopment in post-disaster context. Aspects that links approaches for designing built environments with a socio-spatial understanding of traditional settlements in post disaster reconstruction process are to be explored. Such suggestions can eventually inform the theory and practice about the methodological ways to develop further guidance for designers in the long run.

Keywords— Culture-Space Dynamics; INGO's; Post-Disaster; Rural Redevelopment; Transformations;

I. INTRODUCTION

It is important to develop built environment and public spaces with respect to the social-cultural aspects of a settlement otherwise it is a complete failure especially in post-disaster development context.

It is central to obtain sufficient information about the original planning and design of the settlement and also to understand the vernacular construction techniques and the

socio – cultural space requirements. One must know enough to provide harmonious condition for starting a new life but in a familiar built environment. The data must allow predicting the pattern of evolution of a household for long term sustainability of the projects.

II. RATANKOT : PRE AND POST DISASTER

It's been two years since Nepal was hit by a massive earthquake. The most affected areas were Gorkha, Lamjung and Sindhupalchok as well as Kathmandu, Bhaktapur, Lalitpur Districts. The country is still rebuilding and trying to cope up with the huge shock.



Earthquake epicenter for 2015 and Ratankot location

Among all the earthquake affected areas is a small village named Ratankot in Sindhupalchok district which is slowly and quietly trying to rebuild itself. Thanks to a few active INGO's from Israel, Sweden and Belgium that this village received much needed aid to recover from the shock. Ratankot village is situated in the district of Sindhupalchowk, in the Basmati zone located in Central Nepal. It is an amalgamation of eight small settlements named – Bateodar, Nardanrang, Chanchyaba, Angeri Feth, Sanu Silke, Matilu Silku, Goimase and Baker. This paper mainly focuses on the studies done in Ratankot 7 – Goimase. Ratankot 7 is a small settlement of 105 families spread over the mountain in two parts – Upper Ratankot and lower Ratankot.

The impact of the earthquakes in Ratankot is enormous. The houses that withstood the shocks of the first earthquake collapsed during the second earthquake as Ratankot is situated in the near proximity of the second epicenter. Only one house in Ratankot 7 withstood the earthquakes, this house was the only house using iron bars, pillars i.e. the beam column structure. In Ratankot 8 a few houses kept standing, these houses were at least 15 years old.

Except from a few severe injuries there were no casualties among the villagers. Though a number of livestock died under the rubble of the sheds and houses.

A. Relief Assistance for Shelter

1) Immediate Relief

As a part of immediate relief action government along with an INGO from Israel provided shelters made of mud with GI sheet covers as roof. These structures were of almost 2.1m x 2.1m with a semi-circular roof with maximum height of 2.1m in the center with a door and space on the sides for sleeping and storage.



Shelter provided of mud & GI sheet as an immediate relief

2) Long Term Relief

The Nepali government had collected all the INGO donation money in a collective pool and planned to distribute them equally to the needed VDCs. The government planned to release the reconstruction money to pilot VDCs after the evaluation for loss in the housing sector. The plan was to release it in instalments, first instalment being 50,000 Nepali Rupees. The other instalments will only be released when it is seen that the first instalment is used in the reconstruction process properly (in safe way).

After one and a half year the Nepalese government started with the distribution of the financial relief assistance. The process is as followed: First a Nepalese inhabitant has to prove that his house was collapsed and that he is the owner of this house. (In the case of Ratankot, Nepalese officials came after the earthquake to make a damage estimation). After this process the person in question is entitle to receive the relief assistance.

The government decided to distribute the funds in three instalments. The total amount promised by the current government is 3,00,000 Nrps. The first instalment of 50,000 Nrps is meant to clear the rubble on the site.

The second instalment will be used to build the foundation and the third is meant to be used for building up the house. However the DUDBC (Department of Urban Development & Building Construction) who is responsible for the building catalogue, offered to the earthquake victims, is aware that their design exceeds double the relief assistance budget. The Nepalese government has planned to bring out a new building catalogue. In this building catalogue it is expected that one bamboo model and one CEB model will be integrated so that the people can build earthquake resistant structures within their budgets.

B. Demography

Ratankot 7 inhabits 105 families. The household size of a family varies from one to eight members. The average household size is five. One grandparent, two parents and two children. The average amount of family members per family living in Ratankot is three it is because the young generation moves to Katmandu for work to generate income.

The working group population mainly between 18 to 45 years of age goes out of the village to add to family income. The grandparents generally work on the fields while the younger generation goes to school and help the older people on fields after school. Thus the village population mainly has kids, old people and younger females as the young males move out of village to earn.

Fortunately, most of the people of Ratankot survived the earthquake of 2015. Thus the family structure in general remains the same.

1) Community and Religion

The population of Ratankot is mainly Buddhist while the remaining inhabitants follow Hindu tradition. In reality the majority of the people participate in both Hindu and Buddhist festivals. There is a mutual understanding and respect between both religions. This mutual understanding contributes to the quiet and peaceful atmosphere in Ratankot.

There are beautiful small stupas on various levels (chowk) of the village and few Hindu 'Devi Mata' temples which were partially destroyed by the earthquake but the main monastery was totally destroyed along with the community hall. They made a temporary shelter out of Galvanized Iron sheets to keep the beautiful Buddha stupas and continue with their routine prayers.

The village shows harmonious religious tolerance. After the earthquake the villagers of Ratankot stay together and unanimously decide for progressive plans for the village with the INGO's and government. The community is very strong in the village thus it was important to re-establish the lost community places for the activities of the villagers that they used to perform together. An INGO after doing a survey decided to provide a community centre with a monastery. The design was finalized after the full participation from the people, it consisted of a small courtyard between the community hall and the monastery to spill over the crowd from inside to the outside. In the design also 'community' was given more importance than the religion. The monastery was behind the community hall for two reasons *firstly* it was less used than the community hall, *secondly* so that the hall can be used by all the people irrespective of the religion. Because of the limited funds it was later decided to convert it into a single building without a courtyard but the villagers did not wanted to compromise with the design and decided to contribute to the retaining wall of the building free of labor cost which ultimately reduced the total cost of the construction and it was possible to build the desired building with the available funds.

Two years after the disaster this building is in process of construction and is expected to bring back the much needed social life and activities of the community.

2) Education

The village was slowly coming out of illiteracy. The younger generations were comparatively more literate than the older generations. The younger parents have also started focusing on the education of their children and sent them to school rather than working on the fields. In general the literacy in females is a little less compared to in males but in younger generations this gap is being reduced.



Kids in temporary school in tent

However after the earthquake the single school that catered to the education of both upper and lower Ratankot was destroyed. It was difficult for the government also to provide the proper school infrastructure to the kids of the village as it was still struggling to provide the relief and houses to such a huge earthquake affected population.

The children drawn by their will to learn and the village to provide proper education to its kids managed to make a temporary school with tents. Thanks to an INGO that two years after the earthquake Ratankot now has a new school for its kids. The will of the village and the kids to learn made it possible to continue with the education even in the most unfavorable of the conditions.

3) Economy

The main economic activity in the village is farming. All the inhabitants of Ratankot can be considered to be farmers. Most of them dispose of their own farmland, which is mostly situated around the house. Mainly corn, millet, potatoes, onions, garlic are being cultivated. The main activity, however, remains harvesting the rice. The whole village is surrounded by rice fields. Despite that, people often have to walk an hour to get to their rice field. Those who don't own their own field rent land (circa 10%, at a rate of approximately 7000 NR per season) or help land owners in the form of 'paid labour'. The average pay lies between 150 till 200 NR a day. In addition, almost all inhabitants own buffalos or oxen which are mostly used for working on the land, as well as goats and chickens.

The inhabitants live from the agriculture produce. It is however remarkable that they don't generate any income. They only use the harvest to survive. What's more is that the majority only gets enough harvest for 6 to 9 months with what they produce. The rest of the year, they have to buy food in the shops. In order to be able to pay for this, they are often obligated to sell buffalos, goats and/or chickens.

A second factor that determines the economical status is whether a family member has a job in Kathmandu this also depends upon which type of job. One of the factors that effects

the possibility for a family member to leave Ratankot is the level of education.

A third factor is the occupation of the family members within Ratankot. If the family only lives from agriculture it is very likely that they will have to take a loan, rent land or sell cattle to cover their living expenses. Families who practice a secondary occupation have more chances to make their ends meet than those who only practice farming.

Other businesses in Ratankot are the cutting and selling of wood and the making of charcoal. Few other activities that are very common in Ratankot is the making of bamboo baskets, bamboo mats, corn mats, and grass brooms. Most of the elder man know how to make the bamboo baskets and most of the women know how to make corn mats. But mostly people are discontinuing it because most of the profit goes to the middle man and they feel what they receive is not worth their hardwork.



Economic activities in Ratankot village

Earthquake did bring a change in the economy of the village. People were devastated and started working even harder. There was an increase in the labour charges as there was a lot of construction to be done. Also there were a lot of new people learning the skill and coming into the field because of the demand and the possibility to earn more.

However there was one drastic contrast, while other people were working harder to get back to their normal life few people became totally dependent on the government and the INGO's help for their survival. There were few people who decided not to grow rice on the field as they were still getting it from the government after almost two years of the earthquake as a relief assistance.

This shows that we have to be very careful in providing help and how we are providing it. Whether the assistance provided is helping them to revive themselves or is it making them dependent on other sources for survival? **Its important** that the assistance policies promote development and not dependency.

III. HOUSING

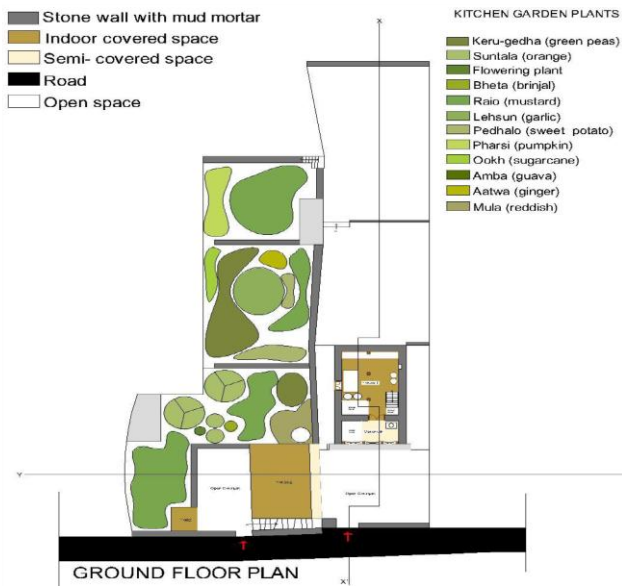
Ratankot village once a collection of beautiful stone masonry structures and houses is now reduced to a rubble. Single and double storeyed fine-looking stone masonry houses with wooden post & pillars (with carvings) crumbled down to a heap of mud and stones.

The traditional houses in the area were all made of stone and wood using mud mortar. These people kept their livestock nearby mostly within their plots. In many cases, on the lower contour lies the entrance for the animals and, harvest shed etc. In other cases there is a separate animal shed next to the

house. It is also the preferred location to place the toilet there (at times). But on the higher side one can enter the main living areas of the house.

The plot area generally varies from 500-600 sq.m with building footprint area of about 50 sqm. The open space is used for farming and livestock while the built space is used for living and storage. Light and ventilation is natural through doors and windows which is enough though not abundant.

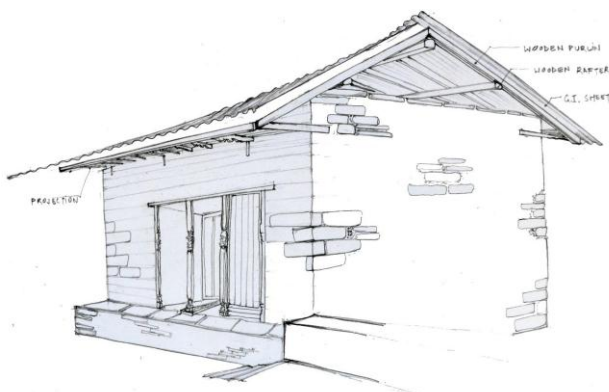
In Ratankot, villagers measure the houses with their 'hands'. From the tip of the finger till the elbow is considered to be one hand as a unit of measurement. A house plan can be a rectangle with width being 11-13 hands and the length being 17-21 hands respectively.



Space usage in a traditional Ratankot house

The main materials used for the houses were stone with mud mortar, timber posts, stone pavement, stone flooring, mud flooring, cement flooring, GI sheet roof or Slate roof.

Most of the houses had pitched roof. The entrance is provided to enter into the living room on the first floor. The storey underneath is used to keep the cattle. The lower storey can be approached from an entrance provided from the lower contour. Wooden purlins and rafters are used to support the roof which is either of GI sheet or slates.

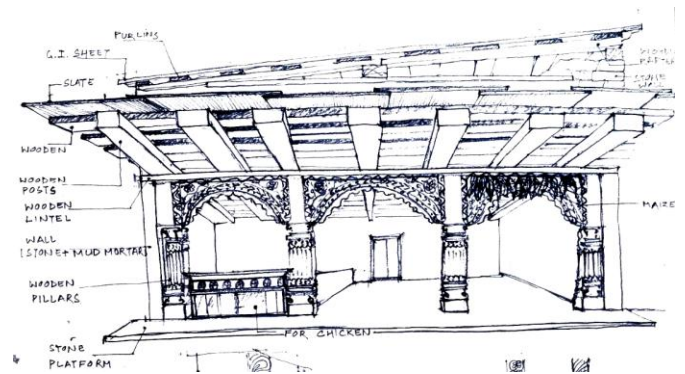


Sketch of the house with pitched roof. The entrance is provided to enter into the living room on the first floor. The storey underneath is used to keep the cattle. The lower storey can be approached from an entrance provided from the lower contour.

Originally the houses did not have any toilets and went for open defecation, later with the efforts of an INGO each family was provided with a toilet block within or adjacent to their plots.



Photographs of the houses showing the roof and entrance of the traditional houses in Ratankot



Sketch showing the detail of front facade of a house. The lowermost storey could survive during the earthquake. Two upper storeys got down during the earthquake, hence the temporary GI sheet covering is provided on the top.

The damage caused by the earthquakes is devastating. 'Half of the buildings of Ratankot have totally collapsed or have been demolished after the earthquake. Of the remaining buildings 75% lost the upper floors and roof while the ground floors present various degrees of damage. Out of the 233 buildings in the Ratankot 7 and 8 community, only one building was damage free and only 15 are able to be repaired and reused without extensive reconstruction of the entire floors.' (From ShocksafeNepal team)

As already discussed people were given shelter of mud & GI sheet as an immediate relief. Few people use them to live but mostly use them as a store and have made their own temporary shelters out of GI sheets.

This shows that even as a temporary relief shelter they prefer to have *their type* of dwelling unit and nothing less.



A temporary shelter after earthquake build by people

After almost two years of earthquake only few families (two or three) have started rebuilding their permanent houses. But these new houses are nothing similar to what it was before with stone, mud and wood. They are either concrete block houses or the CEB 'compressed earth bricks' with cement mortar that have totally replaced stone masonry and cement concrete flat roofs instead of pitched roofs. There are mainly two reasons for boycotting the old construction technique. *Firstly* stones are too costly for them now, the remaining stone blocks from the houses post-earthquake are used in the foundation. For more stones they need to cut it from the mountain and carry them to the building site. Thus after including the labor the cost of each stone is much more than the new materials i.e. the CEB and concrete blocks. *Secondly* people now have fear of building again with stone masonry. They want concrete structures with RCC that can stand another disaster if any to come.



Compressed Earth Block and RCC roof structure of a new house post earthquake.

This change is also a result of 'government building catalogue' which means that the government bodies in the villages (VDC) will only approve the plans of those houses which are being designed as per their 'building catalogue' to make it earthquake resistant. Also if the houses are not as per the catalogue, the owner may not be entitled to the further installments for the house. This has been done to make the new houses earthquake resistant and ensure minimum damage in years to come in case of another disaster.

The change is not only in the materials used for building but also in the planning. The traditional planning with entrance and space for their livestock has changed to a closed four-wall setup following the 'urban' style. The village has sub-consciously decided to move away from the traditional setup to a more urbanized way of living.

IV. INFRASTRUCTURE

A. Physical infrastructure

The infrastructure in the village pre and post-earthquake is a result of both government and INGO's working in the area. Even though there is no *pucca* road government is trying to provide whatever is possible for them for roads and electricity. Other facilities like water and toilets are a result of INGO's work.

The water source in the upper Ratankot has totally vanished as a result of earthquake. In Ratankot 8 the inhabitants seemed very distressed with the acute water shortage which followed the earthquake. But at the same time they expressed a lot of faith on the villagers living in Kathmandu for help and also on the government schemes. An INGO took it on themselves to provide water and toilets to the villagers. After the years of collaboration with the villagers it was successful in once again providing water (one tap each house) and toilets to all the villagers.

B. Social Infrastructure

The village has a very healthy social life. In that small village of 105 families everyone knows the other. Irrespective of their religion and caste they all come together to celebrate all kinds of festivals and functions in a family. Earthquake destroyed the little bit of social infrastructure that the village had. The community hall, monastery, school, few temples all were gone. These places that acted as a focal point for gatherings among the villagers of all ages and genders were gone. Thus to bring back the normal routine of village life it was important to redevelop these places.

With the meetings with the government for redevelopment there was no discussion with focus on cultural regeneration or for public spaces in the village. However since strict restrictions were imposed on the standards or permit for public buildings, INGOs took up the task to rebuild community buildings (*like building an orphanage, community center, a monastery and a school for the children*).

Rebuilding the social infrastructure to bring back the spirit of the social life in the village is very important to get them out of the trauma of earthquake and the associated loss. These places were developed with a lot of community participation with the villagers. It is very important to develop these social places with the participation of the people so that it can reflect the social and cultural essence of the settlement and can be most suitably utilized.

V. ROLE OF INGO'S

INGO's played a very vital role in bringing back the original lifestyle to the disaster affected families. Be it donating funds for the development or providing infrastructure facilities themselves INGO's did their best to provide any kind of possible relief to the affected people. Nepali government collected all the INGO donation money in a collective pool and then distributed them equally to the needed VDCs for redevelopment & rehabilitation of the people.

However the INGO's that provide social facilities must be as per the social environment of the village. No doubt that they want to improve the quality of life as much as possible but when a situation arrives where the kids belonging to an orphanage might have better facilities than those who are

living with their families who are still struggling to make their ends meet after the earthquake it gets tricky to handle the situation... What could be done? Thus it is very important that the facilities provided should be with respect to the social and economic aspect of the village or settlement and not as per the already developed places so that it does not create any barriers instead of uniting them.

INGO's also helped in building community participation for any kind of decision making or development. Community development is essential for successful development or redevelopment project by way of sharing of costs, making decisions and in being responsible for the maintenance of the facilities provided, as well as ensuring public accountability.

Was it not for the help of these INGO's many families in Nepal would still be struggling for the basic human living condition after the earthquake.

A. Coordination

Co-ordination among the working bodies like the Government, INGO's and the beneficiaries is very important for the success of any project. The government of Nepal had some stringent policies and the INGO's had to perform within it. Few INGO's also tried to co-ordinate with the beneficiaries but what was missing was the co-ordination among them.

There were situations where more than one INGO was providing the same facility in the village. This led to the confusion among beneficiaries and also to the wastage of materials. Co-ordination among the active INGO's in the village and division of facilities to be provided can reduce a lot of confusion and lead to better management and development of the village/settlement.

VI. CONCLUSION

Natural disaster is an event that cannot be controlled or challenged, however the aftereffects of the disaster can be. But it is a very delicate matter as it not only changes the physical, social and economic aspects but also the emotional aspects of the affected people. This study recognizes that there is a strong influence of the social, cultural and economic dimensions in the post disaster development. The development must be in regard to these features of any settlement otherwise it is bound to raise questions.

Social and cultural aspects: These are the most intangible and delicate characteristics of a settlement. To understand them and to plan a development in accordance with them is a serious and important job. Failure to incorporate them in any development programme may lead to underutilization of the spaces and wastage of resources as has happened in many other disaster affected areas.

Economic aspects: Economics of any settlement and the activities performed to earn are equally important. The design and development of any settlement should promote the activities and encourage the people to continue them. The spaces provided should be according to the usage pattern of the activity. Also, the social help provided should be according to the economic standard of the settlement and not as per the elite standards of the international helping agencies so that the people eligible for that help are at same level of the people of the settlement and not better than them. Plus the assistance provided should ensure redevelopment and not make them dependent on external help.

Physical aspects: The physical characteristics changes a lot from usage of different materials to the usage of spaces. Post-disaster development gives an opportunity to the rural settlements to follow the urbanized pattern of development. Because of their aspirations to be urbanized they are ready to forget their traditional development pattern that has developed through ages and copy the urban trend irrespective of the context. The after effects of which are realized in the long term when the spaces are not used as they are meant to be. Thus rebuilding using new technology to ensure better strength and quality must be integrated with the traditional knowledge of building and usage of spaces. Instead of totally neglecting the traditional built environment it should be revived by using new technology.

Community participation: Community structure is another very strong feature of any settlement. All the development must be planned to strengthen the community and with the participation of the people to ensure better quality of spaces for the usage as per their requirement. No better than people themselves can help us design and develop spaces that will be fully utilized by them.

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