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Exploring Smart Rural Planning at Jhong, Mustang: A Step towards Sustainable Development

Niranjan Shrestha [a], Martina M. Keitsch [b], Sangeeta Singh [c]

[a, c] *Department of Architecture, Central Campus, Institute of Engineering, Tribhuvan University*
[b] *Department of Design, Faculty of Architecture and Design, Norwegian Institute of Science and Technology*
Corresponding Email: [a] shrestha.niranjan@gmail.com, [b] martina.keitsch@ntnu.no, [c] sangeeta@ioe.edu.np

Abstract
Smart is not a new concept and while there are many studies done for the growing cities and urban areas, rural areas also need much attention. Considering that rural areas are quite unique to each other, the paper focuses only one region. Smartness has been stated in many areas and sectors and has been here linked with sustainable development keeping in mind an overall development of the area. Different methods are prescribed for rural planning out of which participatory methods are very popular. To uncover the hidden truths inside a ethnic group participant observation has been undertaken. The paper studies the area under then land theme and discusses upon it, the gaps in the theme and new parameters are also identified that match the activities in the area. Smart rural planning at Jhong entails the study and involvement of the locals for whom the planning is to be carried out. The global indicators used provided a point of departure but many indicators were redundant, so, development of indicators in the rural region should be area specific and one fits all policy should be revised according to the characteristics of the area.

Keywords
smart rural – rural planning – smart

1. Introduction

Smart is not a new concept as it has already been in use since 1994[1] and is predominantly an area of interest in the Nepalese context as well [2]. The concept of smartness (in Smart City) is associated, in most of the context, with integration of service or utilities sector with ICT (Information Communication Technology)[3] which supposedly would improve quality of life by increasing efficiency of services. But in a rural context, the idea of smartness could differ as there are still traditional systems being used and service sector is still in infancy whereby having the same goal of improving quality of life. Two streams of approaches are present in smartness (of Smart City) discussion which are, viz., first, the information communication and technology oriented approach and the people oriented approach[1].

Rural areas are characterized, most popularly, by their small size of community, low density of population which create intimate relationships and face to face contacts with each other, agriculture is the main occupation or any primary economic activity, in close contact with nature as their daily activities revolve around the natural environment, homogeneity of population in their daily life style, religion, social stratification based on traditional caste system, high social interactions resulting in a higher social capital, integral social solidarity, culture of joint family system headed by the father [4] and also an stratified (in case of many groups) ethnic homogeneity is present.

Spatial planning has already been developed as a discipline in the urban context whereas rural development plans are limited to activities pertaining to certain development goals. Rural Planning, hence, could fill this gap by providing proper alternatives of path to be followed while coalescing around the goal of development. Rural Planning thus entails the exploration of resources, physical, social, cultural and economic that would be used in the present as well as the future and the recognition of current trends in use of those resources to plan the further path in terms of policies towards sustainable development of the rural

area. The concept of sustainable development encompasses viable economic growth and equitable social development within a bearable environment. Sustainable Development is defined as "meeting the needs of the present without compromising the ability of the future generations to meet their own needs" [5]. Nepal is an active member of the initiative for sustainable development and has been closely over-seeing the factors concerning the Sustainable Development Goals (SDGs[6].

1.1 Background of Jhong

Jhong is the one of the VDC (in the older local governance system) of the Mustang district which is located at 3540m altitude. In Jhong village, there were four wards according to the old system but now Jhong village along with the nearby Putak and Chhengurr make ward no. 2 of *Barha Gaun Mukti Ksetra* rural municipality. In 2014 the village comprised 85 households and total residents of 253 including 112 male and 141 female [7].Most of the people in Jhong village are of ethnic group Gurung which covers 84.19 per cent of total population of Jhong village. Most villagers practice farming on small areas of land for their own needs (barley, buckwheat, potato and seasonal vegetable). Under the traditional system, the *Gaun Mukhya* is the head of the village, who is elected out of the many candidates that represent each household of the village.

1.2 Rationale

In the fast urbanizing context of the world Nepal is not an exception. With the recent addition of newer metropolitan cities, sub-metropolitan cities and municipalities [8], Nepal is also moving towards urban growth. The development of the currently celebrated smart-cities has been progressing for the last several years, especially in the developed countries. Since its inception, the electronic computer as a by-product of World War II, has taken on diverse forms, developing from early room-sized behemoths to tiny 'dust' particles [9], which is to be integrated for the efficient functioning of the utilities sector. Keeping in the light of this, smartness needs to be explored in the rural context as well to provide the locals with the modern or contemporary technologies as their urban counterparts while retaining their socio-cultural capital.

The urban areas has more GHG emission intensity [10, 11] than the rural areas which should also be checked by properly planning the rural areas reducing migration to the nearby urban cores. The migration has hampered the planning of development activity in the rural areas as well. The haphazard urban growth has antagonistic impacts like slum creation, poor utilities services and so on.

The uniqueness of the rural areas, caused by the socio-cultural dimension, should be succinctly explored so as to get an effective solution bridging the gap between professional expertise and local needs. Smartness should be redefined according to the context such that it properly addresses the demands of growth and sustainable development and mitigates the negations of migration of the locals to the urban and peri-urban areas.

Rural livelihood must be strengthened so that people can withstand the many pressures they are facing continuing to support sustainable development (ICIMOD, 2015). Rural area has a wide range of unique and different problems compared to urban areas. So, the different needs, reasons and idealisms that are ecological and conservational, rural development should be pinned on the sustainable management of natural resources [12]. Thus, rural residential concentration is not only a means for rural development but the key to long term "scientific development" at the various levels of the nation in which plans and planners can become tools of local group of actors [13].

1.3 Problem Statement

The modern sources of energy has to be imported from the nearby areas of Jomsom or even Pokhara whereby they are still using their traditional sources as well but is very limited. This shows that the area has been affected by the quasi-urbanization of the near areas like ranipauwa and is in the path of improper and unmanageable development. Migration is another issue faced by the area as most youth migrate to the nearby cities for education, employment and other opportunities wherein reducing the intensity of traditional economic activities. The lack disaggregated data combined with the 'providing' attitude of the developmental workers has yet to create effective

solutions to their energy and economy related problems. Such that there is chance of something more than a Hobson's choice[1].

1.4 Research Purpose

The overarching objective of the research is to identify the apt use of resources such that its impact checks the migration of the people and aids in a holistic development of the area. For this the following specific objectives have been defined:

- To study the available resources and their current use pattern. The resources are social, cultural, economic and physical.
- To identify the rural characteristics of the area and study measures to ensure their sustenance.
- To explore and map smartness for sustainable development in terms of use, scale and technology for the resources.

1.5 Limitations of the research

The research area is limited to Jhong of Mustang and might only be useful in other areas with similar background only like in other mountainous region. However, some parts of the output can be useful in the rural areas of Nepal, some only in the nearby vicinity of the field area.

2. Literature Review

2.1 Exploring Smartness

Technological advances has pushed each and every sector towards increasing efficiency in their work flow. The advances in mass communication has the potential to link most of the world with each other. Thus, increase in efficiency together with mass communication has created the concept of 'smart'. In the case of Nepal, the idea of smartness has been put forth in making Smart City as integrating multiple information and communication technology (ICT) solutions in a secure fashion to manage a city's assets which include but are not limited to local department information systems, schools, libraries, transport systems, hospitals, power plants, water supply networks, waste management, law enforcement and other community services[3]. These application are developed with the vision of improving the management of urban flows created due to the use of the services by the inhabitants as well as the cumulative nexus of the city's assets and allowing for real time responses, if and when needed. These conditions reflect the lifestyle of an high income group or elite associated with position or wealth but in a country with least developed economy (LDC) like Nepal where 81.39% of people live in the rural areas (as of 2015)[14], rural areas also require strengthening.

The need to manage the growth of the cities has been well established as per the forecast of United Nations that by 2050 two-thirds of the world population would be living in urban areas. However, in an alternative view the urban growth can also be checked by focusing on rural development and rural conservation through proper rural planning. Limitations of Sustainability are that they neither reflect systematic interactions, not provide normative indications on the directions to be followed[1]. This research is intended as an attempt to uncover sustainable development by recognizing the many relevant facets of development. There is not much clear understanding of smartness in smart city so the basic fundamental understand can be applied to the rural context as well to achieve sustainable development. ICT can definitely be utilized to achieve prosperity, effectiveness and competitiveness and by integrating it in the services sector, smart city brings together technology, government and society to enable a smart economy, smart mobility, smart environment, smart people, smart living and smart governance.

2.2 Smart Rural Development

Smart growth has different envisaged outcomes in different contexts, in the EU it is used in a knowledge context as in innovation, education and reasearch whereas in the USA it mainly revolves around policies to counter the development of urban sprawl [15]. One size fits all policy structures should be reformulated into context-based and knowledge based structures. Smart growth logic are well suited for urban integrated rural areas which has the benefit of size advantage and spillover advantage from the urban areas. Rural regions

[1]Hobson's Choice situation occurs when there is an free option to choose, from only one option

do not have the same access to resources and markets and differ in terms of socio-economic conditions and social structures. Regions should also develop smart specialization strategies, which implies a focus on regions' most promising areas through bottom up planning process and establish conceptual frameworks regarding the role of technological advances, human capital and knowledge spillovers for economic growth and regional convergence.

Determinants of smart rural growth [15] are:

- Agglomeration- grouping of different services or firms could share resources and positive knowledge spillovers would also be possible.
- Creative Amenities- research has shown that the cultural and creative industries that emerge from rural and remote places are connected within a range of social, economic and technical transformations peculiar to those localities and their dependency on cross industry activities such as tourism, food, drinks and cultural production.
- Networks and Collaborations- internal as well as external networking provide a base for creative amenities to develop upon. Collaborations among different networks brings out the potential for creative amenities to develop and flourish.

2.3 Establishing parameters for sustainable development

To check haphazard development of an area a holistic approach is needed that encompasses different aspects of development hence the theories and practices of sustainable development becomes relevant. In 1992, the United Nations Conference on Environment and Development recognized that indicators could play an important role in helping countries make informed decisions concerning sustainable development and the indicators, Indicators of Sustainable Development: Methodologies and Guidelines[16], were set and approved by Commission of Sustainable development (CSD). Based on this document, which has different themes with indicators, land theme was chosen and worked upon.The indicators in the land theme are land use change, land degradation, land affected by desertification, arable and permanent cropland, fertilizer use efficiency, use of agricultural pesticides, area under organic farming, proportion of land area covered by forests, percentage of forest trees damaged by defoliation, area of forest under sustainable forest management.

2.4 Participatory Rural Appraisal

Understanding that the poor people are creative and capable, and can and should do their own investigation, analysis and planning the path for Participatory Rural Appraisal (PRA) opened up[17]. The unique aspect of PRA has been the focus on the people in which the role of professional/experts is of catalyst providing necessary information to the people. There are different methods prescribed by the PRA but the ones that are relevant in this research are Analysis of secondary sources such as maps, reports, satellite imagery, various articles and books published on the subject, semi-structured interviews, identifying the key informants and transect walk.

3. Methodology

The basic belief for knowledge is assumed to be relative since the research focuses on bottom up approach, that knowledge, truth and morality exists in relation to culture, society, or historical context and are not absolute. That, knowledge generated is subjective and realities are constructed on the basis of socio-cultural and other experiences of the researcher and the researched [18]. To gain credible insights and knowledge, emic approach is adopted in order to study or describe a particular language or culture and lay them out in terms of its internal elements and their functioning rather than in terms of any existing external scheme. The inquiry aim is to better understand the context and relate to the dynamics of the area which would help in speculating the future events for forward and backward linkages.

3.1 Methods Adopted

As a part of participant observation, the following methods are employed in the field for data collection

Unstructured Interviews: They go further in the extent to which emphasis is placed on the interviewee's thoughts [19]. The researcher's role is to be as

unobtrusive as possible, to just start the ball rolling by introducing a theme and topic and then letting the interviewee develop the interviewees' ideas and pursue that train of thought. Interviewing was doing with simultaneously taking notes and recording the audio for future transcribing. While conducting interviews it is essential to select the candidates beforehand who have necessary credentials.

Observations: It offers the social researcher a distinct way of collecting data that does not rely on "what people say they do or they say they think" [19]. It draws upon the direct evidence of the experience of the witness events first hand. Direct systematic observation allows proper collection of data as the field area is quite familiar because of preliminary site visits made earlier and preparatory information about the field area is already known. It is necessary to use all five senses of the human body for observations and also use the sixth sense whenever required.

Interactions: During the casual interactions with the villagers it is imperative to know the context and background of the village and the villagers and also for them to know us. Familiarization with their religious inclination, social dynamics, the physical terrain, the geological formations and others that influence their daily life would provide deeper insights into their live by developing trust [20].

Seconday analysis of sources: Secondary Analysis entails the analysis of already collected data in the form of documentations, reports and others that has been collected by governmental and non-governmental organizations like the DDC capacity development plan, satellite maps from google and bing, DDC profile, Resource Mapping Report of Mustang district, and others.

Content analysis: The qualitative data collected is analyzed by thematic analysis of text, indexing and descriptively. In the first method, themes or major ideas or their pattern are identified within a document or a range of documents and also within interviews and the interaction materials. *Atlas.ti* is a computer application that has been used for this.

4. Analysis and Discussion

4.1 Analysis

4.1.1 Land Use Change

Table 1: Area and percentage of major land use categories from [21] and satellite imagery from google and bing

Land Use	1978	2000	2017
Agricultural ('000 sq. m)	1277	2856	756
Agricultural (%)	2.55	5.7	1.51
Forest ('000 sq. m)	31449	4261	744
Forest (%)	62.79	8.51	1.49
Built up ('000 sq. m)	N/A	38.4	39.9
Built up (%)	N/A	0.08	0.08

From Table 1 it can be seen that the area of agricultural land has increased from 1978 to 2000 but has decreased from 2000 to 2017 this might be due to high agriculture related economic activity in the area up to 2000 which seems to have gone down in the recent years which might be attributed to out-migration of the people to other nations as well as other cities (esp. kathmandu and pokhara) and change in the type of economic activity in the modern context as pointed out in the interviews.

The coniferous forest area has decreased exponentially from the year 1978 to 2000 which has been converted in to grass lands and agricultural lands near the settlements. The area is still getting smaller until 2017. The forest areas now are comprised of smaller trees bearing cones belonging to the *Cryptomeria* genus.

The built-up area seems somewhat constant between the years 2000 and 2017 with a slight increase in 2017 but the observations have shown that the buildings in the villages are very old and only a few new buildings has been added in the recent years out of which most are community buildings. However, there are instances of floor addition in the existing houses of few people as well and also there are no bye-laws preventing people from constructing building on the agricultural fields.

4.1.2 Land Degradation

Land degradation is also present in the area with the reduction in agricultural production. According to the interviews as well as casual interaction with the locals, the production has decreased drastically in the last decade with one interviewee mentioning that the

production of agricultural crops in the fields has decreased as much as "1 or 2 units of what used to be 5 units six or seven years ago". This can also be a cause for out migration and the change in the type of economic activity.

4.1.3 Land Desertification

Figure 1: Abandoned land turning barren as seen during transect walk

Abandoned land or deserted land, like in figure 1, can be seen to slowly turn into raw and rugged landscape due to the lack of moisture in the soil. The interviews uncovered that these are mostly due to the out migration of the people to other nations as well as to other cities of Nepal. When people migrate out of the homes, they have to leave a steward, from other parts of the country mainly rukum, rolpa and baglung districts, to look after the house and other properties. These stewards compulsorily do participate in community activities while they may or may not perform agricultural chores.

4.1.4 Arable and Permanent Cropland Area

As already mentioned from Table 1 in page 365, the area of agricultural land increased from the year 1978 to 2000 and has slightly decreased up to 2017. The area only consists traditionally of arable land with barley(9 months) and buckwheat(3 months) as the major crops. However, apple farming has been recently added in the area but is unmeasured but the interviews do point the area for apple farming is increasing every year. Irrigation is done in the area through a river by constructing a catchment area and proper irrigation channels. For the three villages there are two independent irrigation systems, one is for Chhengurr and the other is for Jhong and Putak villages. Jhong and Putak share an irrigation system with two days is allocated for Jhong and one day for Putak.

Some locals use a traditional tool for threshing to separate the beads from pea plant as feed stock for the horses,as observed during transect walk and interaction with one of them revealed that the tool is made out a slender timber log connected to a pivotal hand which are bound by yak skin. Yak skin is supposed to be more durable than modern rubber as well.

Rest of the indicators, fertilizer use efficiency, use of agricultural pesticides and area under organic farming, are not applicable in the field area as the villagers do not use any chemical fertilizers or pesticides and all the farming can be considered organic.

4.1.5 Animal Husbandry

Animal husbandry is new addition to the land theme as a parameter since it is also a major part of the economic activity of the villages. The animals reared are mainly mountain cows (*Jhopa*) and goats for economic activity whereas horses are reared for commute or for cultural ceremonies like *Yartung*. Horses are mostly kept at grazing land afar from the village and are only taken to the village when needed. The cows have shed near the houses and graze in the sparse grass that grows in and near the settlement when inside the village. Goats are reared in a herd and are sent to graze outside of the settlement to the mountains where they stay for two weeks at a time. When returned their health is checked and the numbers counted. When the goats are taken for grazing, two person from the village accompanies them, which is done in turns from each and every household.

4.1.6 Forest area

As already seen in Table 1 in page 365 the area of forest is in a decreasing trend. Forest used to provide fuel for cooking to the villagers with fire wood and other foliage. Goats also go to graze in the forest areas. During the interviews and interactions it was found that the community forest is at higher altitude than the village and is the only forest there. The community forest is managed and maintained by the community of villagers and are allowed to collect firewood only once a month. If any household is not able to participate in the monthly forest maintenance program, they are issued a financial

fine and are also barred from using the firewood from the forest for that month.The trees provided timber for the construction of buildings and other structures as well. The *bhote peepal* (mountain poplar tree) still provides timber for constructing buildings and sheds. They are supposed to be pruned every 12 years for timber.

4.1.7 Other potential Areas

Waste Management- Few spots were seen during the transect walk where inorganic waste like plastic were burning outside of the villages.The interviews and interactions revelaed that there is also a trend to dispose of waste by burying in the ground, this was also done by the health post. This poses a question of waste management. If the migration is checked then there will be a need of better waste management strategy and technique.

Transportation and Spatial connections- After building the concrete bridge of Jomsom, now the northern mustang can now be directly connected to the southern parts of the nation like Pokhara and Kathmandu, which are centers for development and can provide developmental resources. In addition, the road from Kagbeni to Ranipauwa is being black topped which in a culture that has the potential to get transferred to the nearby areas, which is the case area of research.

4.2 Discussion

4.2.1 Agglomeration

The basic function of agglomeration is reduce the overheads in the work processes. This can be seen in land use of the settlement area, where, there are trees of bhote peepal (or mountain poplar) planted near the periphery of their homes that cut down the transportation costs of the fuel wood. Being in near proximity, this also greatly reduces the risks of injury if there was travel involved in such harsh terrain where the road is also used by dull-witted domestic animals.

Agglomeration is also prominently noticeable in the link between agriculture and animal husbandry which the major economic contributors of the area. The dung from the animals like goat and cows area used in agriculture as manure, which also creates a whole new world of organic farming which is much healthier and lucrative. But, now due to the out migration of people from the households, animal husbandry is rare in the area since it is time and manpower demanding activity. However, the culture of sharing the responsibility of guarding the sheep while taking to the grazing land is still upheld by the people, as one person from Chhengurr and two from Jhong goes with the goats to the grazing areas and stays with them for two weeks.

There is not much difference in the type and manner of the use of resource by the every household in the village so, the development of any new technology would be homogeneously spread to all the people in the area which is the most important aspect of agglomeration in the context.

4.2.2 Creative Amenities

The roads are lined with *Senthokpa* (a small edible berry like fruit) that has the potential of being processed and developed into something useful like the seabuck thorn juice which is made in Jharkot. There is also opportunities to showcase their cultural festivals like archery of Yartung, or their local crafts to make carpet from yak, brewing alcohol and beer (*chyang*) and others.

4.2.3 Networks and Collaborations

Each village has its own forest that is managed by the individual forest management committee that is headed by the respective village chief and is comprised of one member from every household. The management efforts are on a regular basis with the provision of collecting fines from the absentees. This shows a dedication towards their traditional culture even though modern LPG dominate their cooking fuel now a days. By using LPG for cooking, the locals have now little use of the fuel wood from the forest which makes them reluctant towards the forests but however animal husbandry is still dependent on the forest areas.

To achieve agglomeration, networking inside the villages is a prerequisite and with the people outside of the village is also required. Outside the village the networking would be vital with the people at Ranipauwa, Jharkot, Jomsom and Pokhara as they currently are the hub for people's destination.

5. Recommendations and Conclusion

5.1 Recommendations

5.1.1 Maintain existing systems

Agriculture- As mentioned in the previous chapter, agricultural land is seemingly decreasing the recent years which is not alarming yet but needs action to prevent the further reduction of agricultural land. New crops have been introduced and vegetables are also planted by the locals such that they can be self dependent in their needs.

Animal husbandry- The practice of animal husbandry, mainly in the jhong village, is sensible since all the households share the responsibility for grazing, that should be continued.

Built up and open spaces- The built up and open areas are balanced inside the settlement areas. The open areas provide a suitable community spaces where people accumulate and converse. Archery range is also present in jhong inside the settlement where youth come to play and socialize. These spaces should be protected by the law so that their sustenance is ensured. Also, policies should be created such that the newer construction of building should comply to traditional buildings in make as well as technology to retain the traditional aesthetics, technology and crafts.

5.1.2 Additional systems

Road and transportation- With the frequency of vehicles in the roads increasing, as well as the ownership of vehicles of the villagers, there should be clear policies that cater to the needs of the local without impeding the cultural environment of the area. The finishing of the road, the area for parking of the vehicles are some of the issues in this sector.

Waste Management- Modern inorganic waste needs to be dealt with as incineration might not always be the best solution.

Specialization institute- a group should be formed, like the *ama samuha* or the youth club, to discuss and oversee the implementation of the proper workings inside the villages that do not disturb the culture of the settlement and the people living in it. It can be headed by the local government and the locals could be the executive members. This committee can encompass more than more than one village based on the cultural and social connections between the villages.

Furthermore, all the development activities in these culturally sensitive areas should be planned, programmed and implemented with an bottom up approach including the voice of the locals from the very first phase such that they become sustainable.

5.2 Conclusion

Hence, smart rural planning at jhong entails the study and involvement of the locals for whom the planning is to be carried out. The global indicators used provided a point of departure but many indicators were redundant, so, development of indicators in the rural region should be area specific and one fits all policy should be revised according to the characteristics of the area.

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