

CHAPTER I

INTRODUCTION

1.1 Background of the study

1.1.1 Historical Background of Architecture

History of architecture starts when first time men thought to build beautifully. Knowledge of architecture is used in relation to buildings which were built in the past, are being built at present or will be built in future. Architecture first evolved out of the needs like shelter, security, and worship and means like available building materials and skills. Prehistoric and primitive architecture constitute this early stage. As Human Civilization progressed through oral traditions and practices, architecture evolved into a craft. In scientific method of building construction there is a process of trial and error, and later improvisation for the better structure or building (Rao, 2009).

Weise (2007) focuses that development of architecture is seen as a symbol of power. He describes that “Throughout history, architecture has been used as a symbol- most often for power. Most historic monuments that we find today were constructed as a symbol of political or religious power. In the Kathmandu valley, we find Durbar Square with palaces and temples that were a product of competition between three Malla kingdom of Kantipur, Lalitpur and Bhaktapur.”

A building without beauty is merely a structure, not an art. Utilitarian consideration of a building, stability and strength are works of engineers. It's the work of architects to add the beauty to it. Architecture is actually an art which guides us to harmonize in a building both the beauty and utility requirements of a building. Architecture is concerned with not only to provide a shelter to man but also to take care basic requirements e.g. place for worship, tombs, business, memorials and other structures which are needed in complex civilization (<http://www.archicentral.com/history-of-architecture-27938/>, accessed 2 April, 2015).

Agrawala (2014) pointed out that Architecture is learnt by experience only-first by seeing, then by realizing and lastly by doing the same thing particularly and thus giving a concrete form. For example, the Taj at Agra, a monument built by an ancient Muslim ruler, stand majestically giving expression of the person's feelings for love through Architecture. Not only that, it also reflects even today a great deal about the civilization and history of that era. Civilization of a particular era is derived by the help of remains of that era in the forms of buildings are articles of utilities or write ups.

Geographical signs indicate that architecture originated in Nile valley for the first time, whereas second centre of architecture were observed in valley of Tigris and Euphrates. Art of Tigris and Euphrates blended in art of Greek, although Greek Architecture has a strong origin itself. After those Romans developed a base for both construction and decoration and from them it spread to the civilized world. After many historical developments in fifteen century in Italy, marvelous series of wonderful architectural presentations in the form of churches, palaces and monuments took its origin borrowed from Roman art.

Early human settlements were essentially rural. As surplus of production began to occur, rural societies transformed into urban ones and cities began to evolve. In many ancient civilizations such as the Egyptians and Mesopotamians architecture and urbanism reflected the constant engagement with the divine and the supernatural, while in other ancient cultures such as Iran architecture and urban planning was used to exemplify the power of the state. However, the architecture and urbanism of the classical civilizations such as Greek & Roman evolved from more civic ideas and new building types emerged. Architectural styles developed and texts on architecture began to be written. These become norms to be followed in important works, especially religious architecture. Some examples of such texts are the works of Vitruvius of ancient Roman Empire, the kaogongji of ancient China and Vaastu Shastra in ancient India. In Europe in the classical and medieval periods, buildings were not attributed to specific individual architects who remain anonymous. Guilds were formed by craftsmen to organize their trade. Over a period of time the complexity of buildings and their types increased. General civil construction such as roads and bridges began to be built. Many new building types such as schools, hospitals, and recreational facilities emerged (Agrawala, 2014).

1.1.2 Historical Background of Vernacular Architecture

Vernacular architecture is an area of architectural literature that studies the structures made by empirical builders without the intervention of professional architects.

For certain architecture to be sustainable, it has to be economically, socially, environmentally and culturally sustainable. Vernacular architecture throughout the world developed on the basis of sustainability. Vernacular architecture is a term used to categorize method of construction which uses locally available resources to address local needs (Weise, 2007).

Weise (2007) focuses that Vernacular architecture tends to evolve over time to reflect the environmental, cultural, and historical context in which it exists. Over the centuries, the non sustainable elements were weeded out, leaving only those

properties that were most appropriate for the place and people. Economic construction was and in many places still is a necessity due to limited resources.

There exist many areas of non- professional architectural practice, from primitive shelter in distant communities to urban adoptions of building types that are imported from one country to another. Because of that, Vernacular architecture is very open, comprehensive concept. It is in fact used as a shortcut and a synonymous for several different practices. These include primitive or aboriginal architecture; indigenous architecture; ancestral or traditional architecture; folk, popular or rural architecture; ethnic architecture or ethno architecture; informal architecture; the so-called “anonymous architecture” or “architecture without architect” and even “non-pedigree” architecture (Arboleda, 2006, <http://www.vernaculararchitecture.com/>, accessed April 2, 2015).

The idea of vernacularism in relation to building was hinted at in the English language since the 1600s, whereas the term ‘Vernacular Architecture’ has been explicitly in use since as early as 1818.

Arboleda (2006) explains that during 1800s, the vernacular was a subject of exploration from different disciplines, and with different biases. First, it was a critical element in the search of national architectural languages. Second, vernacular buildings in the southern hemisphere were seen as objects of curiosity. In European magazines and books, travelers narrated stories about the exotic places they visited, and these stories often included descriptions of the typical buildings of each place. Third, the Vernacular was used as an element to advance the colonial agenda. Some social scientists by the end of the 19th century tried to prove that indigenous vernacular buildings were actually the material evidence of the intellectual inferiority of their builders. Architects became interested in bringing the vernacular to the theory of high architecture by the first quarter of the twentieth century. The praise of the vernacular by Adolf Loos, Frank Lloyd Wright, and Le Corbusier is well known. However, the decisive movement for the insertion of the vernacular in high design theory was “Architecture without Architects”, a 1964, very influential exhibition of commented photographs of vernacular structures at the New York Museum of Modern Art (MOMA). The exhibition was organized by Bernard Rudofsky and had the ultimate goal of elevating vernacular buildings worldwide to the category of beaux- arts.

1.1.3 Background of Vernacular Architecture in Nepal

Vernacular architecture is a dynamic cultural heritage and it is not ‘frozen in time’ like a historical heritage. Its local appeal makes an important attraction in trekking and nature tourism. Fallout of cultural globalization, poverty and poor national policy

emphasis on development and use of local building materials has brought about design and construction of 'modern' houses that has led to loss of vernacular character of rural Nepal that is not only unsustainable but also detrimental to Nepal's tourism industry (Tiwari, Hanaoka, Rijal, Hata, Yoshida, 2004).

Architectural heritage is more commonly associated with high culture and antiquity and the heritage value of the vernacular architecture appears lost in its recentness, commonplaces and anonymity. Indeed, the very little of the act that provides the legal basis for conservation of arts, architecture, and other heritage in Nepal, i. e. the Ancient Monument Preservation Act (1955 and revision), is illustrative of this attitude. Clearly, vernacular heritage is not protected by the law in Nepal, as it is applicable only to buildings or artifacts more than a century in age. But, vernacular architecture, although they may be of recent construction is based on indigenous traditional knowledge of both design and construction, and which exhibits a rare assimilation of social environmental and economic demands of the place and the people in the austere aesthetics of sustainability. Indeed, vernacular architecture is valuable for its dynamics and its capacity of continuing evolution. These values and the unique local architectural character that has resulted out of consistent application of such values and knowledge over generations are as worth conserving as any ancient heritage. Although the ancient per se may not be ancient, they incorporate wisdom and aesthetics of architecture and construction methods developed over centuries in a manner most true to the indigenous society and the environment.

With the great variation of topography and natural environment and an equally large number of diverse ethnicity, rural vernacular architecture of Nepal can be as varied. However, on the basis of major construction material in use, we may divide Nepal into three broad vernacular architectural divisions e.g. The Terai, middle Hills and high Mountains (Tiwari, Hanaoka, Rijal, Hata, Yoshida, 2004).

With the limited resource, people adapted their shelter to the place. The quality and stability of the buildings depended on their capacity to work with the available materials. The people of Tibetan origin who settled in the north, built their houses out of earth or stone, with thick earth covered roofs. The cold dry climate allowed the construction of flat roofs, which were used for household activities. To the south of mountain range, the climate became wet, and sloping roofs were required, with covered balconies and verandahs. To keep the roof structure simple, clear rectangular buildings were built. The walls were of stone, the most available and suitable material. The houses of the individual ethnic groups were distinguishable by their detailing, workmanship and decorations. Their social structures were usually made visible through the organization of the settlement. In the hot humid plains of south, the buildings were built of light wooden or bamboo structures which thatch or bamboo mat roofing. The wooden structures on silts were later introduced and used

by the landlords of the indigenous tribes and by the hill people who migrated down to the plains (Weise, <http://ip51.icomos.org/iwc/seismic/Weise.pdf>, accessed at 4/5/2015).

1.2 Impact of Earthquake Disaster on Rural Housing & Settlement

On Saturday, 25th April 2015 at 11:56 AM, a 7.6 magnitude earthquake as recorded by Nepal’s National Seismological Centre (NSC), struck Barpak in the historic district of Gorkha, about 76 km northwest of Kathmandu. Nepal had not faced a natural shock of comparable magnitude for over 80 years (NPC, 2015). The catastrophic earthquake was followed by more than 300 aftershocks greater than magnitude 4.0 (as of 7 June 2015). Four aftershocks were greater than magnitude 6.0, including one measuring 6.8 which struck 17 days after the first big one.

According to Post Disaster Need Assessment (PDNA) Report prepared by National Planning commission (2015), to date, there are over 8,790 casualties and 22,300 injuries. It is estimated that the lives of eight million people, almost one third of the population of Nepal, have been impacted by these earthquakes. Thirty-one of the country’s 75 districts have been affected, out of which 14 were declared ‘crisis –hit’ for the purpose of prioritizing rescue and relief operations; another 17 neighboring districts are partially affected. The destruction was widespread covering residential and governmental buildings, heritage sites, schools and health posts, rural roads, bridges, water supply systems, agricultural lands, trekking routes, hydropower plants and sports facilities. Rural areas in the central and western regions were partially devastated and further isolated due to road damage and obstructions.

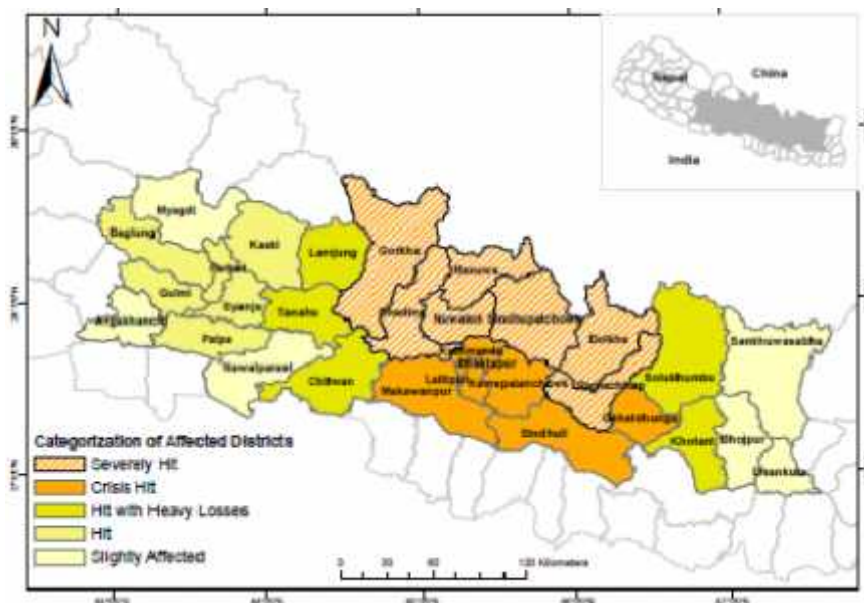


Fig. 1.1: Earthquake affected Districts (NPC, 2015)

The earthquake caused widespread destruction of housing and human settlement, especially in rural area of Nepal. Nearly 5, 00,000 houses were destroyed and more than 2, 50,000 houses were partially damaged. The effect of the disasters were visible among a diverse range of communities and settlements, including remote mountain villages, roadside market towns, heritage settlements peri-urban neighborhood, and emerging cities and several dense neighborhood in the Kathmandu valley. The large-scale destruction of housing resulted primarily from the seismic vulnerability of unreinforced masonry houses that predominate throughout the country. Most houses (58% of all housing construction) are low strength stone or brick masonry with mud mortar, without seismic – resilient features. These intrinsically weak and brittle buildings suffered widespread damage and collapse throughout the 31 districts that experienced intense ground shaking (NPC, 2015).

S.N.	Type of Damage	Number of Buildings
1.	Fully Damaged	4,74,025
2.	Partially Damaged	1,73,867
		Total :6,47,892

Table 1.1: Number of low strength masonry building damaged by earthquake (NPC, 2015)

1.3 Statement of Problem

The vernacular built forms have evolved over time to meet the changing needs of the people. These changes have been through generation to generation and its form and character is different in different places. It is happened due to the need of man to provide shelter in varied climatic conditions which provided different challenges.

This was in regard to availability and appropriateness of various building materials, roofing styles in varied zones of different precipitation levels, lighting, ventilation, social, cultural, religious belief. However all this accumulated wealth of knowledge of some communities is lost due to new construction materials and technology.

In Nepal, vernacular built forms are viewed (through the eye of urban based planners, politicians & engineers) as a symbol of poverty and backwardness. These built forms are replaced with contemporary forms, materials and technology which has not been researched upon to ascertain neither their appropriateness in terms of meeting the needs of the people and environmental, nor their sustainability. This has led to the unsustainable architecture in rural area.

Traditional buildings are well adapted to the location, though their development is based on restricted resources and modest requirements of the people. External influences such as motor able roads and tourism have changed available resources and the aspirations of the people. Adjustments to the traditional rural buildings are required to accommodate new functions. A higher standard is often required to cater tourism, especially in connection with comfort and sanitation. To address these issues, study of rural vernacular architecture is relevant and necessary.

1.4 Objectives of the Study

The objectives of the study include the following:

- ❖ To document and present the existing vernacular architecture in order to provide a better and detailed understanding of the culture, history and built forms of the rural community.
- ❖ To analyze the vernacular architecture with regard to spatial organization, thermal comfort, ventilation, building materials, craftsmanship, climatic response, and settlement layout and site selection for settlement.
- ❖ To study and identify the weakness of construction system of rural traditional dwelling from the point of view of earthquake disaster and to recommend the earthquake risk reduction technique by improving construction system without compromising its authenticity.

1.5 Significance of Study

- ❖ The study of vernacular architecture will explore the characteristics of domestic building in particular regions or locations, and the many social and cultural factors that have contributed to their evolution.
- ❖ It will provide an understanding of the social and cultural importance of rural architecture. Its analyze will help to study the interrelationship of material, social and symbolic aspects of various forms of buildings and settlements, regardless of their size, function, form and geographical, environmental or cultural context.
- ❖ It will identify the weakness of construction system from earthquake disaster and will recommend for earthquake resistance construction technology.

1.6 Limitation of the Study

The proposed study will cover Sikles village which is located in the western development region. The proposed study is completely an academic work; as such there are enormous challenges for field work. It will not be applicable to all village in Nepal because of its geographical situation, ethnic diversity and different characteristics feature of different community. Construction system, material availability and economic condition is different in different villages. So it will not be applicable to all village of Nepal.

1.7 Organization of the Study

This study has been divided into six chapters as follows:

- ❖ **Introduction:** The first chapter deals with background of architecture, introduction of vernacular architecture, background of vernacular architecture in Nepal, earthquake disaster in rural housing and human settlement, objective of the study, significance of study and its limitations .
- ❖ **Literature Review:** The second chapter deals with literature review of vernacular architecture and rural settlements.
- ❖ **Research Methodology:** The third chapter contains research methodology adopted for the study. In this chapter research design, source of data collection, sampling size and procedure, data collection techniques and tools, interview survey, key informants interview, field visit and observations, rapid visual damage assessment are included.
- ❖ **Introduction of study Area:** This chapter deals with village introduction, history of settlement, socio-cultural aspects, architectural feature, settlement pattern, layout of building etc.
- ❖ **Case study and Analysis:** This chapter deals with Analysis of Building typology, building use, Construction system, Architecture and Design feature, seismic vulnerability, climatic response, recent changes in Material, Technology and built form etc.
- ❖ **Conclusion and Recommendations:** The last chapter contains summary and conclusion of the study. Necessary recommendations are also presented.

Drawings, Maps, photographs, are included as per necessity. Necessary annexes are also included.

CHAPTER II

REVIEW OF LITERATURE

2.1 Vernacular Building

Vernacular buildings or houses include not only traditional – style houses but also the various types of buildings which have been evolved to meet the requirement of ordinary people.

Oliver (1989) stated that vernacular houses are handed down as a heritage from generation to generation. He mentions that vernacular houses are always changing from traditional forms to contemporary forms, whereas traditional historical houses are fixed to the beginning of their history. He states that the development of vernacular buildings throughout history has been a response to their environmental context.

Lawrence (1987) argues that vernacular buildings evolve in accordance with living activities and value of residents. Strike (1991) mentions that since the beginning of industrialization, change in vernacular tradition has accelerated for various reasons including modernization and globalization.

2.2 Defining Vernacular Architecture

In the book “Architecture without Architect”, Rudolfsky (1981) gave several terms to describe this type of architecture: vernacular, anonymous, spontaneous, indigenous and rural. He describes the use of the vernacular as not the product of any formal trained architect, but that of an entire community, working through his history.

According to Brunskill (1986), the term vernacular architecture has been additionally explained as building activity of ordinary people, strongly related to its place, especially through the use of local building materials and craftsmanship. Rappoport (1969) states that the major characteristics of vernacular are its additive quality, its unspecialized and open ended nature. These qualities enable its architecture to accept changes and additions that would visually and conceptually be opposite to the ‘designed’ or academic architecture.

2.3 Vernacular Architecture in Rural Nepal

The architectural type in any part of Nepal reflects its social, economic and cultural background. The type and form of Houses are guided by topographic features,

climatic conditions and social traditions. The shapes and forms of houses observed in the rural areas of Nepal are so numerous while their study & classification remains an important task in Nepali architecture.

Shrestha (2004) classified Vernacular Architecture on the basis of ecological belts into three main groups as follows:

- ❖ **Himalayan Type:** Since the natural environment, social tradition and economic condition of the Himalayan people are entirely different from those of other people in other regions of Nepal, the houses built therein are also of unique type. Owing to great difficulty of carrying modern construction materials, houses are built from locally available materials like stones, soil and wood. Most houses are built adjoining wall to wall and are often double storied. These are structured with their faces turning towards south or east in direction and are rectangular in form. Their doors and windows are small and roof s flat. As regards their use, if the houses are double storied, the ground floor is reserved for domestic animals, grass, fuel-wood, etc. which the upper floor is used for living, sleeping, cooking, storing etc. If the houses are of ground floor only, a separate shed is kept close together. However, depending on local conditions, slight variation in house type and in the mode of its use can always be met with.

- ❖ **Hilly Type:** The hilly region, the most extensive region of Nepal, is inhabited by various types of human communities like Brahman, Chhetri, Newar, Gurung, Tamang, Magar, etc. In many parts, they do not live mixed together, but occupy some specific parts of the region. Some of them dwell in higher parts and some in lower ones like tar and gentle slopes near basins. Being inhabited in this way by varied types of communities in different types of environments, it is rather hard to identify the types of houses found in the hilly region of the country. The form of houses varies on the basis of their culture, tradition, social custom and economic status. As such, houses of varied form, shape and storey are found in various segments of the hilly region. Here also, most houses are made of locally available materials and their faces turn towards south or east direction. In the market centers accessible by roadways, several houses structured with modern materials and, therefore, of modern style, have now been on the increase. Likewise the mode of house use too varies widely among various parts of the region under review.

- ❖ **Terai Type:** Most of the rural houses of the Terai region are of ground floor type and are rather elongated in shape. These are built of locally available materials like wood, straw, bamboo, grass etc. Their interior and exterior walls are painted with clay and cow dung. Their roofs are also formed of straw,

grass etc. Economically well to-do people have the houses built of bricks and roofed with tiles and corrugated sheets. The use of interior parts of houses varies according to their social system and cultural tradition. Though some variation occurs in certain aspects, there is good deal of uniformity in shape, size and use of houses. Currently rapid changes have been taking place in the design of rural houses close to big markets and towns.

2.4 Built form and Space Allocation

Gaborieau (1978) stated that the house type used by a large majority of the inhabitants of central Nepal can be roughly defined as a two-storied stone building with a wooden framework and roof truss and a thatch covering. It is flanked by a stone platform, elevated in relation to the courtyard which extends from within the house to the façade runs along the sides to support a verandah. Such a house can be of two shapes: oval 'ghumaune', "which turns" or rectangular 'bangale', in Bengal style (refer to the English word bungalow) and both forms still coexist in villages and hamlets. Apart from this, there is no difference in mode of construction or nomenclature except for the roofing: the oval roof, a kind of flattened truncated cone, is a continuous entity; the rectangular roof has four sides.

The ground floor is the most important part of the house; it is identified with the house; "come into the ground floor" is often replaced by "come inside the house" or "come inside", 'bhitra' as opposed to the verandah which is the external portion of the house. If one wants to clearly differentiate the first floor, 'tala' from the ground floor, then the ground floor is called 'bhui-tala', storey at ground level. This floor, which apparently consists of a single room, is actually subdivided into various sections. Ground floor includes a meeting room, a dining room, a kitchen and a temple. It is also used to store goods of daily use; firstly, furniture items: mats, mattresses, and covers which serve as seats and beds; crockery and sets of kitchen utensils- an assortment of brass, spun copper and iron utensils etc. The first floor, 'tala' is much simpler than the ground floor and used for two purposes of equal importance. It is above all a granary where the entire food is stored or, if there is another granary above the cattle shed, a part of them is stored. The free space fulfills the second subsidiary function: if there is not enough space on the ground floor, the first floor can be used as a bedroom, preferably for the most senior family members Gaborieau (1978).

2.5 Rural Settlement: Feature and Factors

Gerard (1994) pointed out that the connections between farming methods and dwellings are particularly relevant to mountains area of Nepal. Houses in the rural landscapes systematically establish the relations between the dwelling and method of

farming. The rural house provides a solution to the vital problem of relating men, animals and goods. From bottom to top, the same family may own the following: a breeding shelter located on irrigated land, below the level of village, at about 1500-1800 meters; a house in the village proper at an elevation of 1850-2000 meters; a breeding shelter located above the village; and a high altitude shelter between 2700-4000 meters, used during the summer. Besides the permanently occupied village house, these structures are only used in certain seasons of the year depending on the farming calendar and the movement of herds.

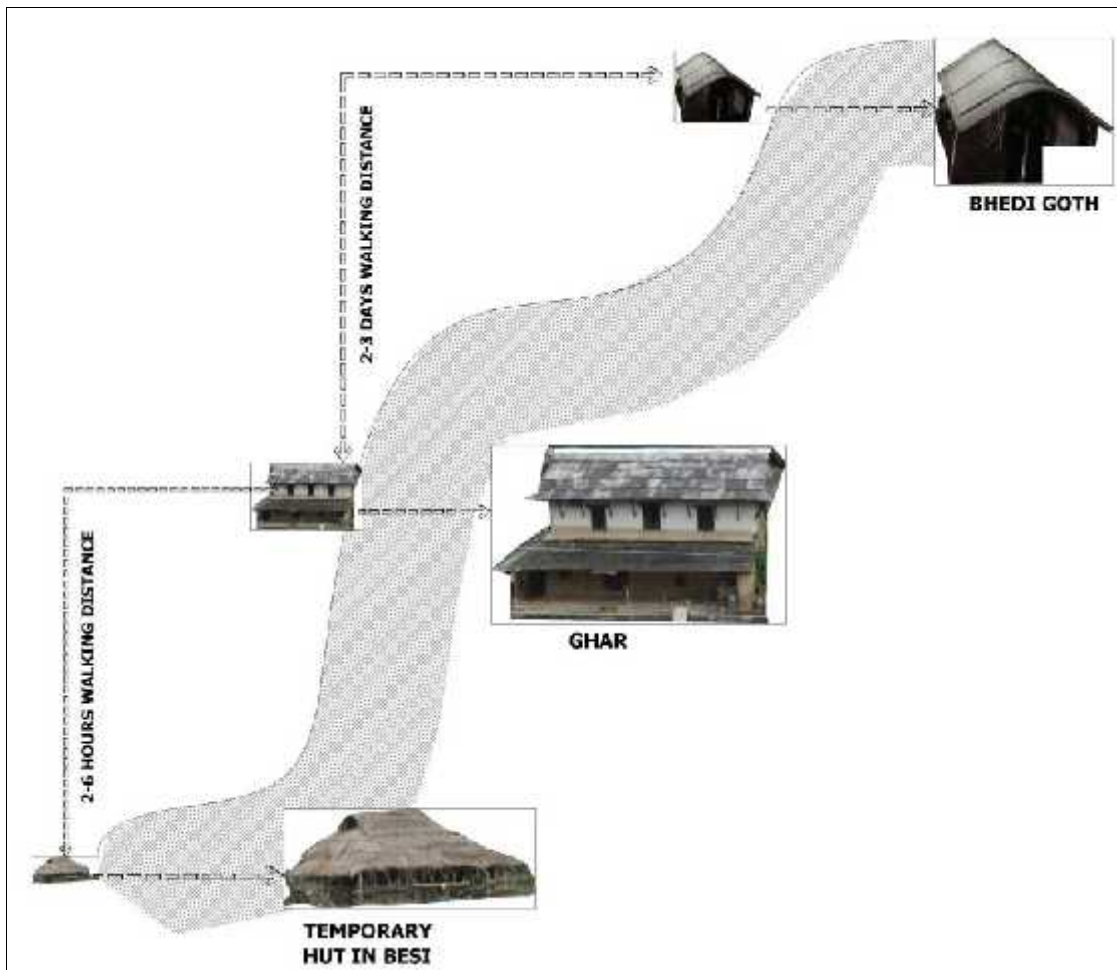


Fig. 2.1: Relation of settlement with farm land and animal shelter (Bagale, 2008)

According to Shrestha (2004), Rural Settlement is rather dynamic, because with the growth and migration of population, its pattern and size began to change. In fact, there are several factors which influence its location, size and form. In the main, the physical factors like topography and climate, economic elements like agricultural land and means of livelihood, socio-cultural phenomenon like tradition and customs exert great influences on varied aspects of rural settlement. As a matter of fact, initially the basic needs of human life determine the location of rural settlement.

Singh (1998) focuses that site, situation and Location/Position are interrelated but easy to be distinguished. It is well-known assumption that in the selection of settlement sites, man is usually guided by both the attractive and restrictive forces of physical setting which is an ensemble of various elements, such as, geology, relief, drainage, soil, and natural vegetation. We need not, therefore, emphasize the significance of site which Blache thinks to be the first to be considered for the study of the distribution of human establishments. But, this statement that “nature prepares the site and man organizes it to enable him to satisfy his desire and his needs” approves of the fact that the very concept of site is inherently cultural. Moreover, the effect of site is cultural rather than physical, since the ideal site depends on the goals, ideas and values of people or period and choice of the ‘good’ site whether lake, river, mountain or coast depends on this cultural definition. The first settlers with their acquired knowledge make rational judgment concerning choice of sites for their habitations always based on balance consideration of ease of conducting internal economy and external transactions. Still, the site performing the basic functions and dysfunctional ones which failed to do so do exist. The latter, however, indicate temporal exigency or chance factor during occupation of site.

Singh (1998) pointed out that situation or setting is usually concerned with physical and cultural conditions over a much wider area. It refers to the relation of one settlement with the surrounding settlements in the country through varied linkages. Situation is partially unique and can be generalized to a limited extent. Location indicates the place where an object or settlement is situated i. e., its geographical address, hence extent in degree, minute and seconds in reference to latitude and longitude expressing uniqueness.

Shrestha (2004) describes the following factors influencing rural settlement in Nepal.

- ❖ **Land Features:** The topographic features like altitude, slope and exposure exercise a far-reaching influence on the development, location and pattern of rural settlement in Nepal. Normally human settlement is rarely found along steeper slopes and higher parts of mountain ranges. In other words, most of the settlement in mountain ranges is confined to lower and gentler slopes. Likewise because of climatic variation, most people make their settlement along the south slopes- North Slope is avoided as far as possible. Leaving a few expectations, in most mountains and hills, human settlements are generally scattered, while in tarai and Terai parts, these are mostly agglomerated. Whether mountain or Terai, even in a single geographical region, some local variation can always be noted that there is due to other contributory elements like culture, custom and tradition.

- ❖ **Water Supply:** Since water supply is a basic need of human life, the sources of water supply play a very paramount role on the development and location of rural settlement. Rivers, springs, wells and stone-taps are the major sources of rural water supply. It is on the basis of these sources that the location of rural settlement is ascertained. If water supply is available at several places, human settlement takes place in scattered form. On the other hand, if water is available at a particular place only, settlement too gets concentrated at its close proximity in an agglomerated form. Thus the sources of water supply greatly determine the location and form of settlement in rural areas.

- ❖ **Agricultural Land:** Since it is the vital sources of food needed for human life, the growth of rural settlement takes place in areas providing suitable land for agricultural activities. Rural settlements in all the geographic regions of Nepal have developed mainly on the basis of availability of agricultural land. But the pattern and extent of rural settlement developed on this basis are not uniform-somewhat it is compact and somewhere isolated.

- ❖ **Fuel Supply:** Another factor exercising great influence on the location and development of human settlement in the rural areas of Nepal is availability of cooking fuel. In almost all the rural part of the country, fuel wood is the prime source of energy for all cooking purposes and its only source is forest. As such, the growth of human settlement in rural areas is found to have taken place in the vicinity of forests. It can be well experienced in all the ecological belts of Nepal.

- ❖ **Natural calamities:** Most of us heard of the tremendous loss of life and property caused by landslides in mountain areas and by floods in the Terai and river basins of Nepal. Therefore, while making, settlement in mountain region, risky areas liable to landslides are avoided as far as possible and settlements are made in a slightly higher ground safe from floods. River banks subject to flood are always avoided. This then reveals how natural disturbances influences to a great extent the location and development of human settlement in rural areas of Nepal.

- ❖ **Malaria Eradication:** Till a few decades back, as the malaria epidemic was prevalent in most parts of Terai and inner Terai, human settlement had very poorly developed in them. Even in the deep river basins of the mountain region, for fear of being attacked by malaria disease, most people were reluctant to make permanent settlement in them. Rather they used to choose the low gentle slope of mountain ranges. However, during the last few years, as the malaria disease has been eradicated, rapid development of human settlement has been taking place in Terai, Inner Terai and mountain basins. In

this way, the prevalence of malaria epidemic in the past and its subsequent eradication has led to a fundamental change in the location and development of rural settlement in the country.

- ❖ **Market centers:** Whatever may be the form and extent of market centers, their emergence has greatly influenced the development and location of human settlement in the rural areas of Nepal. In reality, mankind needs not only the basic goods like food grains, cloth, salt, oil, species etc., but also many other things which make life worth living. Since such goods can be availed from markets and towns only, accelerated growth of human settlement has taken place in their vicinity. This is one of the major processes of the development of rural settlement in all the geographic regions of Nepal.

Singh (1998) observed that physical and cultural factors are more responsible for various agglomeration and dispersion of rural settlement. According to Hudson (1976), the practice of living was fostered among newly settled communities by a necessity of dealing effectively with a somewhat hostile environment, e.g., a fostered or marshy landscape, and by the advantage of organizing a permanent system of cultivation. Singh (1998) pointed out that environmental, socio-economic as well as socio-psychological factors are responsible for dispersion of settlement.

2.6 Types of Village settlement

Singh (1998) gave the examples of types of village settlement by quoting various scholars. D.C. Money, in his Introduction to Human Geography, broadly classifies as : (a) the single large nucleated village, (b) hamlets scattered throughout the countryside and (c) single homestead. Enayat Ahmed gives four types: (a) Compact (b) Cluster and hamlet type (c) fragmented or hamleted and (d) dispersed settlement. Most of the settlement geographers have classified the types according to their regional distribution patterns of such habitations on the basis of theoretical, empirical and associational considerations.

Based upon form, Pradhan (2012) classified settlements into two basic patterns namely dispersed and agglomerated or compact. The settlement patterns are usually identified in terms of number of houses per unit occupancy area. Dispersed settlement can best be described by its single-family residence unit as distinctive nucleus. For the most part, this type of settlement where one family residence stands isolated and apart from others is the characteristic feature of agricultural areas. Generally these occurs in the mountain region due mainly to rugged topography where distribution of resources such as arable land, water etc. is scattered. In compact or agglomerated settlement, there are several family residences together with other type of buildings.

In these types of settlement, buildings and streets are the most visually conspicuous features.

According to Pradhan (2012), adequate arable land, better services and facilities, security, socio-cultural traditions, etc. are some of the factors to describe the concentrated form of settlements. However the role of each of these factors may differ from area to area depending upon the local situation. While the compact settlements of Nepal's Terai region, for instances, are as a result of adequate and productive arable land, flat topography, etc. Despite, there is hot climate, in the country's high altitude region; the agglomerated settlements are due to cold climate, socio-cultural traditions of the particular ethnic groups, etc. though there is limited arable land.

Shrestha (2004) visualized the rural settlement of Nepal in 3 major types:

- ❖ **Linear settlement:** In this case, human settlement gets elongated like a ribbon in one direction only. So, it is called Ribbon settlement. In most cases, such type of settlement is met with by the side of a highway, on the bank of big river and at the foot of the ridge.
- ❖ **Compact Settlement:** It is almost equivalent to Nucleated or Agglomerated settlement. In such type of settlement, houses like a bee-hive occur close together. Route centre, market centre, holy place, water spring or well (in arid areas) are the notable places with compact settlement.
- ❖ **Scattered or Dispersed Settlement:** In this type of settlement, houses instead of being clustered at some distance in an isolated form. Such type of settlement is mostly associated with high mountain regions. In this case, the influence of safety, water supply, communication is very minimum. In most cases, this sort of settlement takes place with the sole purpose of safeguarding farm crops in its surroundings.

2.7 Influence of Natural Environment on Rural Dwelling

As man left the shelter of nature (i.e. cave, tree trunks, large rocks etc.), his search for an adaptable shelter and house led him to different solutions under different conditions. The evolution of the built environment is the product of his patience and sensible search through the centuries. (Turan, 1975, http://jfa.arch.metu.edu.tr/archive/0258-5316/1975/cilt01/sayi_2/227-246.pdf, accessed at 8/3/2015)

Gerard (1994) describes that The Himalayan region is known for its great differentiations in elevations and its extraordinary variety of bioclimatic environments. It is a laboratory of choice in which to study relationship between settlement patterns and the natural environment. The southern slopes of the mountains

can be compared to a huge staircase rising from sea level to a height of more than 8000 meters. From south to north ecologists have identified several levels-sub tropical, alpine, steppe, etc-which leave villagers only a limited range of materials for their dwellings. Let us consider the roof, an essential element of the house. To more or less every ecological level corresponds a type of roofing that relates to local vegetation and mineral resources. If one takes a cross section of central Nepal, one finds, successfully, from the lowest elevation to the highest, seven main types of roofing:

200-600 M	Grass roof among the Tharus of Terai
1350 M	Roofs of small flat tiles among the Newars of Kathmandu valley
800-1,750 M	Thatched or grass roofs in the foothills in the middle of the country
1,000-1,800 M	Fine slate roofs in the middle of the country depending on availability
1,200-1,400 M	Thin slate roofs or slate roofs in the middle of the country depending on availability
+1,750-1,800 M	Timber roof in the fostered highlands
2,500-4,000 M	Terraced roofs in the Tibetan settlements of the Transhimalaya

Table 2.1: Roofing system in Nepal (Gerard, 1994)

Turan (1975) focuses that the very early primitive architecture to the vernacular and then to the industrialized architecture in housing, man tried to find solutions with which to adapt to and survive within a given environmental situation. The environmental influences on his sheltering and their modifying effects on the type, shape, material and even on the means of erecting these shelters have played as important a historical role as the socio-cultural potentialities of man. From the savage food gatherings to the more advanced cultivators, we see the tremendous effort by man to search for the right microenvironment where he can be comfortable away from the physical disturbances. It is a tool which frees man for other activities by creating an environment which suits him, protecting him from the undesirable effects of his surroundings.

CHAPTER III

METHODOLOGY

3.1 Study Area

Sikles village is proposed for a study of vernacular architecture. It is the largest and one of the oldest Gurung settlement in Nepal which situated in the Annapurna Conservation Area.

Sikles is located on the southern belt of the Annapurna Conservation Area Project (ACAP). It lies in the Parche Village Development Committee (VDC) of Kaski district and is situated about 24 km northwest of Pokhara, the headquarter of Kaski District, Gandaki Zone and Western Development region of Nepal.

It lies between 1,100 to 3,331 m above sea level. The lower part below 2000m lies in the warm temperate zone with mean annual temperature between 15 and 20 degree C, while the upper part lies in the cool temperate zone with mean annual temperature between 10 and 15 degree C.

There are altogether 307 households in the village (Village profile, 2013). More than 80 % of the households are occupied by Gurung people and the remaining households belong to occupational neighborhood such as Kami and Damai. The village includes six traditional neighbours: Ghairi-Thar, Sava-Thar, Ko-Thar, Dhaprang-Thar, Lama-Thar, and Harpu-Thar.

3.2 Research Design

For the study of vernacular architecture, I have followed :

- ❖ **Descriptive Research Design**, to describe the village settlement and existing buildings as they exist. It involves the systematic collection and presentation of data to give clear picture of a particular situation. It is helpful to obtain a complete and accurate description of a visual situation. Descriptive research design is focused on site investigation and observation to determine the various aspects (settlement patterns, built form, use of building, climatic response, architectural detailing and construction system etc) of vernacular architecture of sikles village. It also includes analysis and recommendation for the future which is based on the problem identification. Descriptive research design also involves literature review related to vernacular architecture.

- ❖ **Survey Research Design**, one of the powerful and quick methods of superficial study of the facts. I have taken 24.42 % sample (According to Parche VDC profile-2012, there are altogether 307 households in Sikles) which is representative of the whole universe. Personal interviews, Rapid visual Damage assessment, measurement of building by measuring tape, photographs, sketching are also included.

3.3 Mode of collecting Data

The study follows a multi-pronged approach involving the collection and analysis of primary as well as secondary data from the entire relevant source at the national and community levels. Both quantitative and qualitative information are taken into account.

3.3.1 Primary data collection methods

The primary data is collected at household level by inventory sheet (Questionnaire), informal discussion, key informant interview, field observation, visual assessment, measurement of buildings by measuring tape, preparation of sketch to show the settlement pattern and detailing of buildings. A checklist was developed for study of settlement.

Data generated from inventory sheet (Questionnaire) filled by research team was used to fulfill the objective of research. Field visit was done in July 7, 2015 for 10 days. Questionnaires (included in annex) were divided in two sections: Inventory of Building & Household survey. Inventory of building includes architectural data and household survey includes socio-cultural data. Selection of houses was based on stratified random sampling. The focus was to include all wards, all neighborhood, gender and both CGI sheet roofed and slate roofed houses. There are altogether 307 houses. Among them, 75 houses (24.42%) are selected by stratified random sample methods. List of houses and name of respondent is included in annex.

Key informant interview was also done. Two local masons were interviewed to know the construction system they followed. To know the cultural and religious norms, interview with local lama was also conducted. But interviews were not taped, only collected by written notes. Few buildings were measured and drawings are prepared by using AutoCAD software. Freehand Sketches, maps and drawings were prepared in site, which are included in this report. Few are free hand and are included as it is by scanning only. Few (especially settlement map, VDC map etc) are processed in computer by using AutoCAD software and are included in this report.

3.3.2 Secondary Data collection

Documents related to vernacular architecture (rules, plans, regulations etc.), publications, research papers, reports, books, journals, thesis are the major source of secondary data.

3.4 Tools and techniques of Collection of Primary Data

S. N.	Data Collection Techniques	Data collection Tools
1.	Using available information	Checklist, Data compilation forms
2.	Observing	Visual and other senses, pen/ paper, scale, measuring tape, camera
3.	Interviewing	Interview guide, checklist, questionnaire, tape recorder
4.	Key informant Interview (KII)	Interview guide, checklist, questionnaire, tape recorder

Table 3.1: Tools & Techniques of data collection

3.5 Data processing and Analysis

Data processing and analysis is done by both ways, manually, as well as by using computer software (AutoCAD, Sketchup and excel).

CHAPTER IV

INTRODUCTION TO STUDY AREA

4.1 Village Introduction

Sikles village is one of the largest Gurung settlement in Nepal with a population of about 1313 (Village profile, 2013), situated at about 6500 feet, on an East facing ridge overlooking the Madi river. The village is made up of 6 'Thars' (Neighborhood) called Dhaprangthar, Lamathar, Savathar, Harputhar, Koithar & Gairithar.

Sikles is nestled in the shadow of Annapurna II and Lamjung mountain range, and is afforded protection by a holy forest. Whilst most of the forests surrounding the village are used for fuel and building purpose it is forbidden to enter the sacred forest for fear of making the gods angry. In her book, 'Our villages our life sikles', Parker (2009) describes that the traditional white houses are clustered together on the hillside with winding paths. Over the years the slate roofs have been replaced with easier to maintain tin roofs. Outside stacks of corn are stored high above the ground between two poles. Over 85% of the population in sikles is from the Gurung community. Other castes (communities) include Tailors (Damai), Cobblers (sarki) and Iron Mongers (Kami) known as Dalits.

Sikles is part of Parche Village Development committee (VDC) and the village of parche is a twenty minute walk away. It is made up of 5 VDC wards (Ward No. 5,6,7,8 & 9). Village life is organized around these wards with local leaders being elected onto the village Development Committee and also the Conservation Area Management Committees to represent the interest of their inhabitants. Each ward also has its own Aama Toli (mother's group) and Youth Group that organize events and community development activities (Parker (2009).

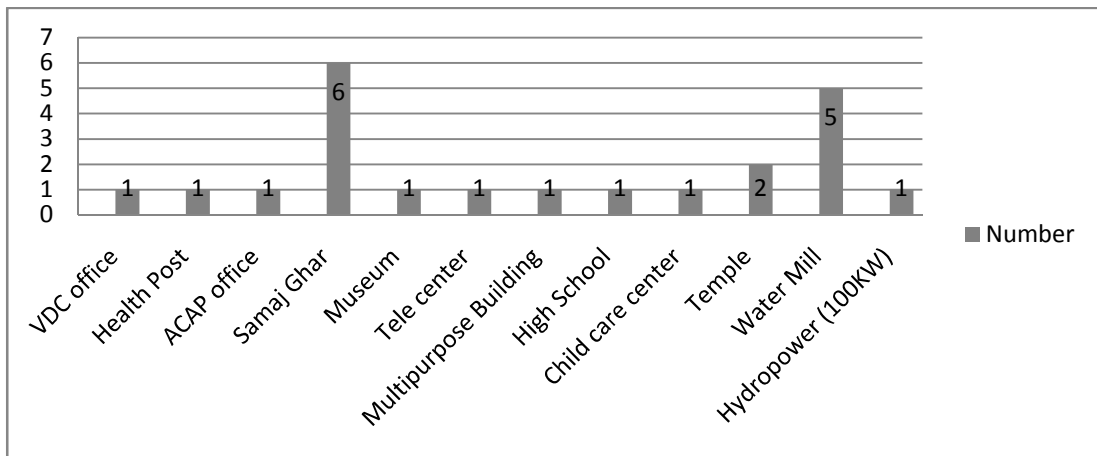


Fig. 4.1: Physical Amenities (Source: Field Study, 2015)

4.2 History of settlement

The history of Sikles is related to various myths. It is said that, the ancient settlement of Gurung community was founded in Manang district before they started to settle in Kaski & Lamjung district. They were nomads and came by crossing Annapurna range for hunting purposes. They happened to drop grains around this place and few months later upon their return they discovered well grown plants on that very spots. Then they realize that it is a fertile land for cultivation. The name of that ancient village was Kola Sopre Tyo. It is located 2 days walking distance from Sikles village. From this village, It is believed that people spread around that settlement and one of them is Sikles. Various historical evidences are also found in that ancient settlement (Kola Sopre Tyo).

4.3 People & Culture

4.3.1 Introduction

The people in sikles are mainly from the Gurung community and are known in their local language as Tamu. There is a strong belief in natural god and goddesses that protect and control the natural environment including hills, rivers, streams and ponds.

Gurungs are a hardy hill people living along the southern slopes of the Annapurna Himalaya in west-central Nepal. Their traditional territories extened from Gorkha District east through Lamjung and Kaski to Syangja District, all in Gandaki Zone. Gurungs are also found north along the Kali Gandaki river above the important town of Baglung in Baglung District of Dhaulagiri Zone, along the Marsyangdi River in Manag District, and along the Buri Gandaki valley. Of late many Gurungs have migrated southward in to the Rapti valley of the inner Terai to take up a new life on fertile land recently cleared of malaria (Bista, 2000).

The inhabitants in Sikles are principally Agro-pastroralist, with some joining the British or Indian armies. The village is more or less, self-sufficient in food stuffs (Millet, Potato, Maize, Rice, soyabeans). The cattle and ship provide dairy products and wool for clothing.

S.N.	Ward No	Tole	Family	Male	Female	Total
1	5	Sabhathar	44	143	135	278
2	5	Koithar	18	58	56	114
3	6	Gairithar	46	145	119	264
4	7	Dhaprangthar	74	197	197	394
5	7	Maphu	25	58	66	124
6	8	Harputhar	77	225	207	432
7	9	Lamathar	23	70	65	135
Grand Total						1313

Table 4.1: Total population of Sikles Village (Source: Parche VDC Profile, 2011)

There are numerous rituals that are performed by three types of local priests Paju, Labri, and Lama. Often animals such as sheep, goats and chickens are slaughtered and fortune can be predicted from the liver of the slaughtered animal. Migration and other factors such as living in a mixed community have meant that some of their traditions have been threatened. Many of the ceremonies are performed in Sava Thar as this is the main gathering place in sikles and where the main village meetings take place. The performance at the time of birth, marriage, death, and arghum is distinct to the Gurung culture (Parker (2009).

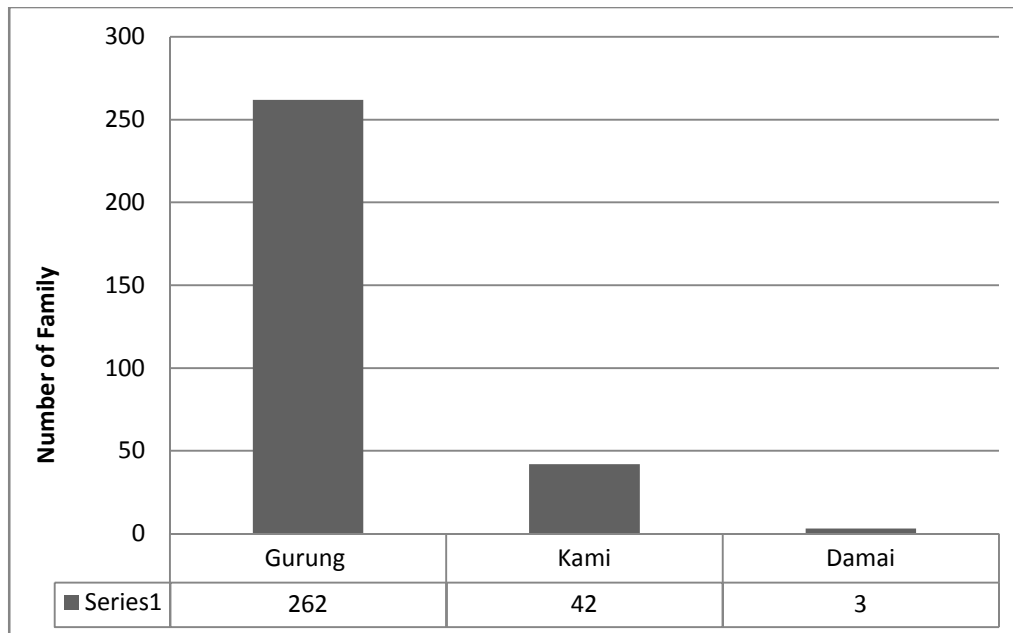


Fig. 4.2: Number of family based on community (Source: Parche VDC Profile, 2011)

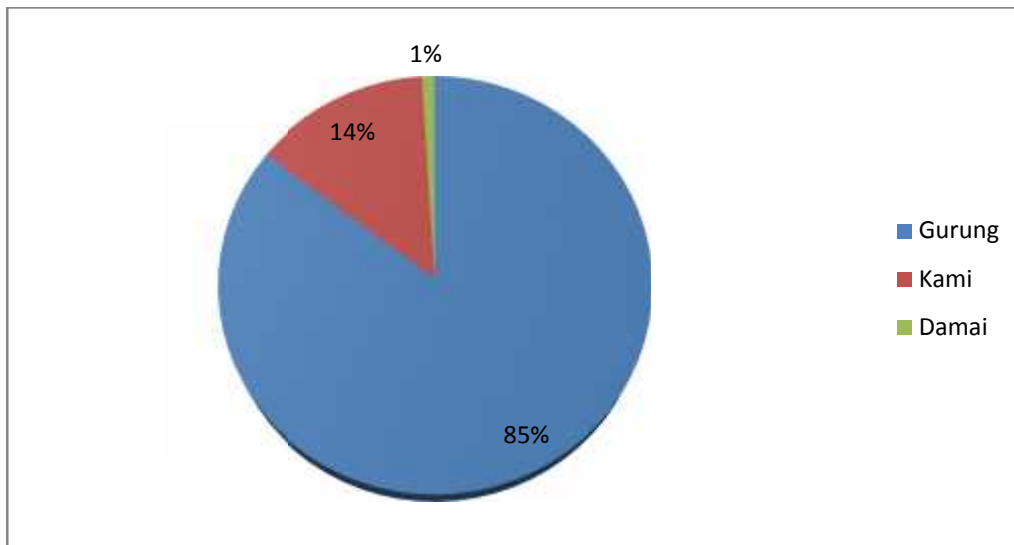


Figure 4.3: Distribution of Caste (Source: Parche VDC Profile, 2011)

4.3.2 Birth Rite

In Gurung culture, when a birth of first son, the boys of village come together for the ceremony and perform ‘putpute’ dance in the courtyard of the houses. The dancers offer cash according to the status of the baby’s parents. The money is spent later on a feast. The relatives of the baby’s mother bring presents of cloths, ornaments and food for the child. There is one more ceremony-the first haircut, when the boy is five or six years of old. Hair cut ceremony is called ‘Chhewor’, which is done by maternal uncle called ‘mama’(Bista, 2000)..

4.3.3 Marriage system

When boy chooses a girl, whether the expected candidate or someone else, he informs his parents. His parents then send one of their friends or male relatives as their representative to the girl’s parent’s house with a present of one rupee and bottle of spirit. The visitors are entertained with food and drink if the girl’s parents accept the proposition but are curtly dismissed if they do not. When the girl’s parents have agreed, the boy can make arrangement to fetch the bride at his convenience. Usually, he goes out with one of his friends to the girl’s house and escorts her home. But nowadays, some people arrange a party and musical band to go the procession to fetch the bride. When the girl is finally taken to her husband’s home, her parents give her a dowry. The dowry consists of copper and brass cauldrons and water jars, sheep, cattle, clothes and ornaments (Bista, 2000).

4.3.4 Death rite

In Gurung community, there are two ways of disposing of dead bodies, cremation and burial. By studying the position of the constellations at the moment of death and the priest decides the method of disposal of the body.

There is a common burial ground for the deceased of a village. When a grave is dug, some rice grains are scattered before the body is lowered into it. A small piece of gold is put into the mouth of the body and some food and liquor is put on top of the body before the grave is filled with earth.

For cremation, a hollow, round structure is built with holes near the bottom through which firewood can be put in. The dead body is then put on top and the wood thrust in from below and lighted.

Death rites last for thirteen days, and affects all the brothers, brother's sons and other relatives, who observe mourning during this time. The descendents son observers mourning for six months or a year. The mourner does not to eat meat or drink any liquor. Pa-ye, the final rite for the dead relatives, is performed about one year following death(Bista, 2000).

4.3.5 Dress & ornament

According to Bista (2000), The traditional clothing that men wear consists of a long piece of loincloth called 'Kathad'. The upper part is a 'Bhoto' (vest) with a traditional Nepali 'Topi' (cap). In between the upper and lower part of the body, a long cloth is wrapped around the waist known as belt, tightly to compresses the stomach muscles. Instead of this cloth warping used as a belt, some wear old army belt etc. In cold season, they cover themselves with 'Labru' (Blanket) made of sheep's wool.

Women wear 'Phariya', 'Cholo', 'Patuki', 'Majetro' and a 'Ghalek', which is a special cloth like bag hanging from the shoulder to other side of the waist, or worn across the chest and hung on back. Nowadays silk cotton, saries, Lungis, Choubandi cholos, velvet cloths etc. are seen worn among Gurung women. Bhangra is common for both male and female.

Ornament worn by Gurung women are similar to those worn by other communities. Ear ring are huge and heavy, phulis on the Nostrils, Naugedies, Tilahari and squarish amulets hung along with poteh. Some even wear golden bangles and golden crescent moon hair clips.

4.3.6 Religion & Festival

According to Bista (2000), Gurung practice their own tribal religion, which consists of worshipping a number of spirits and Hindu deities also such as Shiva, Krishna, Ram, Devi etc and celebrate Dashain, Tihar etc. Few are Buddhist who celebrate 'Baishakh Purnima'. 15th Poush as the New Year have called 'Lhosar'.

They use to great fun like singing, dancing, feasting during these festivals also during the harvesting period. Due to outmigration of young working people, this kind of celebration is declining day by day.

Ghanto, Sorathi, Kaura, Rodi are the major specific cultural facets of Gurung. According to Lal Prasad Gurung, a local priest (Lama), these traditions are declining from Sikles. He says that rodi culture has completely collapsed from Sikles.

4.3.7 Household Tools

Sikles Eco Museum has collections of and display of numerous household tools, tools used in the construction of building, dress, ornaments, weapons and historical elements which are/were used by Gurung. Few are listed as follows:

- ❖ **Water Pot** (गाग्नी-कहौरी) : In rural areas, this pot is found everywhere, usually made of copper and brass, the most popular vessel to fetch and store water. It also forms an important item of the bride's dowry.
- ❖ **Copper pot** (तामे ताउलो-क्योर कह्य) : Copper pot is used to prepare large quantity of rice or curry for workers during agricultural works.
- ❖ **Water vessel** (रोचा) : Until a few years ago, this vessel was used to store the rain water and it was also used as water tank for the social occasion like marriage or rituals where large number of people gathered and joined the programme.
- ❖ **Oil Lamp** (धेत्री-पनस फदी) : This was used for light before electricity in the village. When there is no electricity, this lamp is still used.
- ❖ **Petromax** (सेन्टोल-गैस फदी) : Before electricity in the village, the Patromax was a very good means of light at night during celebrations and rituals.

- ❖ **Wallet** (छालाको बासा-चोक्म भू-योल्) : This was used to keep fire making items like the piece of stone, fiber etc.
- ❖ **Quartz/ Rock Crystal** (दर्शनहुंगा-युम छल्) : This is used to make fire by hitting with chokma, a blunt iron object. This was very important for people of this region before the introduction of matches.
- ❖ **Oil lamp** (ठडेउरो-पिलः) : This lamp was commonly used for lighting in earlier time. Now it is used in praying, festivals or in rituals.
- ❖ **Bamboo Basket** (फुल्दु) : It is used to keep food such as salt and chilies. It is hung above the fire to keep the contents dry.
- ❖ **Herder's Bag** (फ्याउ) : It is used by shepherds to carry their personal items such as money, combs, needles etc.
- ❖ **Bamboo Basket** (पिरुङ्को-पिराउ) : It is used for keeping various domestic items and sometimes used as a hand carry, and also used to transport chicken for purpose of puja.
- ❖ **Bamboo Container** (थुम्सी-सुइदी) : It is used to transport corn crops and the millet from the field. It is kept on back using a wide strap across foreheads to take the weight.
- ❖ **Sieve** (चाली-चेन) : This is used for separating larger solids from smaller solids. People remove the dust and dirt from grain or flour by shaking it through this sieve.
- ❖ **Bamboo rain protector** (स्याखू-क्हूँ) : This is worn over the head and back and it protects from rain. During rainy season, Syakhu is used by many farmers in Nepal because it is easy and comfortable to use.
- ❖ **Bamboo Basket** (डोको-फ्ही) : It is used to transport firewood, fodder, dung and water containers. It is carried n back using a wide strap across foreheads to take the weight. It is made of bamboo.
- ❖ **Honey Hunting rope and items:** The rope ladder for descending the cliff, the rope to pull or descend the cradle, the bamboo sticks and the cradle are the items used while wild honey hunting.
- ❖ **Clay pot** (हाडी - पु) : Made of clay, a handi is used to fry popcorn.

- ❖ **Clay pot (घैटो – कुंडर)** : It is used to store homemade liquor for later use in the making local rakhsi. Some people use it as water container. The use of such pot has been decreasing with the availability of metal and plastic drums.
- ❖ **Mortar (सिलौटो – खल)** : It is used with pestle for making paste by grinding peppers, chilies, garlic etc.
- ❖ **Wooden Container (ठेकी – पोर/परु)** : It is used as a container for milk or curd. In recent years, there has been lack of suitable timber and people with skill to make a Theki.
- ❖ **Iron Pot (कुंडे)** : It is used for boiling milk.
- ❖ **Wooden Container (पुचै)** : It is used as a cup for drinking rakshi. The puchai is not normally washed with water which is why it is usually used by its owner. Wealthy people often decorate the puchai with silver.
- ❖ **Wooden Container (गब्बु)** : The Gabbu is used to keep ghee or honey. The best wood to make these containers is Dar.
- ❖ **Chicken Coop (गुबिन)** : The mother hen and baby chicken are kept in a coop to protect the chicken from predators. It is used to cage the bird.
- ❖ **Fish Carrier (फुर्लुड)** : It is a basket for keeping fish caught by fisherman.
- ❖ **Pipe (हाते हुक्का)** : After putting tobacco with burning coal at the top part, it is smoked through water at the bottom. It is made of pottery, wood and metal.
- ❖ **Bamboo Container (थुम्सी-कोब्यो)** : It is used to transport corn and the millet from the field.
- ❖ **Woolen Blanket (कम्मल-राद्)** : Blanket, made of quality wool, used for sitting or as a sleeping mat. It is placed on a rice-straw mat while respecting guest to sit.
- ❖ **Bow/Arrow (धनुषवाण-त्तिली/मे)** : This weapon was used for shooting arrows to hunt wild animals.
- ❖ **Spear (भाला-बछ्छ)** : Traditionally used for hunting and killing wildlife by using poison on its metal point. It was also used in wars in earlier times.

- ❖ **Scimitar** (खुडा) : This was used in ancient war. Nowadays, it is considered as a weapon to protect from evil things and that's why it is worshipped by the people.
- ❖ **Musical Drum** (ढोल-तुंदु) : This drum is used by the local priest during rituals or traditional dance such as jhyandu.
- ❖ **Nepalese trumpet** (नरसिंगा-धुतुर) : This is an important music instrument of Nepali folk music-panchai baja, which is performed during marriage ceremony and other special occasion.
- ❖ **Cymbals** (भ्याम्टा-छ्योलें) : This is used with Dhol by the local priest during rituals or traditional dance such as jhyandu. These types of cymbals are also used for panchai baja.
- ❖ **Musical Drum** (मादल) : This drum is very popular for folk music.
- ❖ **Flute** (बासुरी) : This musical instrument is made of 'Gopi Bans'.
- ❖ **Musical Tool** (सनाई-साने) : It is one of the important music instrument of Nepali folk music- panchai baja. Panchai baja is performed during marriage ceremony and other special occasion.
- ❖ **Drum** (द्याङ्ग्रो-इह) : This is drum used by local priest 'Ghyabri' during rituals.
- ❖ **Water Bag** (छकल) : Water bag is used to take drinking water to the field. The local people who were in British-Indian army, perhaps they must have brought it to this region when they came from the company.
- ❖ **Spinner** (चर्खा-रार) : This is used for spinning wool and nettle fiber.
- ❖ **Wooden hammer**: In the process of nettle fiber for weaving, this hammer called 'Mungro' is used for hitting the nettle after boiling and before washing.
- ❖ **Weaving Belt** (पेडा) : This is wide leather strap used by the women around the waist during weaving.
- ❖ **Weaving tool** (कोम) : This is used when weaving to make thread tight and shaped.
- ❖ **Trease chest** (कन्तुर) : Made of local wood known as 'Chanp', it is used to keep money.

- ❖ **Chest (मदुस-सिं मधुस)** : Made of local wood known as ‘Chanp’, the madus is used to store clothes and other articles. There were skilled people in Sikles who made madus, but in recent years madus has been replaced by trunks.
- ❖ **Construction Tools:** T-Square, String, Auger, mallet, Nail drawer hammer, Rabbit plane, Galrie, Plane, Chisel, Heading chisel, Hand saw, long etc etc. are used for building construction.

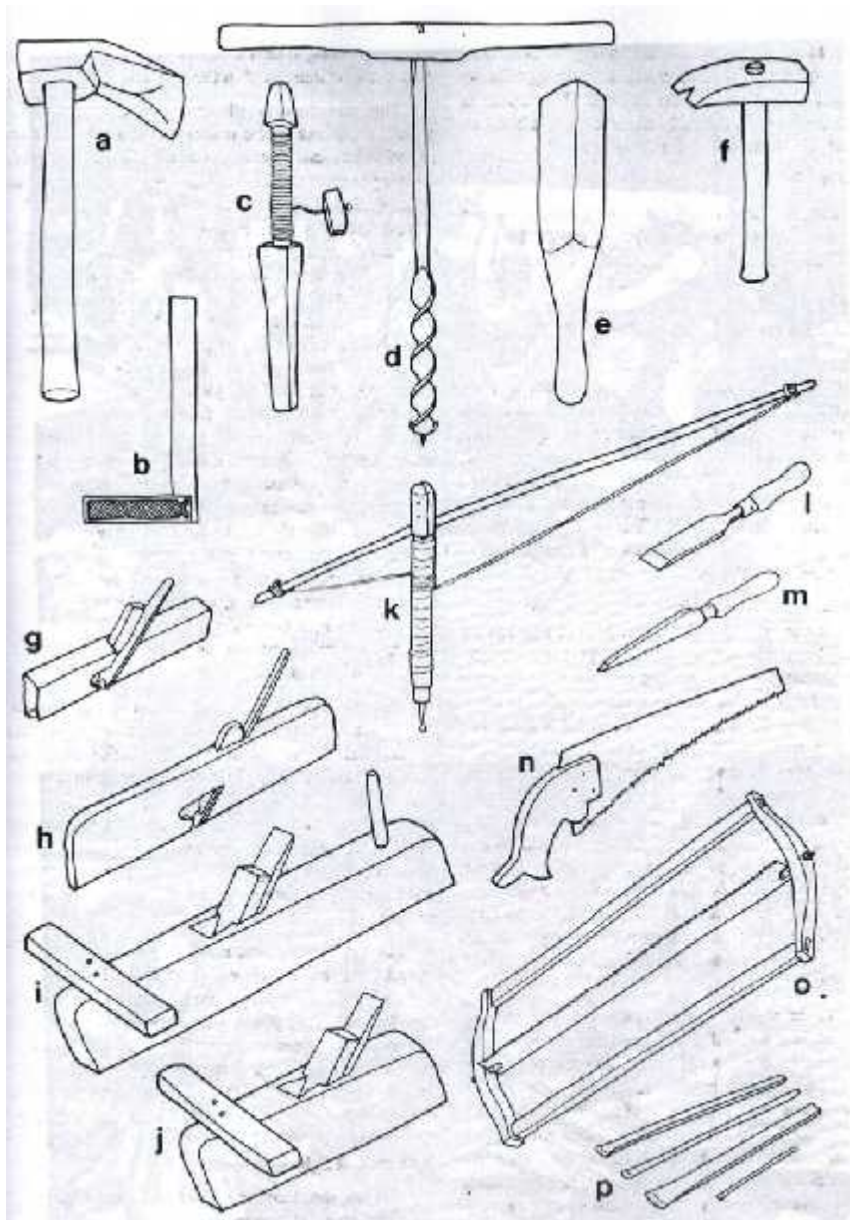


Figure 4.4: Construction tools for vernacular Building (Gerard, 1991)

Legend: a: adze, b: t-square, c: string, d: auger, e: mallet, f: nail drawer hammer, g: rabbit plane, h: rabbit plane, i: garlic, j: plane, k: gimlet, l: chisel, m: heading chisel, n: hand-saw, o: long saw, p: sculptor's chisels

4.4 Occupation

The economy is primarily based on agriculture, which is supplemented by animal husbandry. Some are engaged in foreign services and in the cities. Hotels and home stay facilities are new sources of income due to tourism. Due to new opportunities, highland herding, hunting and other traditional way of livelihood is decreasing.

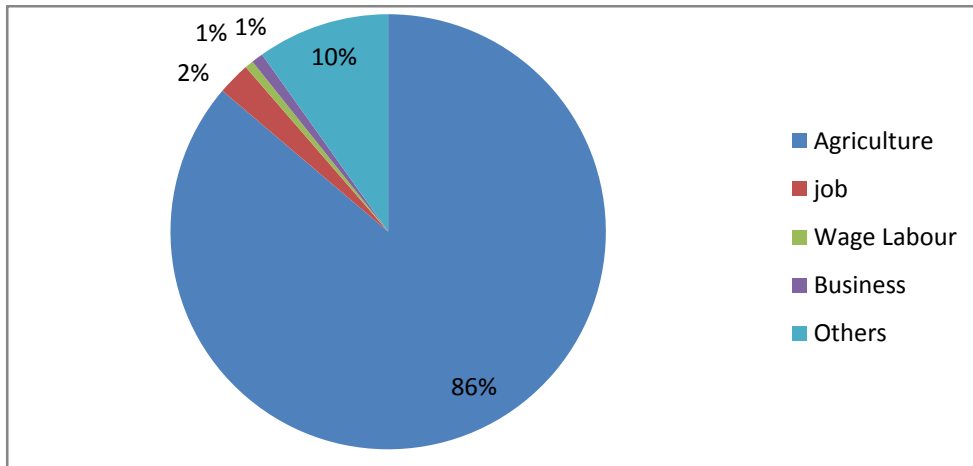


Figure 4.5: Occupation structure in Parche VDC (Source: Parche VDC Profile, 2011)

4.5 Settlement Pattern

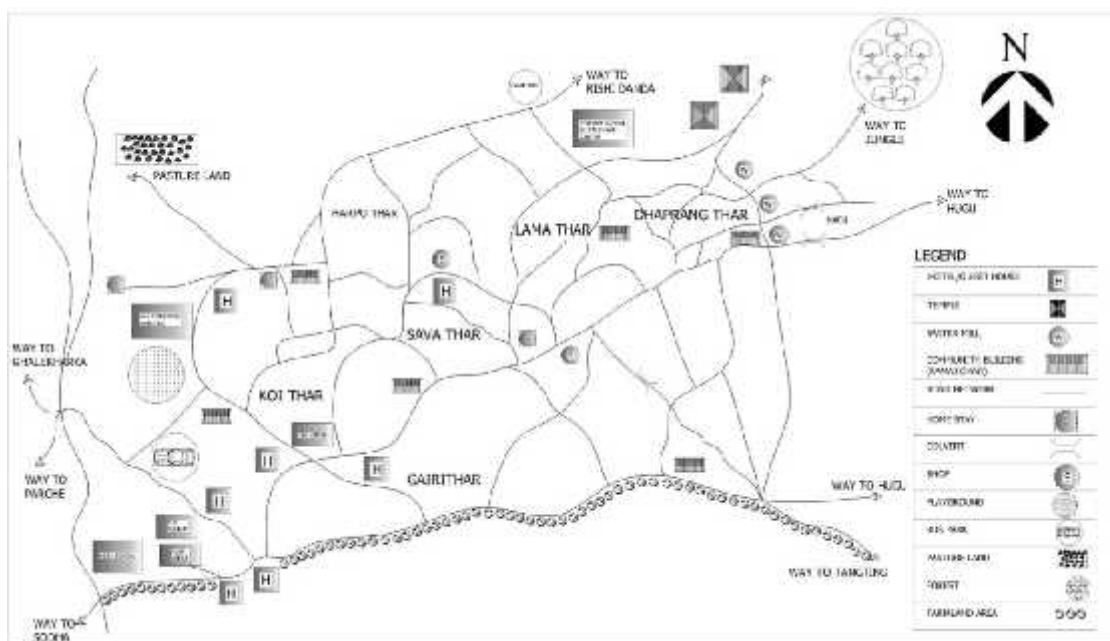


Figure 4.5: Settlement Pattern (Field study, 2015)

Geographical features and factors have had a great influence on the settlement patterns. Sikles is a compact settlement extended in East-West direction. The houses

are constructed at the varying levels of the hill slopes. There are altogether 307 houses with cluster in different level. Almost all houses face towards East or South to get maximum sunlight during winter.

Settlement has a distinct territorial limit which includes all categories of land: forest, grazing, and farmland (non irrigated called Pakho). Houses are built on non-irrigated terraces. Irrigated terraces (Khet) are located about 2 hour walking distance from village.

4.6 House Form

Almost all houses in sikles are rectangular in shape. Generally the houses are constructed by using stone masonry and are two storied, CGI covered roofs with a raised portico facing the small open space called courtyard or 'Aagan'. Slate is also used as roofing material in few houses.

According to Roy (1990), the rectangular house plan with the hip-gabled roof and carved wood detailing originated about hundred years ago when British Gurkha regiments began recruiting the Gurung. This activity brought new momentary wealth to the hills in addition to providing a link with other cultures. Mud and thatch were replaced by more expensive building materials and elements of Newar Architecture slowly merged with the Gurung tradition.

Located on the sunny slope of non-irrigated terraces, a complete residential complex consist of not only dwelling unit, but also animal shelter, 'Dhansar' called food storage space, backyard called 'karesabari' , frontyard called 'aagan' , toilet and a place of worship.

The typical rectangular house is kept as far back as possible near the slope of upper terrace. The longitudinal façade faces the courtyard which stretches in front till the edge of the lower terrace and extends as far as possible on the sides. The annex buildings are built around the frontyard or aagan (Gaborieau).

The space arrangement inside the building is as follows:

- ❖ **Ground Floor:** The ground floor is accessed from open courtyard (Aagan) through semi-covered portico called 'Pidi'. A large room having centrally located fireplace 'Koda' having space around is used as Living, Kitchen, eating and sleeping purposes. Racks usually two side of room hold the household utensils and other decorative elements.

- ❖ **First Floor:** Basically the first floor is a large open hall used as a grain store. 'Bhakari', a bamboo net without base and 'Kotha', a bamboo drum holds rice and millet. Various agricultural and fishing tools are also kept in first floor. Usually openings are smaller in size with elaborately carved. The timber post holds the longitudinal beam and the main roof.

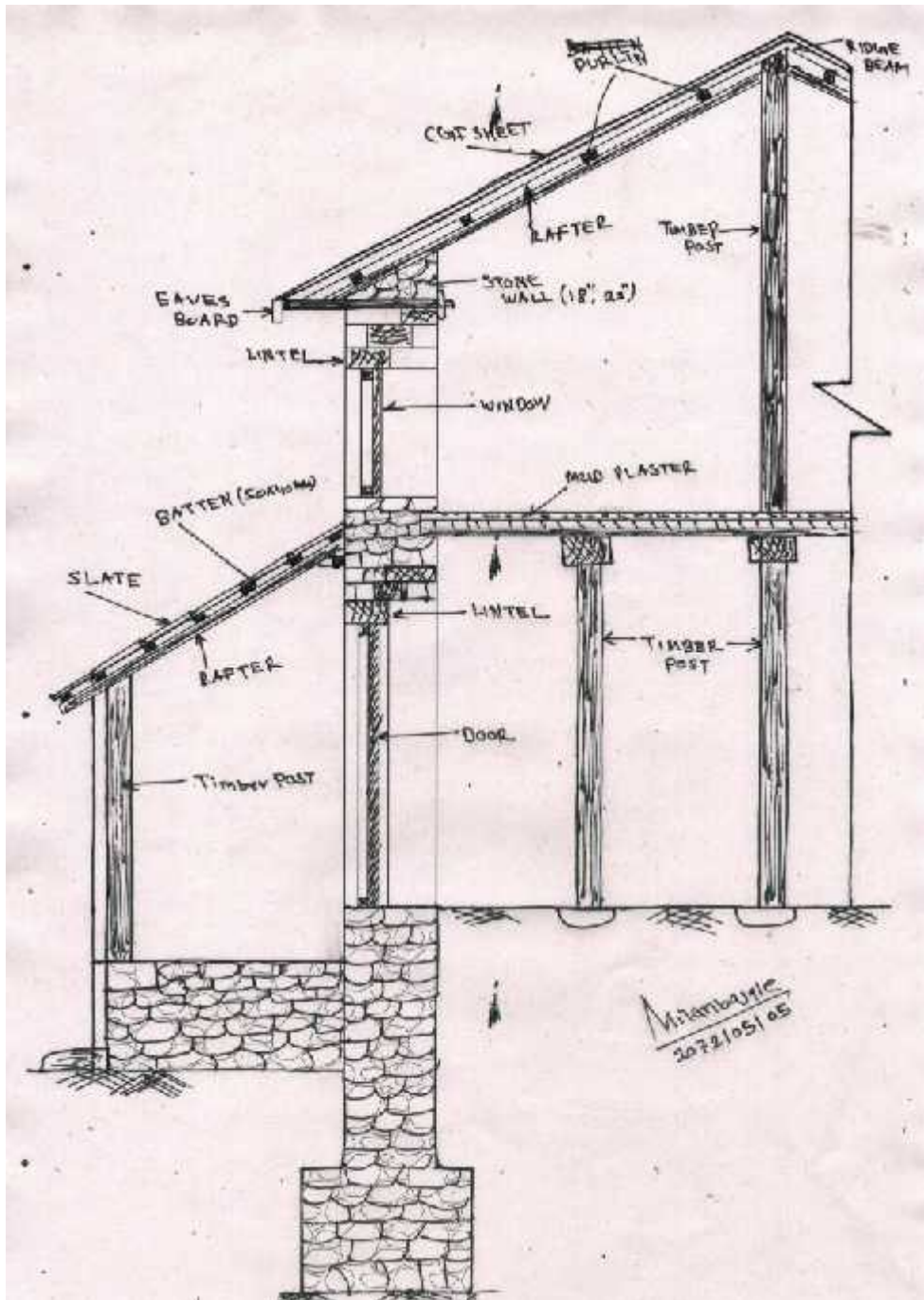


Figure 4.7: Typical Section (This Sketch is developed by referring the sketch included in the report entitled 'World Housing Encyclopedia – an Encyclopedia of Housing construction in seismically active area of the world-Nepal profile, 2002)

4.7 Major Construction Material

Generally, houses are made of stone, mud, timber, slate and CGI sheets. They consists of two storied with adjoining extension block called ‘Dhansar’. Rubble stone (the blocks of stone that are used are either undressed or comparatively roughly dressed) and Ashlar (square or rectangular block of stone that are dressed and have fine bed and end joint) stone masonry in mud mortar are used in walls which are coated with mud. The stones are collected from quarries, riverbed or field. The joists and rafters are just placed on walls without any anchorage.

Floors are constructed by planks of wood compacted with mixture of mud and cow dung. Post, beam and roof supporting members are made of locally available wood like Sal, sisau etc. Roof made of slate or CGI is supported by wooden rafter and purlin with twokal and thedi. Roof has high projection and high degree (30-45 degree) slopes. Simple tools such as chisels, hammers, saw etc are used for construction. Houses are owner-built where village artisans play pivotal role.

Ward No	Tole	Thatched Roof	Roof with Slate/ Tile	CGI sheet	RCC Construction
5	Savathar	1	7	36	0
5	Koithar	0	0	18	0
6	Gairithar	0	0	46	0
7	Dhaprangthar	0	0	74	0
7	Mafu	0	0	25	0
8	Harputhar	1	8	68	0
9	Lamathar	0	0	23	0
	Total	2	15	290	0

Table 4.2: Construction system in sikles village (village profile, 2011)

4.8 Conservation for Development by ACAP

According to Parker (2009), there is a long tradition of conservation work within Sikles, as in many mountain communities in Nepal. In the past, all the natural resources surrounding the village, from the forest to the honey and the water, were all managed by a council of village elder by a system known locally as ‘rithi thithi’ . A council of elders was elected to represent each ward to make decisions about when to cut down the forest and what activities were needed in order to maintain the village. In sikles, decisions related to agriculture are taken by the elders and spiritual leaders in Sava Thar and the mothers group are active in trail repair and temple maintenance.

The nationalization of forests in the mid 1960's in Nepal took the legal control over the management of the forest away from local people and saw a decline in the traditional management systems. Whilst the village elders remained they no longer managed the natural resources in the area and many feel this led to a decline in conservation activities in sikles and other parts of Nepal. The indigenous resource management system was undermined. Similar impacts were seen in other parts of Nepal where National Parks were created in an attempt to promote 'conservation'. Since 1990, The Annapurna Conservation Area Project had have office in sikles and is working with local people to promote conservation for development (Parker, 2009).

NTNC-ACAP has established seven unit conservation offices to administer the field level activities and program. Unit Conservation office (UCO), sikles is one of the office out of seven which was established in southern part of region covering 463 sq.km. The area comprise of seven VDCs viz. Parche, Namarjung, Sildujure, Thumakodanda, Saimarang, Bhachowk and Mijuredanda VDCs of the kaski district . The area under UCO sikles covers the total area of Parche and Namarjun VDCs only and the rest of others are partial. More clearly, Sildujure (ward no. 1-7), Thumakodanda (1-5), Saimarang (1-3), Bhachowk (1-4) and Mijuredanda (2-3). (UCO office Annual report, 2012)

The landscape of UCO Sikles begins from low hill with dense forest leads to end the open pastureland joining the snowcapped high mountain in the north. Agriculture, animal husbandry, and foreign job are the main source of income of local inhabitants of this area. The agriculture and animal production are in the subsistence level even today from which the life style and standard remained almost same from years. The coverage of forest and natural resources base is improving, as the people can get the fuel wood, fodder and timbers nearer than the past they had. The quality of physical infrastructure in village level is getting better. Trails, drinking water supply systems are in progress. Poor physical condition of school building has been improved better and anitation and hygiene of the village settlements are being improved. The NTFPs (Non Timber Forest Products) of the area are underutilized, as the present rule does not allow harvesting for commercial purposes without environment assessment. The Yarsagumba (cordyceps), Banlasun (Tiger Lily), Lauth salla (Taxus Baccata), Allo (Himalayan nettle), Nirmasi (Delpenium), Bikh (Aconite) and Kaulo, Satuwa, Tejpat, Lokta, Tusa, Chiraito are high value NTFPs found in the area. The market price of these species is profitable and the demand is high in the NTFP market. Only lacking is the sufficient study on these NTFPs (UCO office Annual report, 2012).

According to Mr. Dhak Bahadur Bhujel, Senior overseer of ACAP-UCo office, sikles, to uplift the living standard of local people, the project has focused on income generation programs. The main program which are designed and implemented by ACAP are natural resources conservation, tourism development, infrastructure

development with people's participation, skill development trainings etc. He said that all of the programs go to the villages through CAMC (Conservation Area Management Committee) which is a local body to institutionalize to regularize the local need.

CHAPTER V

CASE STUDY AND ANALYSIS

5.1 Sikles: Location for study of Vernacular Architecture

Sikles village is selected for a study of vernacular architecture, which is located on the southern belt of the Annapurna Conservation Area Project (ACAP). The traditionally built stone walled houses are clustered together on the hillside with winding paths connecting them. It lies in the Parche Village Development Committee (VDC) of Kaski district and is situated about 24 km northwest of Pokhara, the headquarter of Kaski District, Gandaki Zone and Western Development region of Nepal.

It lies between 1,100 to 3,331 m above sea level. The lower part below 2000m lies in the warm temperate zone with mean annual temperature between 15 and 20 degree C, while the upper part lies in the cool temperate zone with mean annual temperature between 10 and 15 degree C.

Altogether there are 307 households in the village (Village profile, 2013). Sikles is one of the largest Gurung village in which more than 80 % of the households are occupied by Gurung people and the remaining households belong to occupational castes (so called Dalits) such as Kami and Damai. The village includes six traditional neighbours: Ghairi-Thar, Sava-Thar, Ko-Thar, Dhaprang-Thar, Lama-Thar, and Harpu-Thar. For case study of vernacular architecture, 75 houses (24%) were selected randomly.

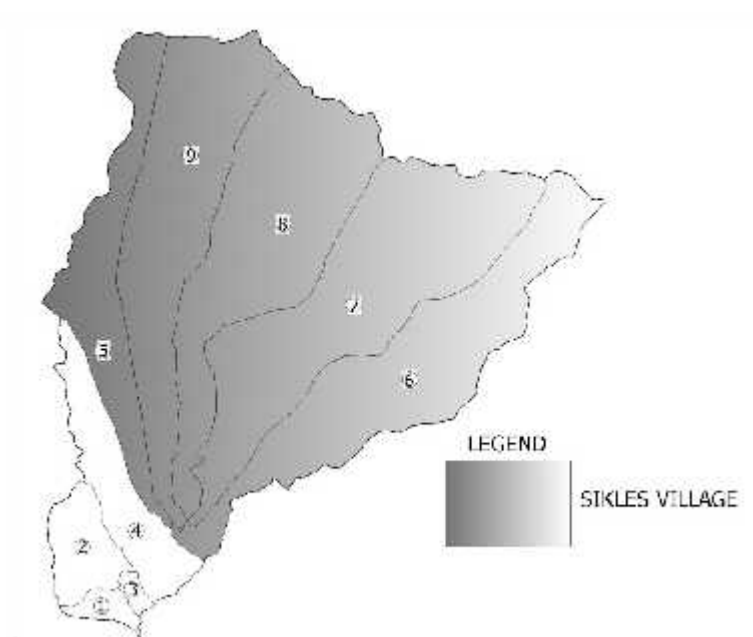


Figure 5.1: Map of Parche VDC (Map reproduced from Village profile)

5.2 Building Typology and uses

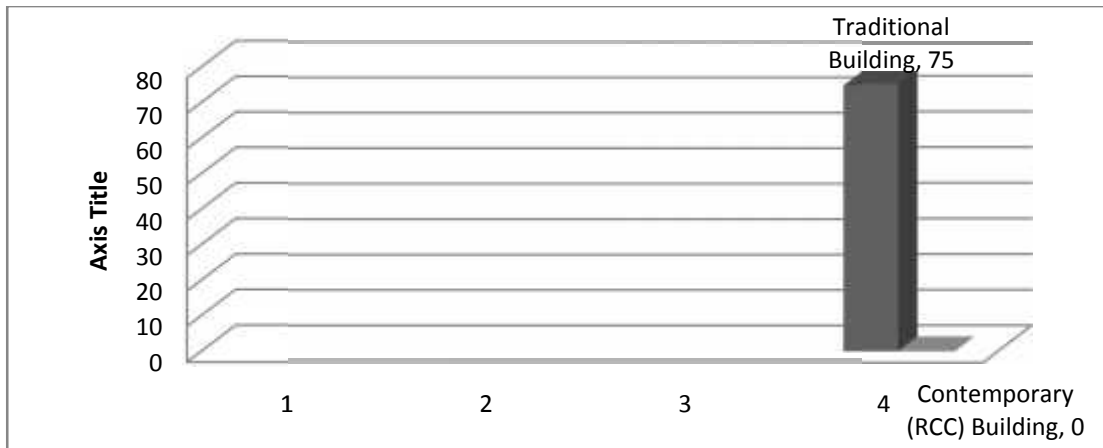


Figure 5.2: Building Typology (Source: Field Study, 2015)

There is no residential building made of RCC frame structure (contemporary structure). The under buildings construction are also being constructed by following traditional way i.e. mud mortar with stone wall and slate or CGI sheet roofing. The common architectural typology is of rectangular plan with hip-gabled roof and carved wood detailing. Almost all houses not have internal wall made of masonry for separating internal space. Wooden plank is used as partition for few houses. Almost all buildings are of two-storied; consist of stone wall with mud mortar having a wooden framework and roof truss and CGI or slate covering. No thatched roof building is found. Use of slate is declining due to easy availability of CGI sheet, which need less money, skill and labor than slate.

Building Use: There are altogether 307 houses in sikles village. Sample Survey (75 household) indicates that 92% of the building are used only for residential purposes, 1% is used for residential with hotel, 3 % is used for residential with home stay facility, and 1 % is used for residential with industrial use (rice mill). Home stay facility is not formally expanding in sikles. But, According to Mrs. Nau Maya Gurung, local resident of Sikles, occasional home stay is very common culture during feativals (like in Magh & Baisakh), which need more accomodate facility.

S.N.	Building Use	Number	Remarks
1	Residential	69	
2	Residential & Hotel	1	
3	Residential & Shop	2	
4	Residential with Home stay	2	
5	Residential & Industrial use	1	Rice Mill

Table 5.1: Building use (Source: Field survey, 2015)

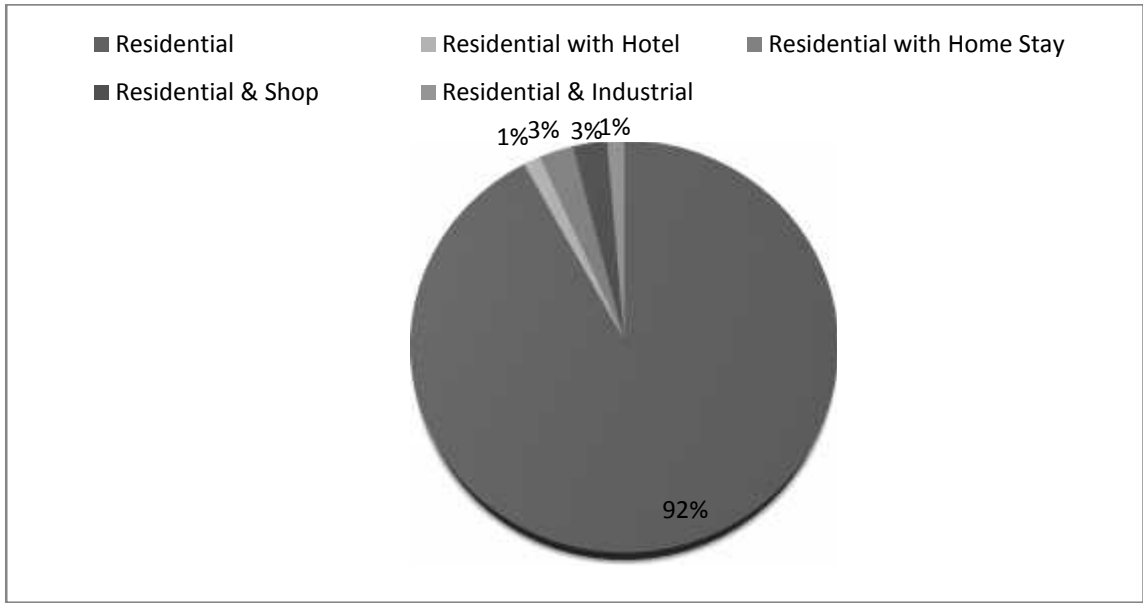


Figure 5.3: Building Use pattern (Source: Field Survey, 2015)

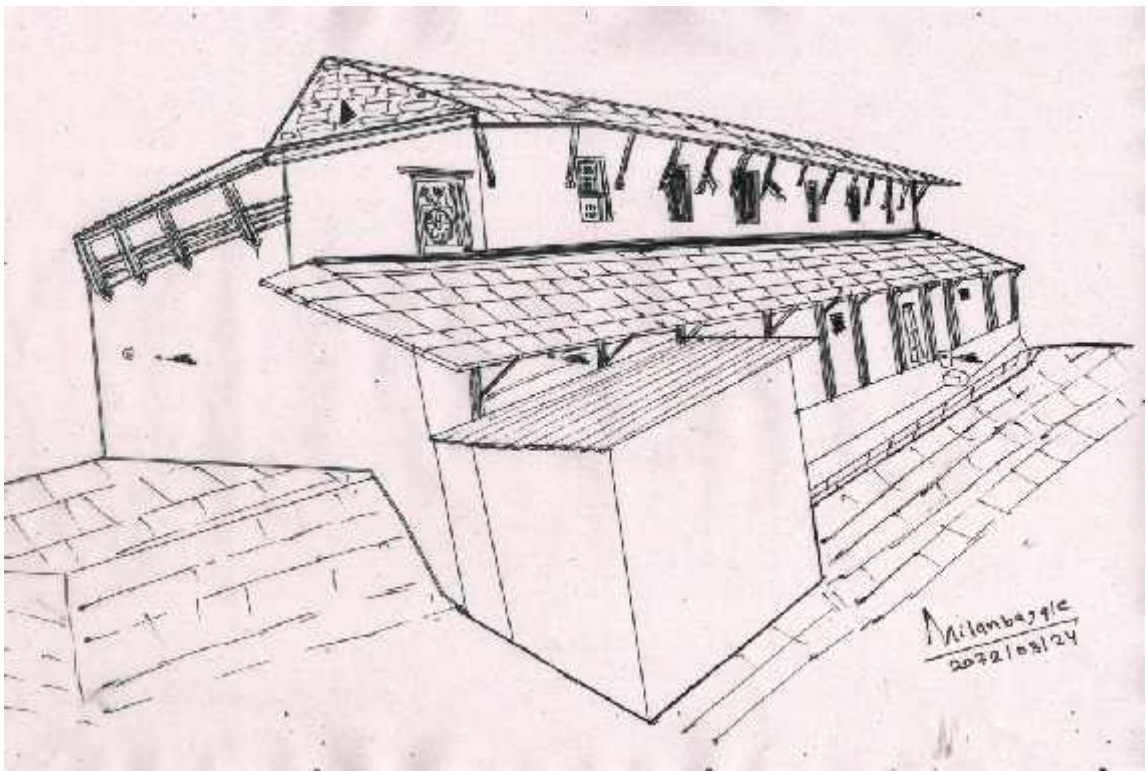


Figure 5.4: Isometric view of typical House (Quick Sketch drawn on site, 2015)

5.2.1 Case study of Typical House

5.2.1.1 House owned by Mr. Chitra Bahadur Gurung

Location: Ward No.5

House Type: Traditional

Orientation: South facing

Wall thickness: 18"

Floor height: 7'-8"

No of stories: 2

Roofing system: CGI roof

Adjoining Block: Dhansar & Animal shed

The house is rectangular in plan with 23'-7" (15.72 haat, 1 haat=1.5 feet) length and 18'-6" (12.33 haat) wide. This is two storied building having wall thickness 18", made of stone with mud mortar. Ground floor is used as Kitchen, Living and bed room. This floor is accessed from the open yard through semi-covered portico to the main living spaces. As the owner still use timber for cooking purposes, the environment of the room polluted during cooking time.

Kitchen consists racks which hold the household utensils and other decorative elements. A comparatively large post with a slightly carved capital holds a special position. This is main structural post in the house which supports the beam and slab. Narrow and steep wooden ladder leads the upper floor.

First floor is used as a large open hall used as storage space. Bhakari, a bamboo mat wrapped round to hold rice and kotha holds millet and other grains. Fishing nets, various agricultural tools like kuto, kodalo, syakhu are also kept in this area. The timber post holds the ridge beam supporting the main roof.



Figure 5.5: Ground Floor Plan

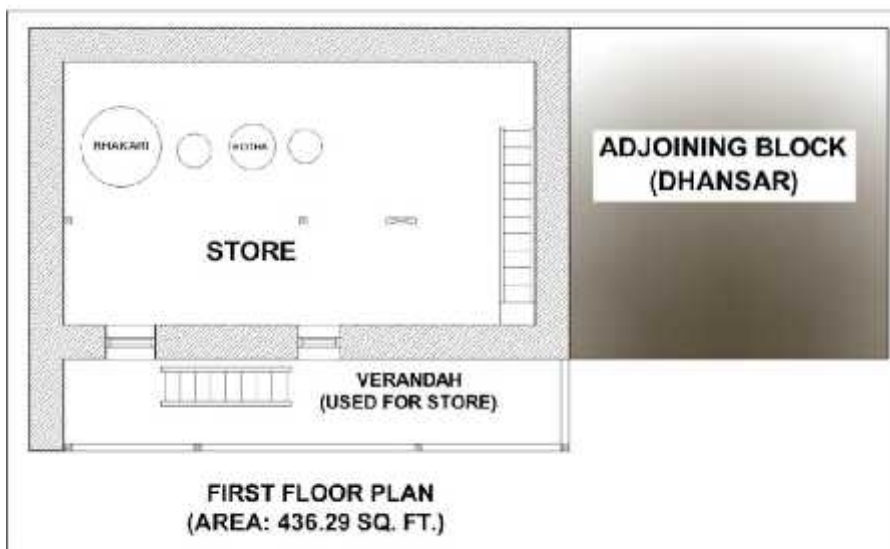


Figure 5.6: First Floor Plan

The verandah (pidi) is used as living space. The plinth is raised at 75 cm to avoid dampness on ground floor. Animal shelter is adjoining with pidi. Traditional carved wooden windows are kept in front elevation.

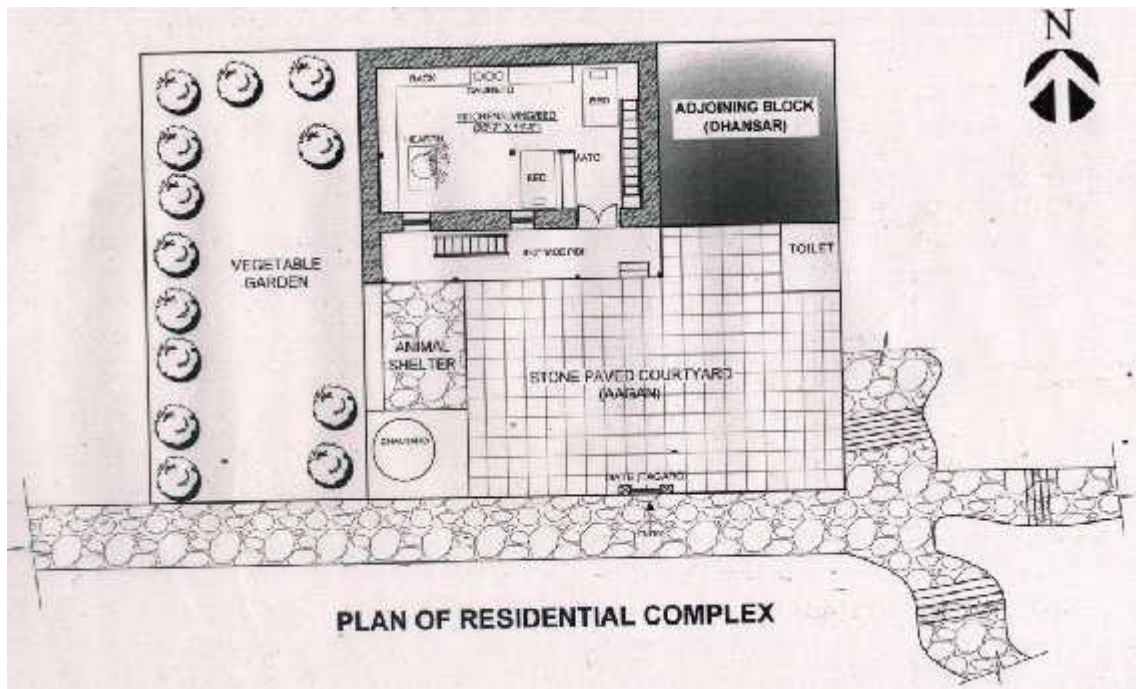


Figure 5.7: Residential Complex

Adjoining block called 'Dhansar' is used as a store. The animal shed is located in west wing of the courtyard. It is adjoin with main block.

Stone paved courtyard called 'Aagan' is used for multiple functions. This area usually serves as a place to dry grains or other things. This area also provides the space for interaction between neighbors.

Stone, timber, CGI sheet, mud mortar are the major construction materials. Stone is used for flooring in courtyard, for wall construction. Wood is used for post, rafters, door and windows. Mud is used as mortar and also used for plastering.

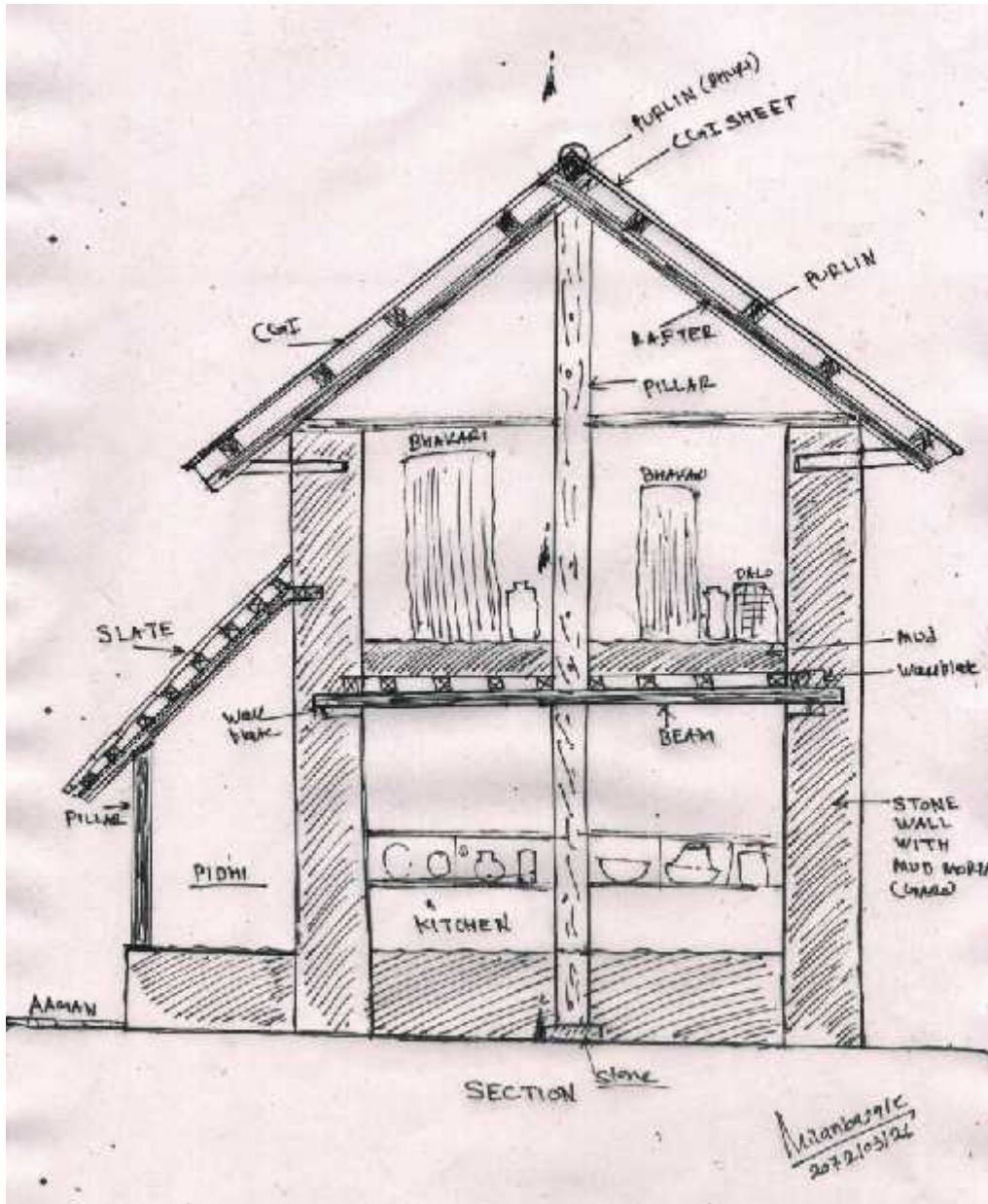


Figure 5.8: Section (Sketch Drawn on site, 2015)

5.2.1.2 House owned by Mrs. Maya Devi Gurung

Location: Ward No.5

House Type: Traditional

Wall thickness: 18"

No of stories: 2

Roofing system: CGI roof

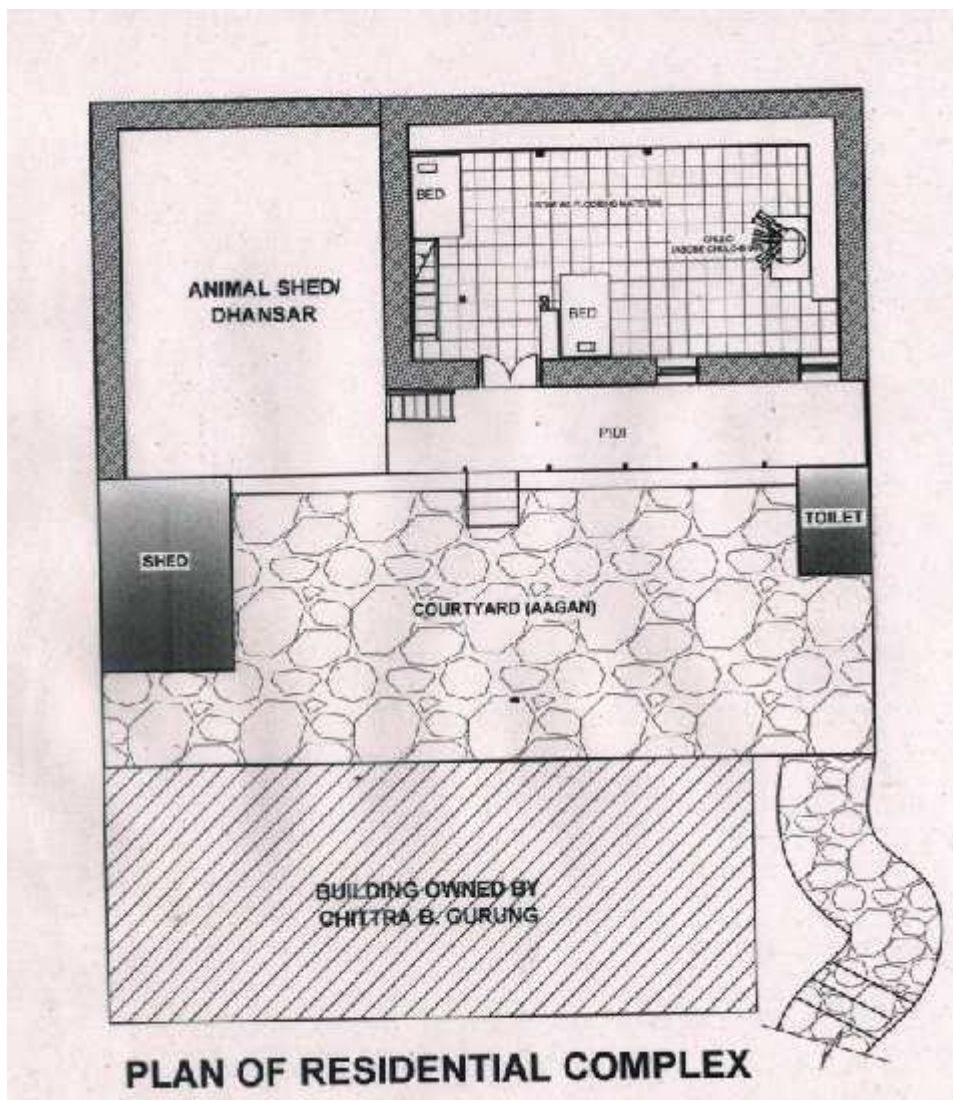


Figure 5.9: Residential Complex

Building owned by Mrs. Maya Devi also consists of rectangular plan having ground floor used as kitchen, living and bed and first floor is used as store, similar as other houses in sikles. Size of house is 23'-7" (26.5 haat, 1 haat=1.5 feet) length and 18'-6"

(17.77 haat) wide. A change is that stone flooring is done in kitchen, which is not common in Sikles. Stone paved in kitchen is slate which was removed from roof and used as flooring.

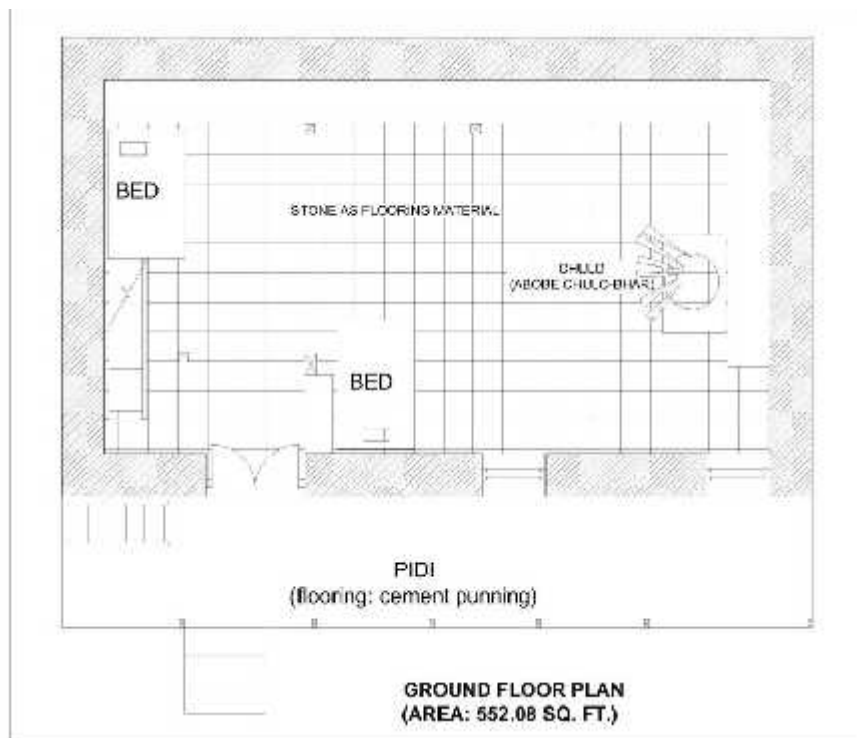


Figure 5.10 : Ground Floor Plan

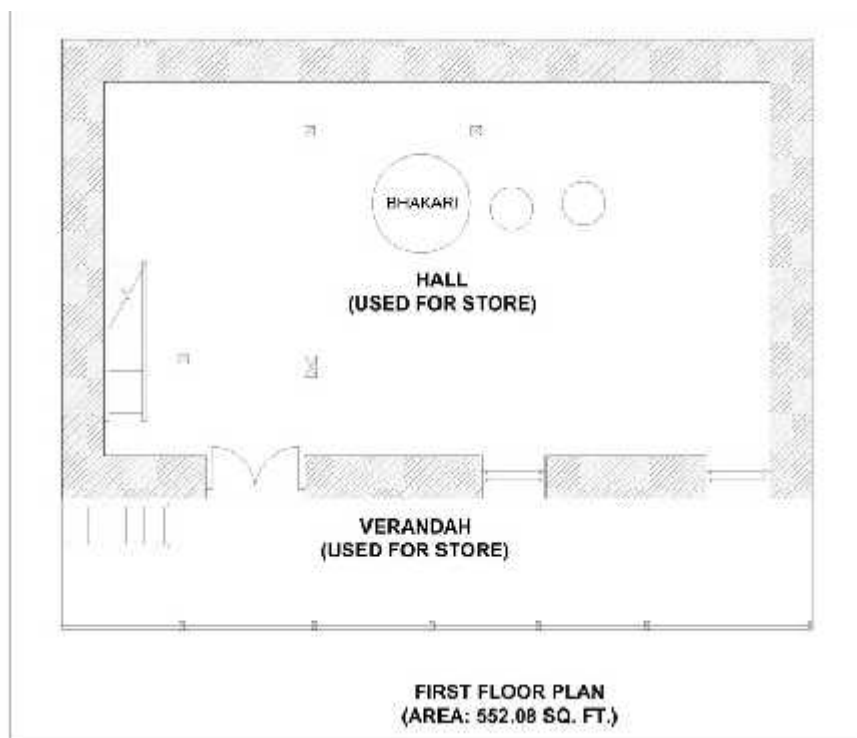


Figure 5.11 : First Floor Plan

5.2.1.3 Home Stay: Owned by Mrs. Maya Gurung

Location: Ward No.9

House Type: Traditional

Wall thickness: 18"

No of stories: 2

Roofing system: CGI roof

Accommodation capacity: 20 people

There are three formally registered Home-stays and few unregistered home-stays in sikles village. Among them, home-stays run by Mrs. Maya Gurung is the oldest one. Ground floor is used as a kitchen and dining space whereas first floor is used as sleeping zone. First floor consists 2 bedded small room and a hall without bed. 5 feet wide bedroom is very congested.

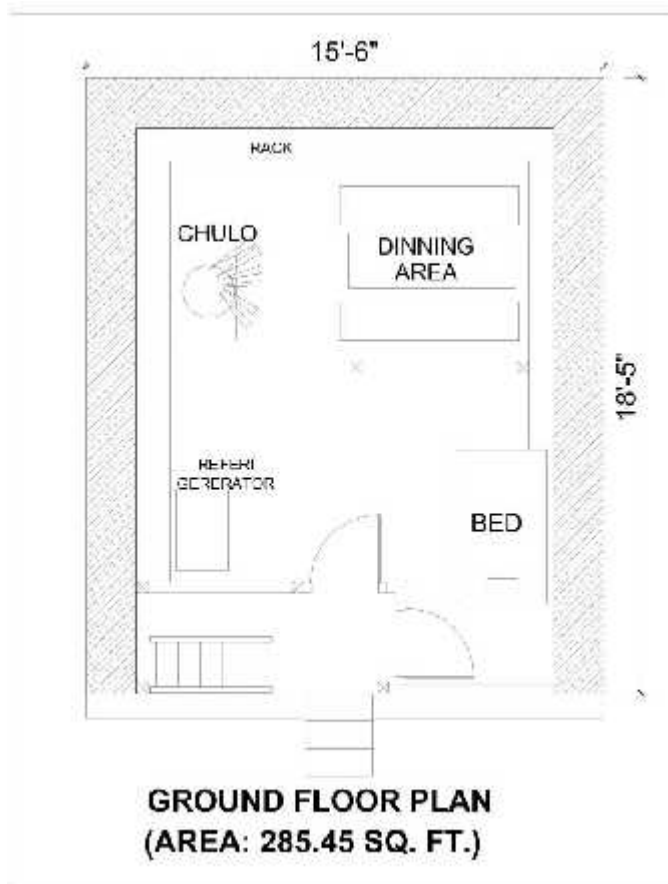


Figure 5.12: Ground floor plan

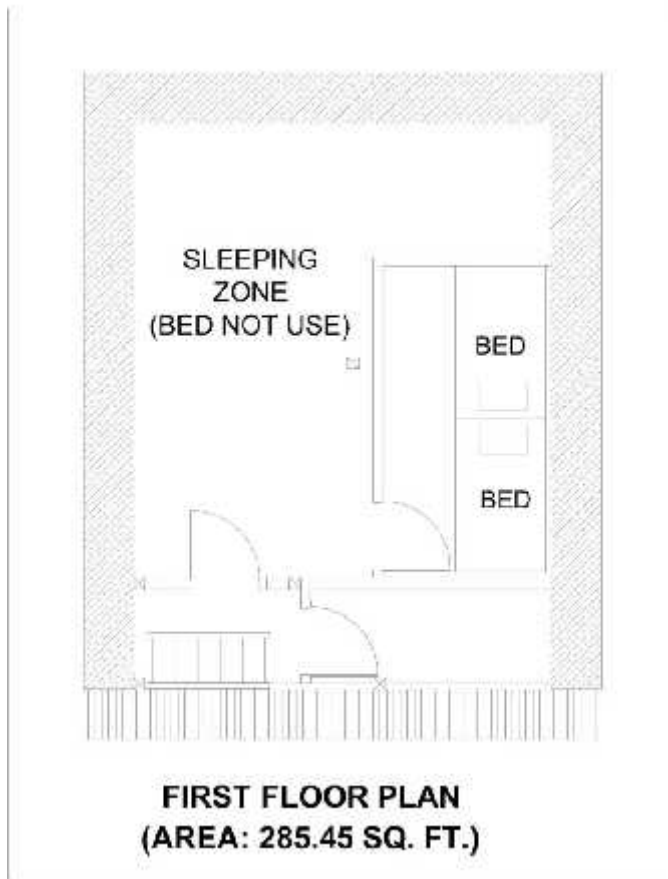


Figure 5.13: First floor plan

The floor plan shows almost square shape building having length 18'-5" (12.27 haat) and breath 15'-6" (10.33 haat) .

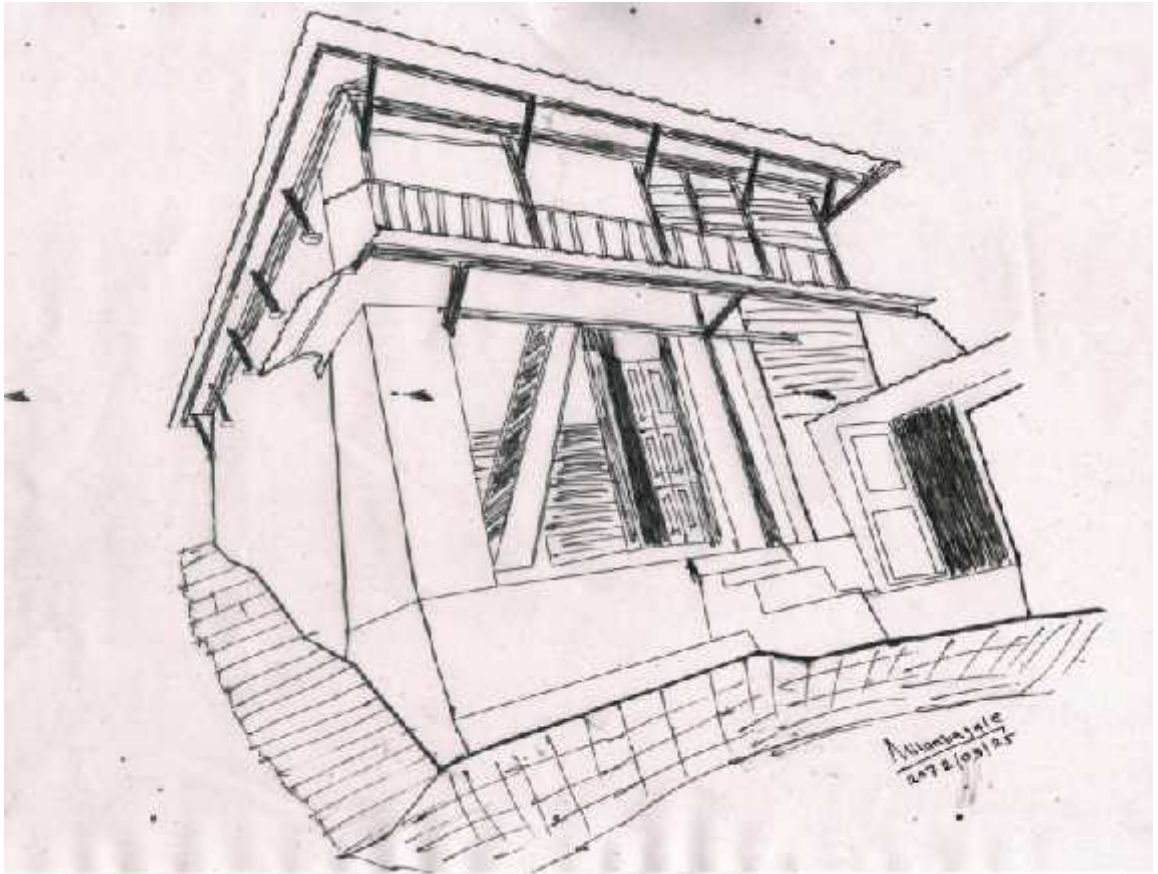


Figure 5.14: South-West view of building (Quick Sketch drawn on site, 2015)

5.2.1.4 Home stays: Owned By Mr. Tau Bahadur Gurung (Chandra Home stay)

Location: Ward No.8

House Type: Traditional

Wall thickness: 18”

No of stories: 2 storied- main block, home stay block- single storied

Roofing system: CGI sheet

Accommodation capacity: 8 people (3 rooms)

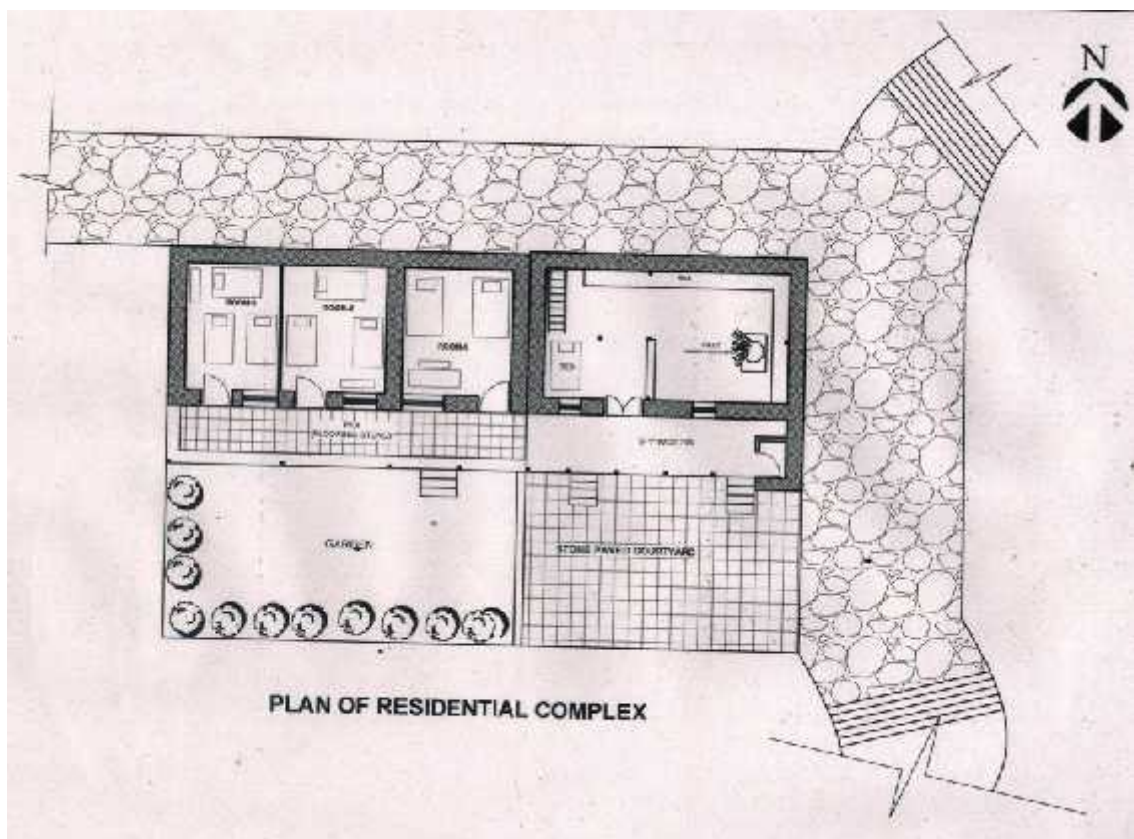


Figure 5.15: Residential Complex (field study,2015)

Separate & single storied home stay block is constructed adjoining with the main block. It consists 3 rooms with altogether 8 beds. Main block consists of Kitchen dining in ground floor. First floor is used as restaurant and store.

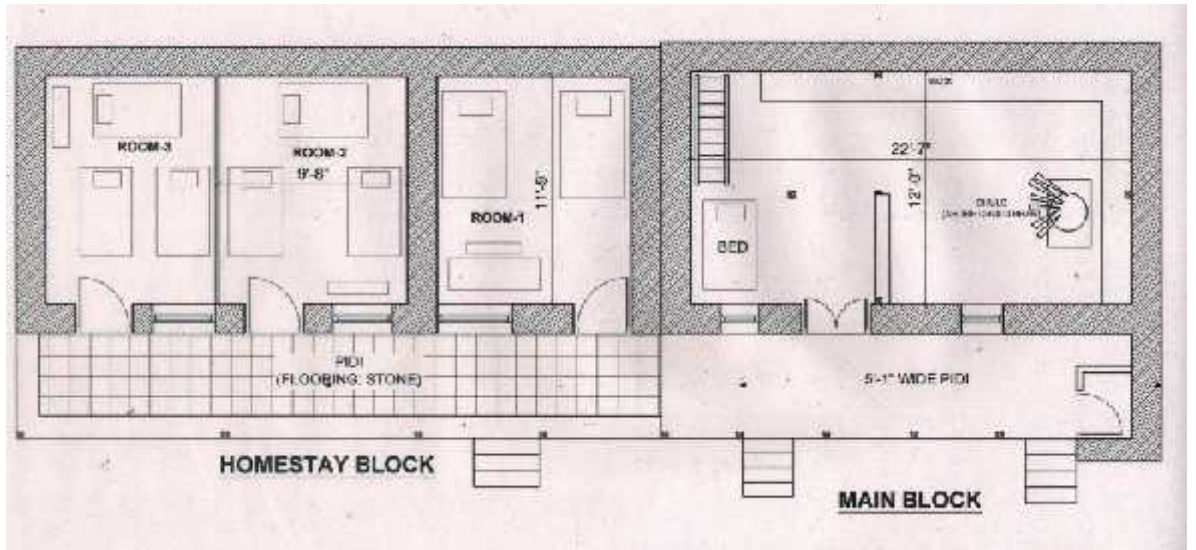


Figure 5.16: Ground Floor Plan (field study, 2015)

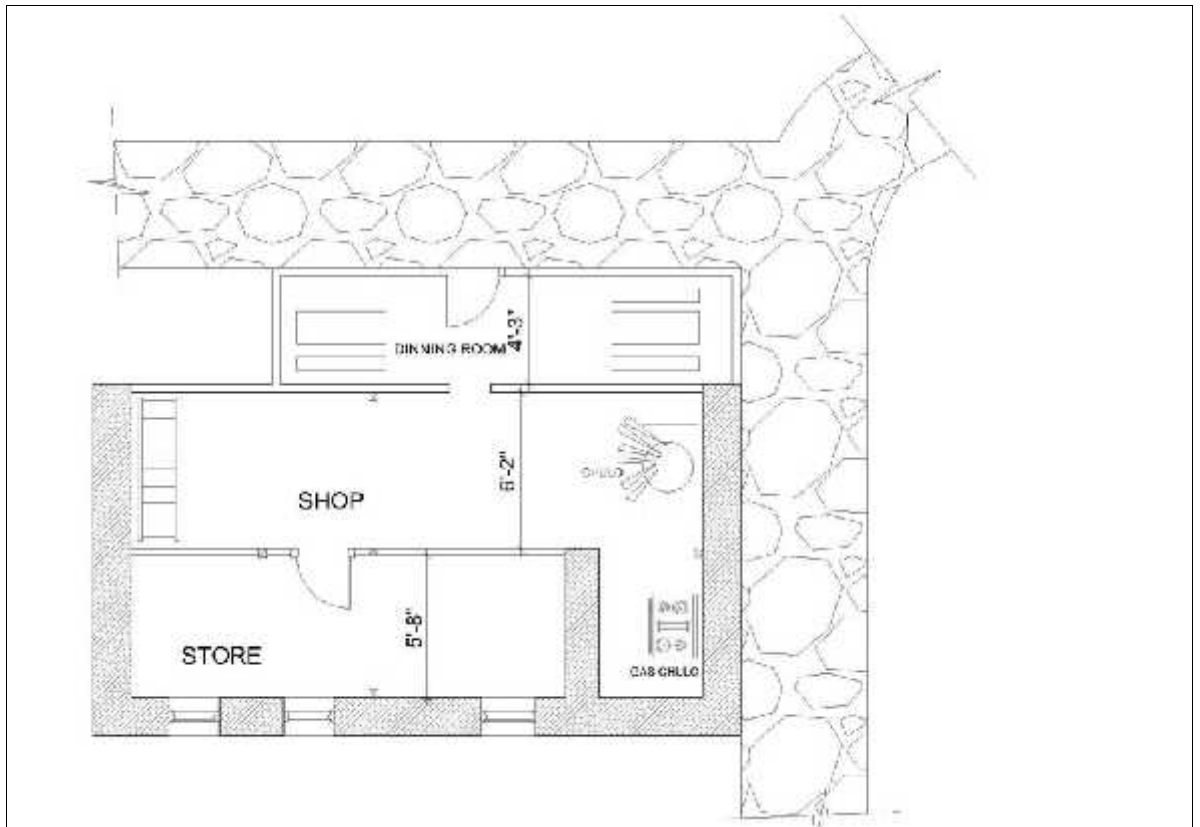


Figure 5.17: First Floor Plan

5.3 Construction System

Sample survey shows that all houses (75) are constructed with stone masonry with mud mortar. Under construction residential buildings also follow the traditional way of construction. Floor and roof truss are constructed of timber, which transfer their loads to the wall and then to the foundation.

Verandah or Pidi is a lean-to structure to the main block, which is supported by timber posts. The posts generally rest upon a stone pedestal.

The walls are constructed by rubble or coarse masonry with mud mortar. Stones are collected from river bank (Chedo khola, Todi khola etc) and transported by tractor, donkey and human. The joists and rafters are just placed on walls with anchorage.

The common feature of construction system is that a large wooden post having size 9"x4" adjoins with 'aato' and row of small post having size 4" x4" support floors and roof. Posts are normally supported by stone kept below floor finishing level. The main wooden beam rest on the wooden pillar which support wooden joist. A layer of mud having thickness ranging from 4"-6" is laid above wooden floor, which works as a floor finishing level.

S.N.	Construction System	No of Buildings
1	Load bearing in mud mortar	75
2	Load bearing in cement-sand mortar	0
3	RCC	0
4	RBC	0

Table 5.2: Construction system (Field study, 2015)

5.3.1 Material used for roofing

Sample survey indicates that 95 % houses (71 out of 75) consist of CGI sheet roof and only 5 % (4 out of 75) houses consists of slate roof. This indicates that slate roof is disappearing from sikles. The reason behind this is easy availability of CGI sheet which is easy in construction and cheaper than slate.

Slate is available locally but costly than CGI, it needs skilled human resources which is lacking and there is also problem of rain water leakage from slate roof and chances of damage of wooden member is high. Thatched roof and rcc slab roof is not found.

S.N.	Material used for roof	No of Buildings
1	CGI sheet	71
2	Slate	4
3	Thatch	0
4	RCC	0

Table 5.3 : Material used for Roof construction (Field study, 2015)

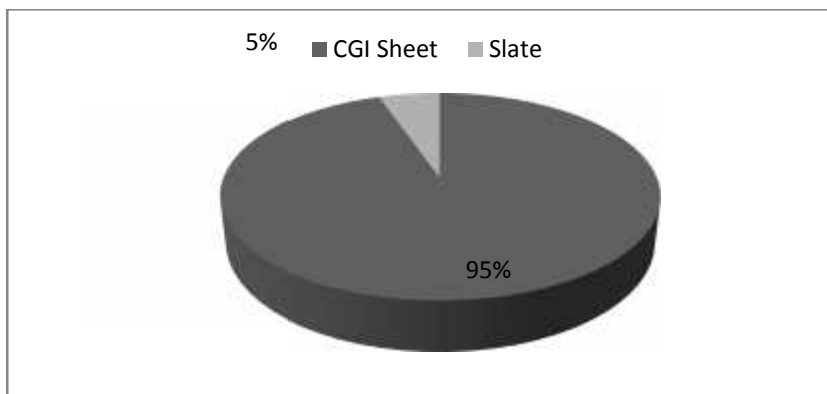


Figure 5.18: Material used pattern for roofing (Field study, 2015)

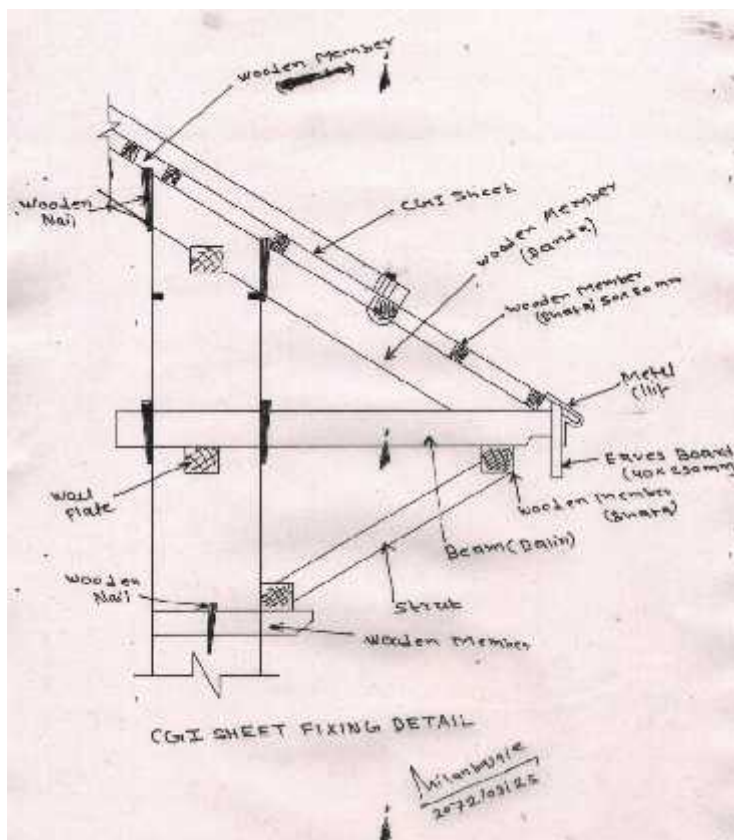


Figure 5.19: CGI sheet fixing Detail (Sketch drawn on site, 2015)

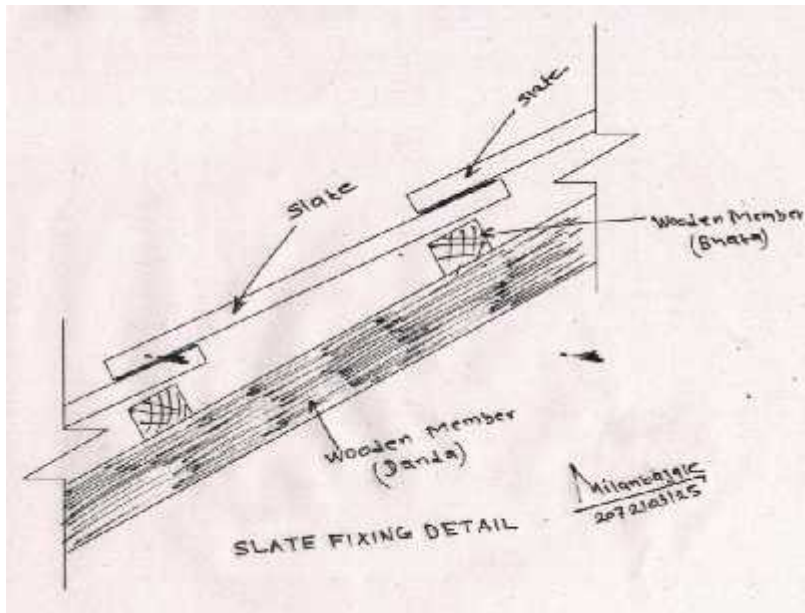


Figure 5.20: Slate fixing Detail (Sketch drawn on site, 2015)

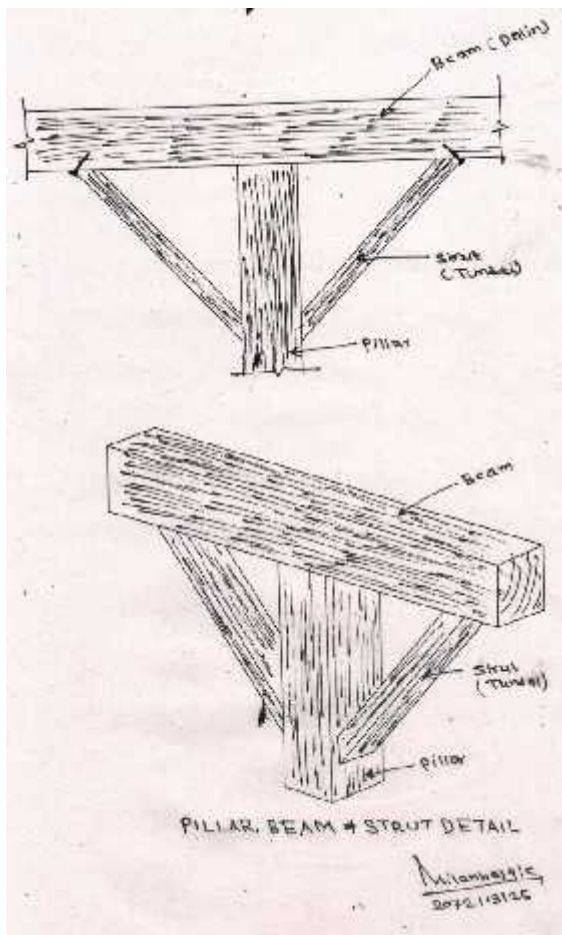


Figure 5.21: Pillar, Beam & Strut (Sketch drawn on site, 2015)

5.3.2 Local Mason's Experience about Construction system

According to Mr. Dil Prasad Gurung (39 years old), 5 feet deep foundation is mostly practiced for construction of building. Houses size is normally ranges from 15-20 haat (22-30 feet) long & 8-12 haat wide (12-18 feet).

The trend of wall thickness is 18" & 22". Stone is the only used material for wall construction which is carried from Chodo Khola, Todi khola and transported by Tractor, Donkey and by local people.

He said that mud mortar is prepared by mixing white and red mud. It has good binding capacity. But it is necessary to remove organic particles, pebbles and stones before preparation of mud mortar.

Dil prasad agreed that slate roof is more beautiful than CGI roof but CGI is more popular for construction due to low cost, reducing wooden member and easy availability.

According to Mr. Balaram Gurung (48 years old), a local carpenter and mason, 'Uttis' and 'chanp' wood is mostly used for wooden work. 'Chanp' is better because it is less affected by dampness and by termite. But proper seasoning is necessary before use. 1 year seasoning is better. During seasoning, first it is kept in sunshade for few weeks, then should be exposed in sun. After few weeks, it should be store in dry place. After preparing wooden frame, again seasoning is needed for few weeks.

He said that the basic tools for woodwork are 'Ranja', Circular Machine, Drill Machine, Hammer, Stone for making tool sharp, hand saw, big saw (Jungi aaro) etc.

Dil prasad & Balaram both are not formally trained mason and carpenter. They gained the knowledge of construction from their parents. They are formally unaware about earthquake safety construction technique but they are happy that all houses constructed by them became safe during the earthquake. They want to join any formal training relating to earthquake safety measure of construction but there is no opportunity for them. VDC is not initiating for mason training.

5.4 Architectural Character & Design Features of Building Elements

The architectural character & design feature of building elements under sample survey can be analyzed & summarized as follows:

5.4.1 Door- Window openings

The interesting character is that almost all the openings are made on front façade. Window opening on back and side is rare. Main entrance is located on front façade and there is not alternate exit found in any building. Windows are found in 2 and sometimes in 3 numbers.

First floor consists of well carved windows in 3 numbers on front facade. The windows are always of very small dimensions and design in such a way that minimum light and air enters the room. It should improve in the current context. It creates difficulties to work (like to read and write) inside the room.

In general, the door-windows consists of an interior frame and exterior frame which are joined together by four wooden ties and compile together with wooden and sometimes metal nails. This system is almost similar to Newari building in Kathmandu valley.

5.4.2 Pillar, Beam & Strut

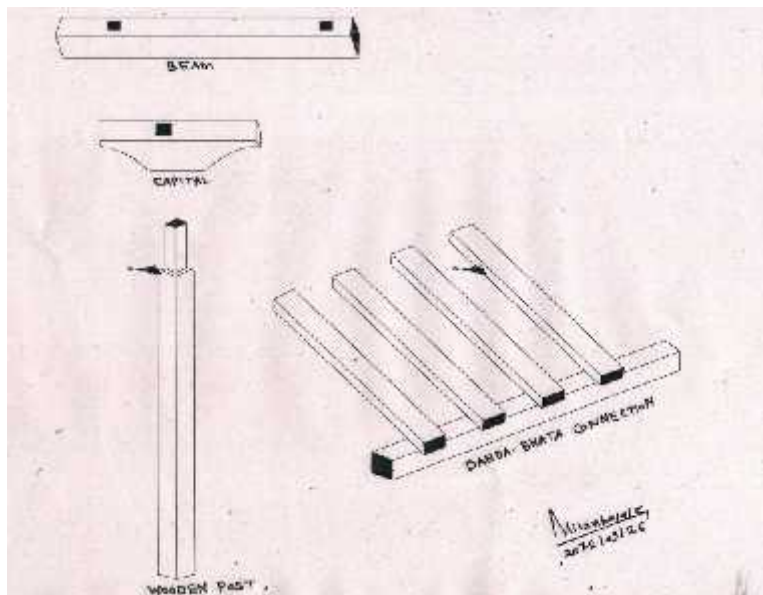


Figure 5.22: Post, Lintel & Beam (sketch drawn on site, 2015)

The portico or pidi consists of well carved pillars having dimension of 4"x4" with 6 feet height. Pillar used inside the building is usually not carved. A dressed natural

stone supports the wooden pillar and wooden bracket which transfer the load from beam on to the post. Pillar, bracket and strut are carved whereas no carving is done in beam.

5.4.3 Roof

The one of the most important architectural feature of vernacular building in sikles is one way slope roof above verandah or pidi and gable roof covering the first floor of the building which is similar to other village in the hilly region. As sikles is the area with annual rainfall 3500 mm. This projected slope roof protects the mud plastered wall from heavy rainfall. The roof overhang is generally 2 feet. The roofs are covered either by CGI sheet or by slates.

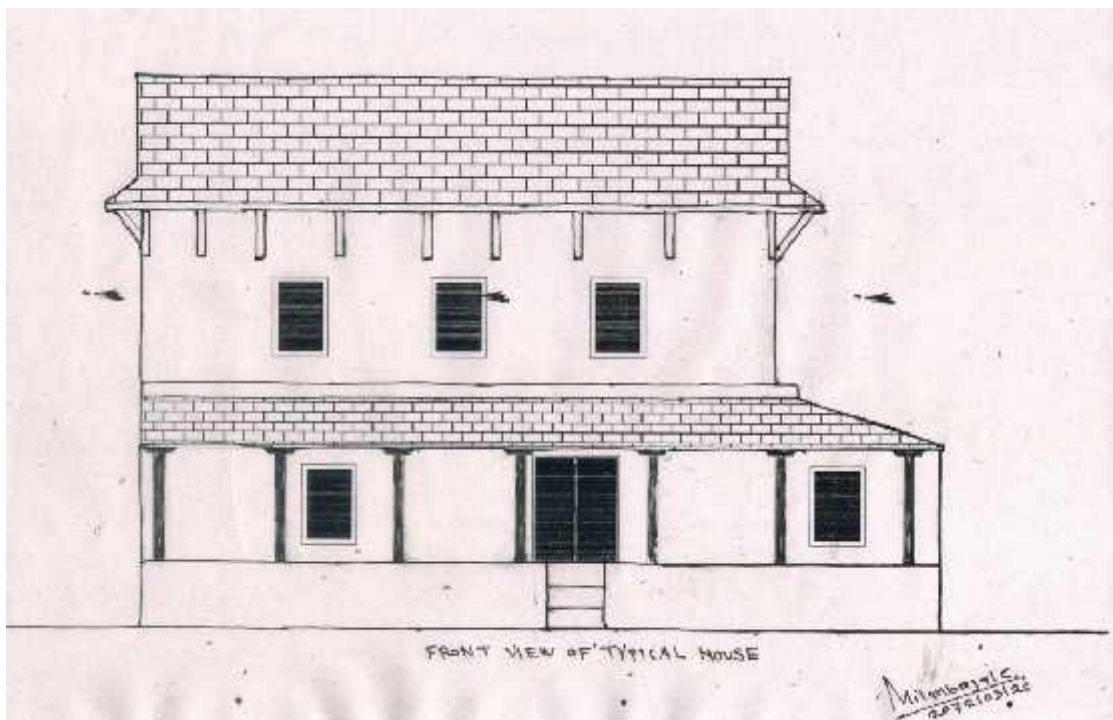


Figure 5.23: Front view of a typical building from Sikles

5.5 Material condition

CGI sheet is the major construction material used in sikles village. It is easy to install and easily available due to transport facility. It is durable and economic but attached with the problem of rusting and affecting the aesthetics of village. Data indicates that out of 71 houses, only 3 houses have neat and clean CGI sheet in their roof because they are newly constructed building.

Slate roof is the identity of architecture around Annapurna region. It is locally available material but disappearing from the roof. The cause is easily availability of CGI sheet which is easy to install and cheaper than CGI sheet. Another cause is slate roof has problem of water leakage from the joint between slate which cause wood deterioration, damage the grain store inside the building. So disappearing rate of slate roof is high. Wood deterioration rate also high due to heavy rainfall and seasoning trend of wood is declining.

S.N.	Material Condition	No. of Houses	Remarks
1	Rusting in CGI sheet	68 (out of 71)	3- new construction
2	Damage in slate roof	4 (out of 4)	
3	Water leakage from slate roof	4 (out of 4)	
4	Wood deterioration (partial)	72 (out of 75)	3- new construction

Table 5.4: Material condition (Field study, 2015)

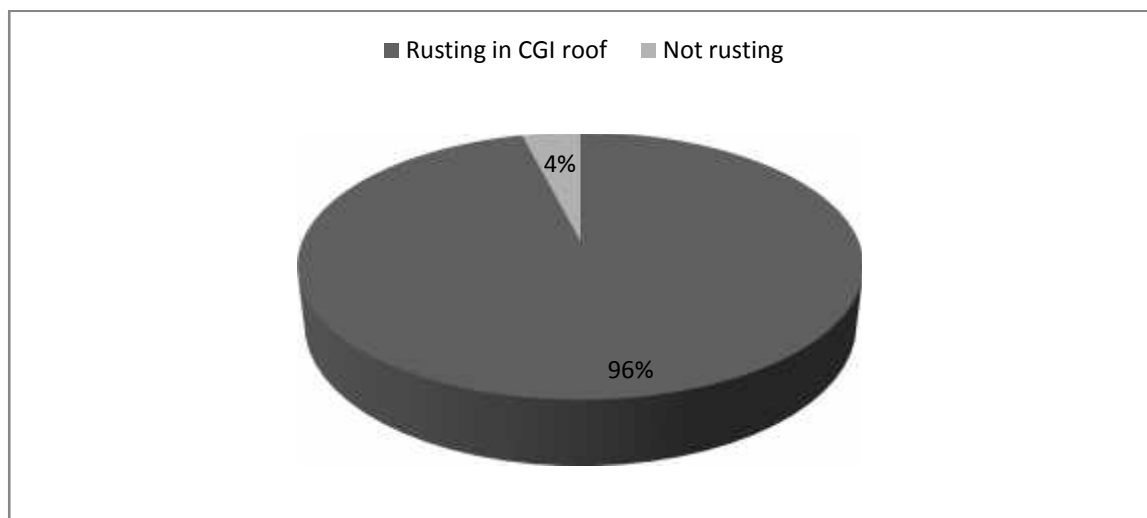


Figure 5.24: Rusting of CGI sheet

To prevent rusting from CGI sheet, coloring in every few year may be the solution but May not be economical. To prevent water leakage from slate roof, skill human resources is needed, who have idea of proper overlapping of slates. Installing a layer

of rubber or plastic sheet inside before nailing slate to rafter may also prevent water leakage.

5.6 Age & Addition

5.6.1 Age of Building

S.N.	Age of Building	No. of Buildings	Remarks
1	constructed before 50- 100 yrs	17	23%
2	constructed before 25-50 yrs	32	43%
3	Constructed before 20 yr	21	28%
4	Constructed within 5 yrs	4	5%
5	Under construction	1	1%

Table 5.5: Age of Building (field study, 2015)

Study indicates that 23 % of the houses are constructed before 50-100 years, 43 % houses are built before 25-50 years, 28 % houses are built before 20 year, 5 % houses are built with 5 years and only 1 % is in under construction phases. Thickness of wall is 22” in those building which are constructed before 50-100 years whereas 16” thick wall is found in building constructed before 20 yrs.

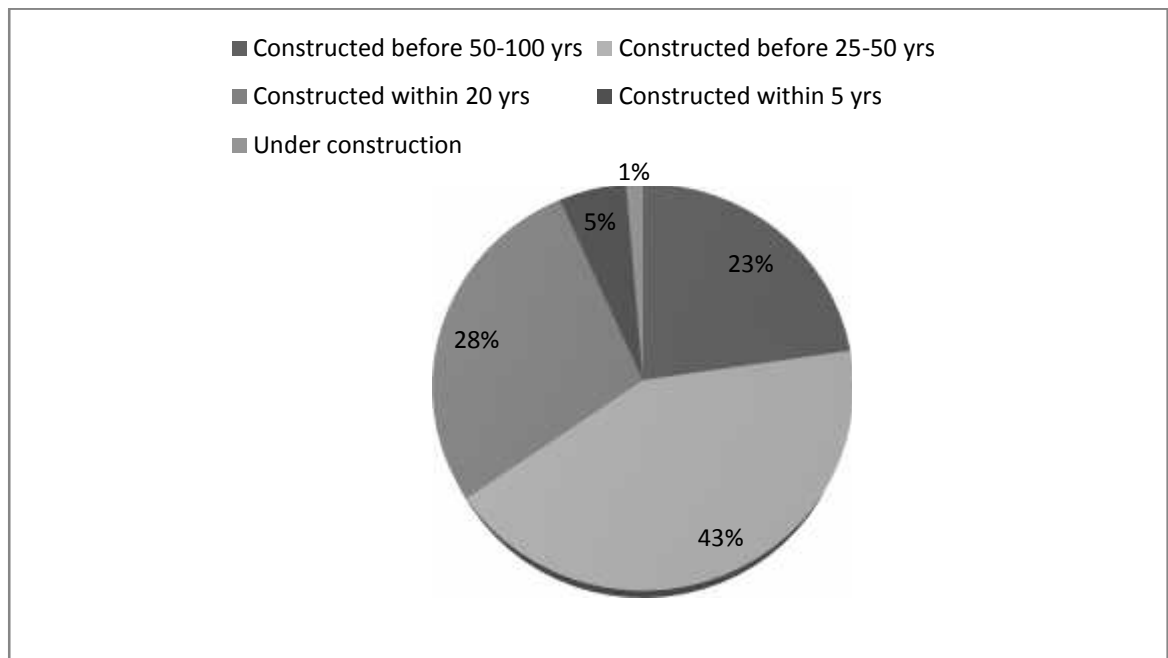


Figure 5.25 : Age of Building

5.6.2 Addition

Survey shows that most houses has added Dhansar (Adjoining block) block adjoining with main house.

S.N.	Addition	No. of Buildings	Remarks
1	Building with Dhansar	67	
2	Building without Dhansar	8	

Table 5.6: Addition of Building (Field study, 2015)

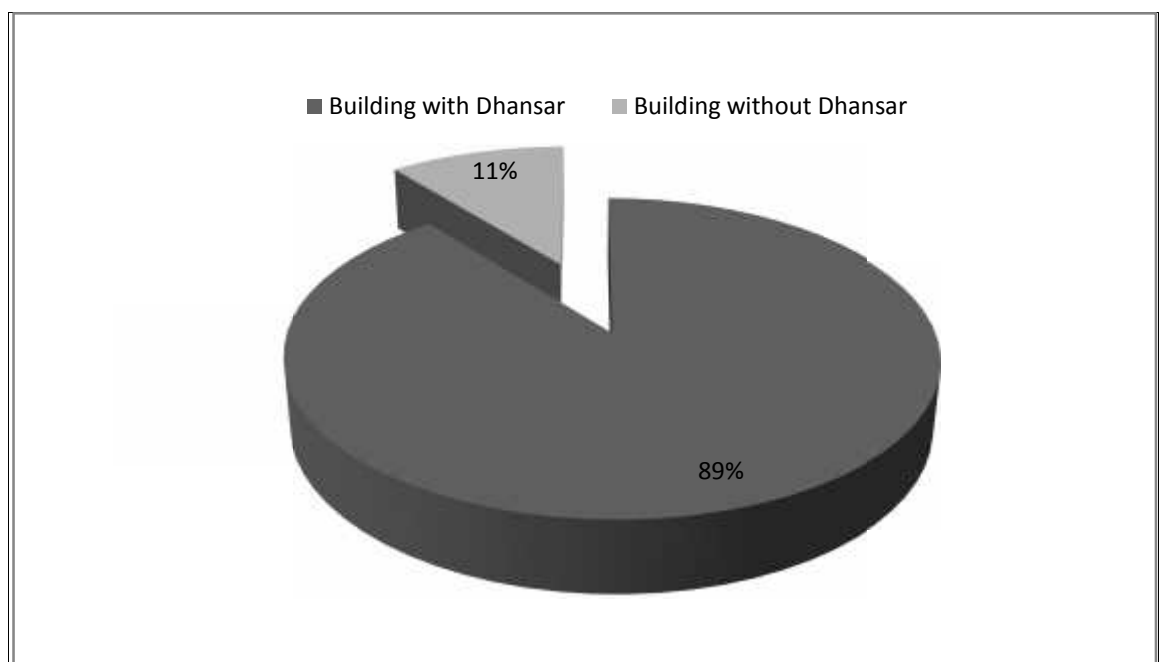


Figure 5.26: Addition of Building

89 % houses have adjoin block called Dhansar. Dalit communities have no dhansar because their land holding is small. Theoir economic condition also week comparing to Gurung .

5.7 Rapid Visual Damage Assessment

On Saturday, 25th April 2015 at 11:56 AM, a 7.6 magnitude earthquake as recorded by Nepal's National Seismological Centre (NSC), struck Barpak in the historic district of Gorkha, about 76 km northwest of Kathmandu. Nepal had not faced a natural shock of comparable magnitude for over 80 year. The catastrophic earthquake was followed by more than 300 aftershocks greater than magnitude 4.0 (as of 7 June 2015). Four aftershocks were greater than magnitude 6.0, including one measuring 6.8 which struck 17 days after the first big one. The earthquake caused widespread destruction of housing and human settlement, especially in rural area of Nepal. Nearly 5, 00,000 houses were destroyed and more than 2, 50,000 houses were partially damaged. The effect of the disasters were visible among a diverse range of communities and settlements, including remote mountain villages, roadside market towns, heritage settlements peri-urban neighborhood, and emerging cities and several dense neighborhood in the Kathmandu valley (NPC,2015).

In the case of sikles, Sample survey indicates that there is no loss of life due to earthquake. No house is completely collapsed. Rapid visual Damage Assessment was done to identify the type of damage occur. It shows that No damage formation in 39 % of house whereas 5% houses partially collapsed (collapse of side wall, 'putali garo' etc). Damage assessment indicates that moderate damage (crack more than 5mm in wall and floor, diagonal crack in wall, 1 or 2 pieces of stone fall down from wall, wall bulge etc.) is seen in 43 % of houses whereas hair crack (crack upto 2-3 mm in wall and floor) is seen in 13 % of houses.

S.N.	Type of Damage	No of Buildings	Remarks
1	No Damage	29	
2	Partially collapse	4	
3	Moderate Damage	32	
4	Slightly Damage (Hair crack) formation in wall and floor (up to 2-3 mm)	10	

Table 5.7: Type of Damage due to earthquake

Data indicates that Sikles is less affected by the recent earthquake of magnitude 7.6. The cause may be their built culture is strong enough to bear the seismic load. According to Mr. Dhak Bahadur Bhujel, Senior Overseer, ACAP-UCO office, sikles, no earthquake safety measure is followed in Parche VDC to construct the building. Local Mason Mr. Balaram Gurung said that they have no formal training and unaware about earthquake resistance construction technique. It is better to follow Seismic design guideline by VDC and to give training to local builders and masons about

earthquake resistance construction technology which will be helpful to make more safer building. Formally, they are unaware but they have good skill to construct earthquake resistance building. So Engineers and local masons should bind together to share their mutual knowledge for safe construction.

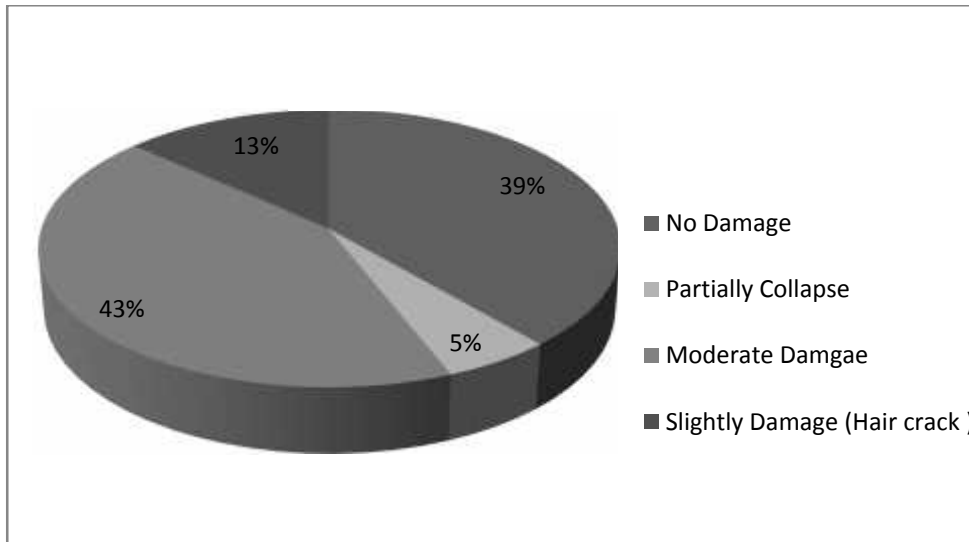


Figure 5.27: Rapid Visual Damage Assessment



Figure 5.28: Damage Indicator - No damage in Building

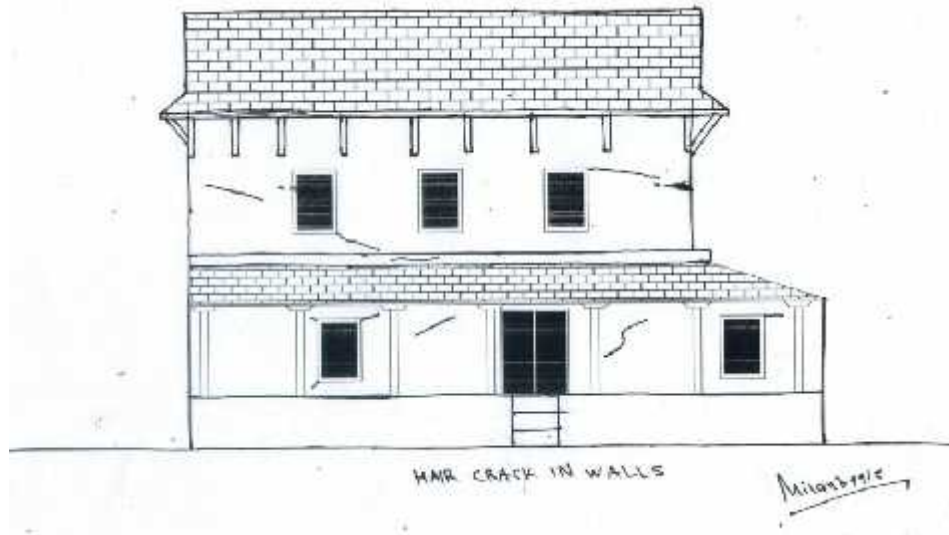


Figure 5.29: Damage Indicator: Slight Damage (Hair cracks upto 2-3 mm seen in many walls)

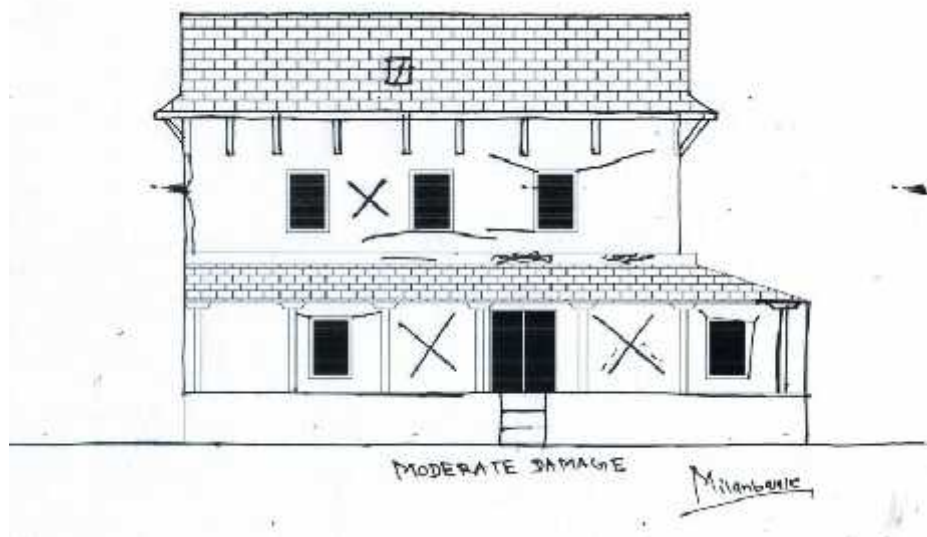


Figure 5.30: Damage Indicator: Moderate Damage (Cracks above 5mm, diagonal cracks in wall, fall of pieces of mud plaster, fall of few pieces of slate and stone etc.)



Figure 5.31: Damage Indicator: Partially Collapsed (Large and extensive diagonal cracks in walls, failure of small elements like strut, failure of gable wall, fall down large pieces of mud plaster, fall down pieces of slate from roof and stone pieces from wall, bulge in wall, pillar etc.)

5.8 Services and Amenities

5.8.1 Water Supply

Out of 75 houses, 66 household have pipe drinking water facility in their home whereas 9 household have no drinking water facility. They use public tap to fullfill their needs. Out of 9 household having without drinking water facility, 6 are from occupational castes (Bishowkarma-Dalit) and 3 are from Gurung ethnic goup. 2 buildings are under construction which are owned by gurung . It indicates that Dalits are deprived due to their poor economic condition. Mr. Dhak Bahadur is agreed with this and added that land holding by dalit is so small that they have no enough space to construct tap around their building premises.

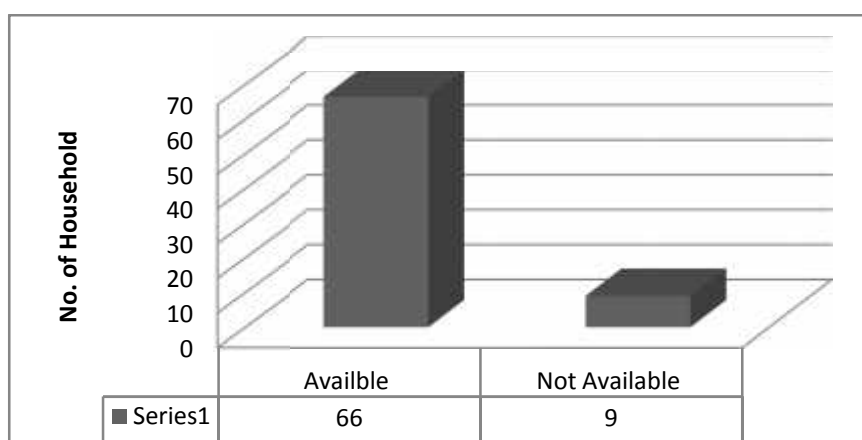


Figure 5.32: Availability of Water supply in individual Household

5.8.2 Toilet

One under construction building does not exist toilet otherwise all buildings have toilet facilities. It is possible because Parche VDC is declared as ODF (Open Defecation Free) zone.

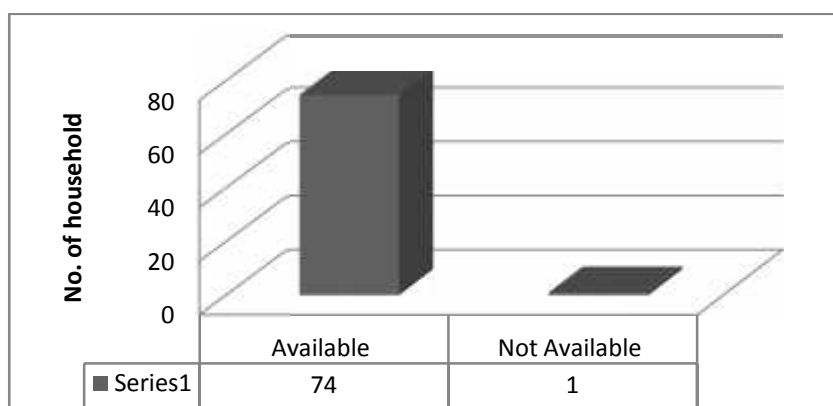


Figure 5.33: Toilet in individual Household

5.8.3 Electricity

Electricity is distributed through local micro hydro, which is supported by ACAP. Electricity is supplied in each and every house.

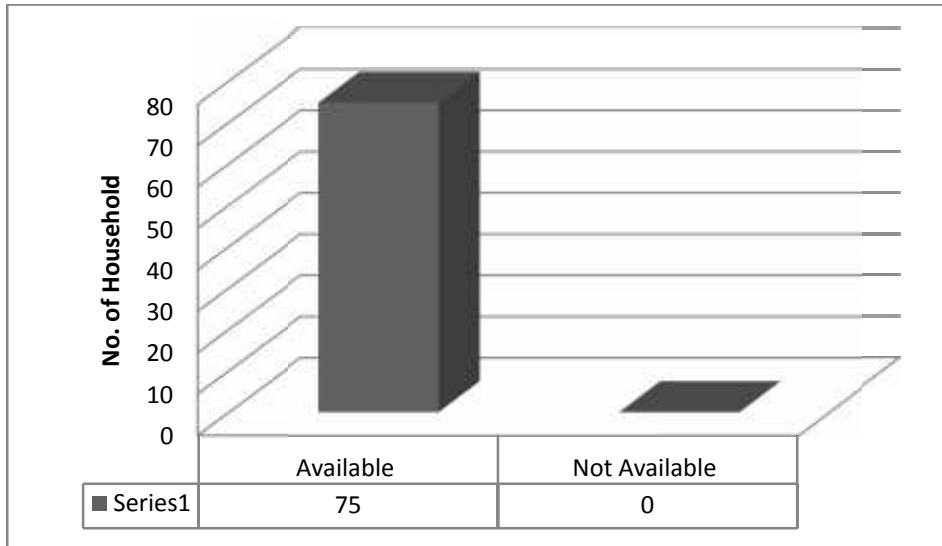


Figure 5.34: Availability of Electricity supply in individual Household

5.8.4 Solar System

There is no load shedding in sikles. So, alternate source of electricity is rare in sikles. But during rainy season, micro hydro faces various problem and alternate sources is needed. 3 houses have solar system for alternate source of electricity. Out of three, 2 are home stay.

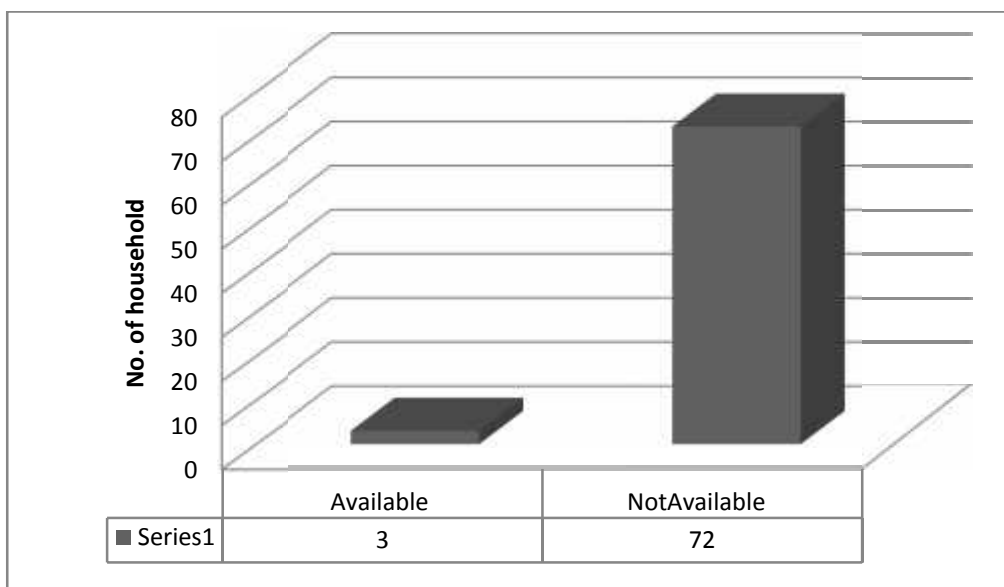


Figure 5.35: Availability of solar system in individual Household

5.9 Climatic Response

Buildings of traditional societies generally respond to numerous determinations: ecological, economical and cultural (Gerard, 1994).

“Nature suggests, man Decides”, Agreeing with Gerard (1994), the study indicates that material use and building orientation are responding with climate. Almost all houses are oriented towards south and east, which is helpful to create sunny area in front of house. According to Parche VDC profile report (2011), the temperature ranges Maximum 28 degree to minimum 0 degree. So creating warmness inside and outside the building is the aim of building orientation. Openings are small to prevent cold wind during winter.

According to Parche VDC profile (2011), the average annual rainfall is 3350 mm. Study indicates that angle of slope roof ranges from 30 degree to 45 degree. The causes of high pitched roof may be for rapid flow of rain water. The projected slope roof protects the mud plastered wall from heavy rainfall. The roof overhang is generally 2 feet. The roofs are covered either by CGI sheet or by slates.



Figure 5.36: Projected roof protects mud plastered wall

5.10 Religious & cultural aspects in building construction

According To Mr. Lal Prasad Gurung Lama, a local Astrologer, there are various cultural traditions and religious rituals, which should be performed before and after construction of any building. He said that there is a good harmony between Hindu & Buddhist religious procedure performed before and after construction. His word in narrative form is written in box below.

लाल प्रसाद गुरुङ, लामा, ६३ वर्ष

घरको जगपूजा गर्दा तामाको २ वटा लोटा, धूप, दिप, सुगन्ध आउने फूल र रक्सीको जोगाड गर्नु पर्छ। जगपूजा गर्ने हुंगा खोज्दा, कुन वर्गले खोज्ने भनेर पहिला लामाले हेर्नु पर्छ। गुरुङ जातीमा मूसा वर्ग, कुकुर वर्ग, बाघ, विरालो, गाई, गिद्ध, सर्प, घोडा, भेडा, बाँदर, चरा र मृग गरी १२ वर्गका मान्छे हुन्छन्। तर, हाम्रा गाउँमा दमाई र कामीहरूको घर बनाउँदा यो वर्ग हेर्ने काम गर्नु पर्दैन। यो त गुरुङको संस्कार।

जग पूजाको लागी ३ वटा हुंगा चाहिन्छ। गाईको दूध र गोबर पनि चाहिन्छ। लामाले निकालेको शुभ दिनमा जग पूजाको काम हुन्छ। पूजा गर्नुभन्दा पहिले १ हात गहिरो खाल्डो खनिन्छ। खाल्डोभित्र गोबरले लिपिन्छ। पानी र दूध भरेको तामाको लोटा त्यहाँभित्र राखिन्छ। लोटाभित्र पैसा पनि राखिन्छ। दहीमा मुछेको सेतो अक्षताले पूजा गरिन्छ। पूजा गर्दा ३ देखि ५ जना मान्छे चाहिन्छ। विजोर चाहिन्छ। जोर भए गयो गयो हुन्छ। विजोर भए आयो गयो हुन्छ। त्यसैले विजोर चाहिन्छ। मन्त्रोच्चारणसहित पूजा सकिएपछि टिकोटालोको काम हुन्छ।

जग पूजा सकिएपछि आफ्नो अनुकूल मिलाएर घर बनाउन शुरु गर्ने चलन छ। जग हाल्ने कामवाहेक धुरी, खाबो, थाम, दलिन हाल्ने र छाउने दिन पनि शुभ दिन निकालेर काम गर्नुपर्छ। मूलढोका हाल्ने दिन त टिकाटालो पनि गर्नुपर्छ, चेलीवेटी बोलाएर।

जग पूजा गर्दा छावा... छावा... भनिन्छ। राम्रो राम्रो होस् भनेको। आयु राम्रो होस्, छोरा छोरी होस्, शुभ शुभ होस् भन्दै सुनपानी छर्कने गरिन्छ। यो माटोको घर हैन, सुनको घर होस्, सुनकै खाबो, छानो, लिस्नो, भ्याल, ढोका हो भन्दै शुभ कामनासाथ पूजा गरिन्छ। लामाले रिन नलागोस्, रोग, शोक नलागोस्, सह आओस् धान, धन आओस् भन्दै कामना गर्दछन्।

घरको छाना छाउँदा शुभ दिनबारे ख्याल राख्नुपर्छ। हाम्रो लामा विद्या अनुसार १ महिनामा १ दिनमा १ घण्टा 'आगो समय' आउँछ। त्यो बेला बार्नुपर्छ या छल्नुपर्छ। त्योवाहेक सोरुड भन्ने हुन्छ, त्योचाहि १ हप्ता बार्नुपर्छ। पहिला घरमा खरको छाना हुने र आगोले सखाप पार्ने भएकोले आगो बार्ने चलन चलेको हो। छाना छाउने शुभ दिनमा कुखुराको भाले काटेर घरको चारै सुरमा रगत चढाईन्छ। भाले धुरीमै काटिन्छ र छेदभेद मन्साईन्छ। जंगलबाट निर्माण सामग्री लयाईने भएकोले भूतप्रेत, सिमेभूमे मन्साउने चलन चलेको हो।

घर बनिसकेपछि घरपूजा (घरसापटी) गर्न ऊन नकातेको भेडो चाहिन्छ। भेडोलाई आँगन या घरभित्रै काटिन्छ। पितृ पूजाको काम, महाकाल धिताम पढ्ने काम पनि हुन्छ। कसैले १८०० वटा बत्ती पनि बाल्छन्। जौ, तिल, धान मकै हालेर होम गर्ने काम पनि हुन्छ। हाम्रो संस्कारमा हिन्दू र बुद्ध दुवैको संस्कृति मिसिएको छ। लामा पढाउने र पण्डित बोलाएर होम गर्ने दुवै कामसमेत गर्छन् कसैले। अनि हुनेखानेले दश मुरी धान कटेर भोज खुवाउने समेत गर्छन्। खासगरी तलो छाप्दा गाउँलेहरूले निशुल्क सहयोग गर्ने भएकोले सबैलाई बोलाएर भोज खुवाईन्छ।

घरमा सरेको केही समयमै मान्छे विरामी पर्ने, मर्ने, चोर लाग्ने जस्ता अनिष्ट देखिए ग्रह फाल्ने काम गर्नुपर्छ। ग्रह फाल्दा लामाले भेडा, बाखा या कुखुरा काटेर चढाउछन्। घरधनी र इष्टमित्रले त्यो मासु खानु हुँदैन। पण्डित बोलाएर ग्रह फाल्दा चार सुरमा महादेव, गणेश र विष्णुको पूजा गरिन्छ। बावियोको डोरीमा तोरण बनाएर घर घेर्ने गरी टागिन्छ। पूजा गरेपछि घरको सबै कुनामा जल, अक्षता छर्कने काम हुन्छ। लामाले चाहि चामलको पिठोको मूर्ति बनाएर पूजा गरी ट्याडगो ठोक्छन्। आजकाल त ठेकेदार लगाएर घर बनाउने चलन आयो। ठेकेदारलाई जे जे मन लाग्यो त्यही अनुसार काम हुन्छ। हेराउने, शुभ साईत खोज्ने, तलो छाप्दा, बनबाट काठ ल्याउँदा सघाउने आदि परम्परा अलिकति धर्मराउन थालेका छन्। रितिरिवाज हराउला कि भन्ने डर छ हामीलाई। घर बनाउँदा गरिने रितिरिवाज बचाउनुपर्छ।

5.11 Recent changes in Material, Technology, Built form & Village Planning

5.11.1 Changes in Settlement Pattern

Compact settlement of sikles is being to dispersed covering wide space in the settlement for building construction. It happens because of increasing commercial activities generated by tourism and many people are involved in operating hotel and guest house, which need larger, built up space with wide courtyard. Settlement is increasing in bus park area (Eastern part of village) due to commercial activities. Settlement cannot extend towards north due to fixed boundary having religious forest (cremation area), temples and grazing land. So it is extending towards south having enough land for settlement. Extension is also seen towards west.

5.11.2 Changes in Construction Materials

The vernacular roofing material of Sikles is slate. But it is disappearing and being replaced by CGI sheet. It needs fewer repairs; have good capacity to protect interior space from rain, easy to install, good fire resistance capacity, cheaper than slate and easily available due to transportation facility. Due to change in material, design of roof (especially slope angle) is also changing. 'Village with Rusted roof' is the reality of sikles which is not pleasing from architectural point of view.

5.11.3 Change in plan form & Interior

Although roofing material is changing, but, still RCC residential building (not residential, institutional building like VDC office following RCC system) is not constructed in Sikles. That's why, plan form and their interior is not changed. Buildings converted into home stay changed their interiors due to specific requirements, but others remain same except few modifications with added new elements. Adding TV room, study room for children is the recent change of time supported by remittance flow into village.

5.12 Built form & Village life

Similar to other village in Nepal, majority of people derive their livelihood from agriculture, forest and animal husbandry. According to Parche VDC profile (2011), 86% population is engaged in agriculture. Study indicates that agro based Lifestyle, built form and building use pattern have good harmony to each other.

Gerard (1994) quoted Demangeon (A well known Geographer from Germany)'s popular note about relation between dwelling and method of farming in his research entitled "Ecology & Anthropology of Traditional Dwelling". Demangeon said that the character of the house depends mainly on its internal organization, an organization born of the needs of farming. He said that the rural house provides a solution to the vital problem of relating men, animal and goods.

Case is same in sikles, as Demangeon said. The priority is given high to animals and agricultural tools and products inside and outside the dwelling. Chicken shelter is kept in one corner of verandah or 'pidi', animal shelter is adjoining with 'pidi' and agricultural tools and products are stored in first floor. Out of 75 households, only 2 buildings have sleeping zone in first floor. Those two buildings are hotel and home stay, otherwise first floor is used to store food grain, agricultural and fishing tools.

Agreed with Gerard (1994) that the dwelling in rural area is conceived as an instrument of work- a tool which the farmer adapts on his farming needs. But in the current context, some changes also seen. Human comfort is given more emphasis and the concept that building as a tool for agriculture is changing.

CHAPTER VI

CONCLUSION & RECOMMENDATION

6.2 Conclusion

Nepal is rich in climatic, social, cultural and geographic diversity which is reflect in vernacular architecture developed in different zone. We have a wide variety of vernacular architecture. This research has investigated the various dimensions of vernacular architecture such as economical, ecological cultural influence in the development of architecture, space utilization in traditional building, lifestyle and built form, climate response design techniques, influence of culture in architecture, material availability.

This study about village (vernacular) Architecture, focused on rural construction system and built environment will useful especially for Architects, Rural Development Experts, Civil Engineers, Planners, Sociologists and for local development experts. This is the study of Architecture from the perspective of rural development, which aims that Architects, Engineers and rural development expert should focus to study village architecture and have to support for safer construction to cope with various disaster.

My research also pointed that village architecture is less documented and rural development experts are focusing only in socio-economic issues and are not focus on settlement system and built form. Vernacular buildings are not gaining priority for conservation work. So this research focused that it is necessary to document, prepare maps and drawings.

This research found that village architecture in sikles with its intact tradition is still alive and local mason has a good skill to maintain, repair, addition and changes without losing its authenticity. This research has also developed a set of recommendation to conserve village architecture.

6.3 Recommendation

- ❖ Settlement with vernacular architecture is not identified as a heritage zone by Ancient Monument Preservation Act (1956). It is necessary to prepare an act or guideline for conserving vernacular architecture.
- ❖ Provision of incentive, training and information should be provided to local masons, builders and villagers to encourage for conservation of traditional building and local construction system.
- ❖ If Villagers can understand the value of their vernacular architecture, they will agree to protect and conserve their craftsmanship, skill, knowledge and built culture. So awareness generation program is very much relevant.
- ❖ For conservation of architecture, tourism development may be important tool. According to ACAP-UCO office, sikles, average annual tourist flow is 1500 per year, which is very less comparing to other village of Annapurna conservation area. Among them, number of foreigners is very less. So tourism development plans and programs should prepare and implement.
- ❖ It is better to encourage local people for home stay programme rather than for establishing hotel building. Home stay may attract foreign tourist which will be helpful to conserve their built form.
- ❖ The slate roof is disappearing rapidly. It is the identity of village architecture around Annapurna region. So local authority should focus to conserve slate roof construction system.
- ❖ Governmental buildings (VDC offices, health post) are constructed without considering the local built culture, craftsmanship, material and technology. Local construction system, material and craftsmanship should be used to conserve local built culture. It will generate local employment also. The influence of contemporary urban architecture (RCC system) may cause disappearance of local built culture.
- ❖ National building code of Nepal (NBC, 2003) and guideline for buildings made of brick and stone masonry (Based on NBC 203: 1994) is not implemented for construction work in Parche VDC. It should be implemented.
- ❖ Recent building guideline (*Basti Bikas, Sahari Yojana tatha Bhawan Nirman Sambandi Aadharbhut Marga Darsan, 2072*) issued by Ministry of Local Development and federal affairs is not addressing the issues of buildings

constructed by stone and brick masonry with mud mortar in rural area. According to Building Act 2055, these building are grouped in 'Category D'. Post Disaster Need Assessment (PDNA) Report prepared by National Planning commission said that 4,74,024 low masonry buildings are fully damaged and 1,73,867 buildings are partially collapse due to recent earthquake. Recent building guideline is not addressing about rural housing. So Attention should be given by the government for rural housing.

- ❖ Physical Development plan should be prepared for infrastructure development of Sikles village.
- ❖ Parche and its adjoining VDCs are suffering from landslide which causes loss of life and property. Landslide risk assessment should be necessary around sikles area.
- ❖ Mason training is needed for earthquake safe construction. Engineer and local mason should work together for earthquake resistant building. So VDC should recruit a Civil Engineer for design and supervision of rural dwellings and other types of building.
- ❖ Architecture cannot be conserved without conservation of intangible heritage. Social (self-help approach of construction is replacing by hiring of contractor) ,cultural (rodhi culture etc.) and various religious aspects are disappearing due to youth migration in abroad . Youth development program, skill development trainings may promote local youth to work in their village.
- ❖ Firewood is use for cooking and kitchen consists of small opening. Smoke generated form firewood causes indoor air pollution and women's health is adversely affected. So Promotion of improved cooking stove is necessary by VDC, ACAP and local community.
- ❖ Light and ventilation inside the room is not enough to read and write. Children are facing this problem. So windows should design in such a way that enough light can enter inside the room.
- ❖ Adjoin animal shed nearby 'pidi' or verandah should be shifted. It creates unhygienic environment around residential complex.

REFERENCES

- ACAP, UCO (2013). *Annual progress report*. Kaski: NTNC-ACAP,UCO sikles office.
- Agarwala, S.C. (2014). *Architecture and town Planning*. Delhi: Dhanpat Rai & Co.
- Arboleda, G. (2006). What is vernacular architecture? Retrieved from <http://www.vernaculararchitecture.com/>, accessed April2, 2015.
- Bagale, M. (2008). Culture center, Ghandruk, Kaski. An unpublished thesis in Bachelor in Architecture, Purbanchal University, Khwopa Engineering College, Bhaktapur, Nepal.
- Bagale, M. (2010, August 6). Vernacular Architecture in Nepal. *The Rising Nepal, Friday Supplement*, P.II.
- Bagale, M. (2013). *Ek ghar ek roojgar : Prayagdutta Tewariko Krishikatha*. Pokhara: Kaushila Foundation.
- Bista, D.B. (1980). *People of Nepal*. Kathmandu: Ratna Pustak Bhandar
- Brunskill, R. W. (1986). *Traditional Building of Britain: An Introduction to Vernacular Architecture*, BAS Printer Limited, Hampshire.
- Gaborieau M. (1991). *The Indo-nepalese houses in central Nepal : Building patterns, social and religious symbolism*. Gerrad T. (Editor), Man and his house in the Himalayas: Ecology of Nepal (pp.33-53). New Delhi: Sterling Publishers.
- Gerard, T. (Ed) (1991). *Man and his house in the Himalayas: Ecology of Nepal*. New Delhi : Sterling Publishers.
- Gerard, T. (1994). *Ecology and Anthropology of Traditional Dwellings*. TDSR, Vol v, No.11, P.9-20

- Hudson, F. S. (1976). *A geography of settlements*. UK: Macdonald and Evans
- History of Architecture*. Retrieved from <http://www.archicentral.com/history-of-architecture-27938/>, Accessed 2 April, 2015)
- Lawrence, R. J. (1987). *Housing, Dwellings and Homes: Design Theory, Research & Practice*. n.p.
- NPC (2015). *Nepal Earthquake 2015 Post Disaster Needs Assessment, Vol A: Key findings*. Kathmandu: Government of Nepal, National Planning Commission .
- Oliver, P. (1989). *Encyclopedia of Vernacular Architecture of the world*, University Press, Cambridge.
- Parche VDC (2011). *Village profile: Parche VDC*. Kaski: Parche VDC
- Parker, S. (Ed) (2011). *Our village our life: Sikles in focus*. Kathmandu: n.p.
- Pradhan P. K. (2012). *Urban Rural Relations and Rural Devekopment in Developing World*. Kathmandu: Quest Publication.
- Rao P.M. (2009). *Architectural Design: Theory and Practice*. Delhi: Standard Publishers Distributors.
- Rapoport, A. (1969). *House Form & Culture*. Prentice-Hall, Englewood cliffs.
- Roy, O. (1990). The merging of traditional and modern culture in Nepal. *Architecture + Design (May-June,1990)*, 73-79.
- Rudofsky, P. (1981). *Thailand and Southeast Asia in Encyclopedia of Vernacular Architecture of the World*, Oliver. P. University Press, Cambridge.
- Shrestha, S.H. (2004). *Economic geographic of Nepal*. Kathmandu: Educational

Publishing House.

Singh, R. Y.(1998). *Geography of Settlement*. Jaipur: Rawat Publications.

Strike, J. 1991. *Construction into Design: The influence of new methods of construction on architectural design*.

Tiwari S.R.,Hanaoka S.,Rijal H. B.,Hata S., and Yoshida H. (2004).

Cultures in Development: Conservation of Vernacular Architecture. Vaastu Magazine, Volume 6 (2004), 21.

Turan, M. (1975). Vernacular architecture and environmental influences: An analytic and a comparative study. *M.E.T.U. journal of the faculty of architecture*,1(2). Retrived from http://jfa.arch.metu.edu.tr/archive/0258-5316/1975/cilt01/sayi_2/227-246.pdf on March 8, 2015

Weise K. (2007). *Sustainable Architecture*. Vaastu Magazine, Volume 9 (October 2007).

Weise K.(2007). *Supporting and Improving Traditional Building Practices in The Central Himalayas through an Integrated and Implementation Oriented Approach*. Retrieved from

<http://ip51.icomos.org/iiwc/seismic/Weise.pdf>, Accessed April 5, 2015.

ANNEX – 1
QUESTIONNAIRE



Tribhuvan University

Central Department of Rural Development

University Campus, Kirtipur, Kathmandu

Thesis Title: VERNACULAR ARCHITECTURE OF RURAL NEPAL

(A case study from Sikles Village, Kaski, Nepal)

INVENTORY SHEET: BUILDINGS

Name of Researcher:

Survey form No:

Date:

Name of Interviewee:

Age and Sex:

INVENTORY: BUILDINGS

1. Building Typology (Architectural)

Traditional House Contemporary Structure

No specific style

2. Ownership

Private public or community Government

3. Usage

Residential and residential commercial and residential commercial

public or community government unoccupied

4. Number of Stories

- 1 2 3 4 5 more than 5

5. Construction System

- Load bearing in mud mortar Load bearing in cement-sand mortar RCC
 With wooden posts With RBC Slab

6. Age & Additions of building

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.....
.....

7. Structural Condition

- Foundation settlement Bulge (specify location)
 Cracks (specify location)
 Partial Collapse

Remarks.....
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.....

8. Material condition

- Wood deterioration Brick deterioration Concrete deterioration
Damage in roof- slate or CGI sheet

Specify possible causes and effects

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.....
.....

9. Present Uses of Building:

- ❖ Ground Floor:
- ❖ First Floor :
- ❖ First Floor :
- ❖ Second Floor :
- ❖ Uses of Additional Building :

10. Building with home stay facility

Yes No

11. If yes, specify No of room / Bed allocated for home stay

.....
.....

12. Major Construction materials

- ❖ External Wall :.....
- ❖ Partition Wall:.....
- ❖ Roof :.....
- ❖ Floor and wall finishing:
- ❖ Mortar :
- ❖ Column & Beam:.....

13. Thickness of wall

- ❖ External Wall:.....
- ❖ Major Internal wall (partition) :.....

14. Site feature

Flat Land Steep slope Gentle slope Terrace

15. Services & Amenities

- ❖ Water supply:

- ❖ Drainage:
- ❖ Toilet:
- ❖ Electricity:
- ❖ Bio-Gas :.....
- ❖ Solar home system:.....
- ❖ Other:

16. Damage caused by recent earthquake

- No Damage Moderate damage partially collapse Completely collapse

17. Technical supervision during construction of building

- Yes No

18. Notes/ Comments:

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HOUSEHOLD SURVEY

1. Total Number of Family Members per family:

- ❖ Male:
- ❖ Female:
- ❖ Members having job (except family occupation) :
- ❖ Family occupation.....
- ❖ No. of literate person:
- ❖ No. of illiterate person:
- ❖ Members going to school:
- ❖ Members working abroad:.....
- ❖ Family religion:

2. Vulnerable Members (specify number)

- Children <12 Elderly > 65 Single Women Handicapped

3. Primary and Secondary Occupations

- ❖ **Primary:**
- ❖ **Secondary:**.....

4. Social Group – Specify caste

.....

5. Ownership of agricultural land (if yes, how many Rupanees)

.....

6. Since how long have you/your family been staying in this house? Is it owned or rented?

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7. Have you incorporated any earthquake safety measures in your house/building? If yes, of what kind and where?

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8. If loss of life and property is happened by recent earthquake of magnitude 7.9, specify in detail.

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9. Notes/ Comments:

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ANNEX-2 'A'
PHOTOGRAPHS
(BACKGROUND INFORMATION)



Fig. 2.2: Birds eye view of an Agglomerated rural settlement in Gandruk Village, Kaski (Bagale, 2010)



Fig. 2.3: Compact Rural Settlement in Bara District (Terai region) of Nepal (Photo: Milan Bagale)



Fig 2.4: Dispersed Settlement from Metrang VDC, Kaule, Chitwan (Bagale, 2013)



Fig. 2.5 An oval house from Jita village, Lamjung (photo: Milan Bagale)



Fig 2.6: A Rectangular house from Ghandruk Village, Kaski (photo: Milan Bagale)



Fig 2.7 : View from Kyamin VDC Tanahun: Adjoining Block with main residential building (left) – ‘Dhansar’ is mostly used as cattle shed and grain store (photo: Milan Bagale)

ANNEX-2 'B'
PHOTOGRAPHS
(RELATED TO STUDY AREA)



Road Network to reach sikles is poor (photo: Milan Bagale/field study, 2015)



Trail to reach sikles is poor (photo: Milan Bagale/field study, 2015)



Bus station nearby village (photo: Milan Bagale/field study, 2015)



View of Sikles Village, Ward No: 9 (photo: Rajan Bagale/field study, 2015)



Bird's Eye view of sikles Village (photo: Rajan Bagale/field study, 2015)



Interview with Mr. Chitra Bahadur Gurung (photo: Ram Shrestha/field study, 2015)



Interview with Mrs. Khasa Maya Gurung (photo: Ram Shrestha/field study, 2015)



Local women washing wool in public tap (photo: Milan Bagale/field study, 2015)



Local women is preparing woolen product (photo: Milan Bagale/field study, 2015)



Courtyard (Aagan) used as grain refine area (photo: Milan Bagale/field study, 2015)



Improved water Mill nearby village (photo: Milan Bagale/field study, 2015)



Interior view of improved water mill (photo: Milan Bagale/field study, 2015)



Mr. Dil Prasad Gurung (Right), local mason, sharing his ideas about building construction (photo: Rajan Bagale/field study, 2015)



Mr. Balaram Gurung preparing wooden frame (photo: Milan Bagale/field study, 2015)



Pastureland on the northern side which started after completing village boundry (photo: Milan Bagale/field study, 2015)



Village entry point and 'chautaro' on the northern side (photo: Milan Bagale/field study, 2015)



View of Memorial construction in memory of deceased (photo: Milan Bagale/field study, 2015)



Commemorative stone in the memory of deceased laid in 'chautaro' (photo: Milan Bagale/field study, 2015)



Building owned by Maya Devi Gurung (photo: Ram Shrestha/field study, 2015)



Stone paved Narrow street connecting the house (photo: Milan Bagale/field study, 2015)



View of Kitchen (photo: Milan Bagale/field study, 2015)



Stone as a flooring material in kitchen (photo: Milan Bagale/field study, 2015)



View of first floor (photo: Milan Bagale/field study, 2015)



Sleeping zone inside the kitchen (photo: Milan Bagale/field study, 2015)



Mr. Lal Prasad Gurung working in kitchen (photo: Milan Bagale/field study, 2015)



Staircase leads first floor (photo: Milan Bagale/field study, 2015)



Wall Construction Detail (photo: Milan Bagale/field study, 2015)



Slate roof, which is disappearing in sikles (photo: Milan Bagale/field study, 2015)



Slate fixing detail (photo: Milan Bagale/field study, 2015)



Wall Construction Detail (photo: Milan Bagale/field study, 2015)



New construction: Modification in Door, Window and finishing material (photo: Milan Bagale/field study, 2015)



Small unit of settlement (photo: Milan Bagale/field study, 2015)



Animal shelter adjoin with padi (photo: Milan Bagale/field study, 2015)



Door-Window Detail (photo: Milan Bagale/field study, 2015)



Crack formation in wall due to earthquake (photo: Milan Bagale/field study, 2015)



Future Generation of sikles (photo: Milan Bagale/field study, 2015)

ANNEX-3

LIST OF HOUSES UNDER SURVEYED

S.N.	Name of Respondent	Address	No of stories	Remarks
01	Khasa Maya Gurung	Ward No.5	2	Hotel & Residence
02	Chitra B. Gurung	Ward No. 5	2	
03	Maya Devi Gurung	Ward No.5	2	
04	Nanmaya B.K	Ward No.5	2	
05	Kanchi Gurung	Ward No. 5	2	
06	Shree Maya Gurung	Ward No.5	2	
07	Rosh Maya Gurung	Ward No.9	2	
08	Maya Gurung	Ward No. 9	2	Home stay & residence
09	Chakka Man Gurung	Ward No.9	2	Shop & Residence
10	Dilli Jung Gurung	Ward No. 6, Gairithar	2	
11	Tek Bahadur BK	Ward No.7	2	
12	Naumaya Gurung	Ward No. 6	2	Non register home stay
13	Khim Jung Gurung	Ward No. 6	2	
14	Mauta Singh Gurung	Ward No. 6	2	
15	Bhojmaya Gurung	Ward No. 5	2	Building in finishing phase
16	Ganja BK	Ward No. 5	2	
17	Sansaram BK	Ward No. 5	2	
18	Jung Bahadur BK	Ward No.5	2	
19	Balaram Gurung	Ward No. 5	1	Under construction
20	Punya Shree Gurung	Ward No. 5	2	
21	Kesbir BK	Ward No. 9	2	
22	Lal Prasad Gurung	Ward No. 7, Dhaprangthar	2	
23	Lalshree Gurung	Ward No. 7	1	
24	Iman Gurung	Ward no. 7	2	
25	Harka Bahadur Gurung	Ward No.7	2	
26	Chitra Singh Gurung	Ward No.7	2	
27	Rohit Gurung	Ward No. 5	2	
28	Nardhoj Gurung	Ward No. 5	2	
29	Harka Singh Gurung	Ward No. 5	2	
30	Pamfa Gurung	Ward No. 5	2	
31	Manshree Gurung	Ward No. 5	2	
32	Bhim Gurung	Ward No. 5	2	
33	Nar Bahadur Gurung	Ward No. 5	2	
34	Hishubha Gurung	Ward No. 5	2	
35	Lil shubha Gurung	Ward No. 5	2	

36	Mauth S. Gurung	Ward No. 5	2	
37	Sun maya Gurung	Ward No. 7	2	
38	Hari Kala Gurung	Ward No. 7	2	
39	Lila Jung Gurung	Ward No. 7	2	
40	Aas Bahadur Gurung	Ward No. 7	2	
41	Dil Shobha Gurung	Ward No. 7	2	
42	Yel Kumari Gurung	Ward No. 7	2	
43	Kamala Gurung	Ward No. 7	2	
44	Parda Gurung	Ward No. 7	2	
45	Tul Prasad Gurung	Ward No. 7	2	
46	Buddhi Bahadur Gurung	Ward No. 7	2	
47	Debraj Gurung	Ward No. 7	2	
48	Gobiraj Gurung	Ward No. 7	2	
49	Kesh Bahadur Gurung	Ward No. 7	2	
50	Jhalak Bahadur Gurung	Ward No. 7	2	
51	Jagat maya Gurung	Ward No. 7	2	
52	Arsha Gurung	Ward No. 7	2	
53	Bir Subha Gurung	Ward No. 7	2	
54	Dal Bahadur Gurung	Ward No. 7	2	
55	Kumari Gurung	Ward No. 7	2	
56	Homaya Gurung	Ward No. 7	2	
57	Padam Gurung	Ward No. 7	2	
58	Kul Bahadur Gurung	Ward No. 7	2	
59	Gopiraj Gurung	Ward No. 7	2	
60	Birmaya Gurung	Ward No.7	2	
61	Mukti Prasad Gurung	Ward No. 7	2	
62	Tilak Bahadur Gurung	Ward No. 5	2	
63	Menusupa Gurung	Ward No. 6, Gairithar	2	
64	Purna Bahadur Gurung	Ward No.9, Lamathar	2	
65	Ratan Singh Gurung	Ward No. 8	2	
66	Man Kumari Gurung	Ward No. 8	2	
67	Ganesh Man Gurung	Ward No. 8	2	
68	Tau Bahadur Gurung	Ward no. 8	2	1 storied Home stay Block adjoin with main block
69	Dhanakhu Gurung	Ward no. 8	2	
70	Chum Bahadur Gurung	Ward No. 8	2	
71	Dan Bahadur Gurung	Ward No. 8	2	

72	Prasad gurung	Ward No. 8	2	
73	Hom Prasad Gurung	Ward No. 8	2	
74	Laxmi Gurung	Ward No. 7, Dhaprangthar	2	
75	Khud Bahadur Gurung	Ward no. 5	2	

ANNEX-4
MAPS & DRAWINGS