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## “Empty Spaces” In Modern Cultural Landscapes Structure: Identification for the Sake of Socio-Economic Stability

By T.M. Krasovskaya

*Lomonosov Moscow State University*

**Abstract-** Cultural landscapes of the Russian Arctic remind a palimpsest where historical spatial fragments are being combined with modern. Complex spatial structure of cultural landscapes in populated regions, in several cases, promote delusion of “empty spaces” existence, i.e., territories not fashioned by some cultural group and thus free for new economic development. Involvement of such territories in modern economic development may cause loss of traditional economy incomes for the indigenous population, as well as cultural heritage and socio-economic conflicts. Humanitarian geography approaches were used to define cultural landscapes, demonstrate their different patterns in the Russian Arctic. The goal of this study is to reveal the origin of “empty spaces” appearance in the Russian Arctic and demonstrate the importance of cultural landscapes studies to identify and characterize them for the sake of socio-economic stability.

**Keywords:** cultural, landscape, Arctic, indigenous, management, mapping.

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# “Empty Spaces” In Modern Cultural Landscapes Structure: Identification for the Sake of Socio-Economic Stability

T.M. Krasovskaya

**Abstract-** Cultural landscapes of the Russian Arctic remind a palimpsest where historical spatial fragments are being combined with modern. Complex spatial structure of cultural landscapes in populated regions, in several cases, promote delusion of “empty spaces” existence, i.e., territories not fashioned by some cultural group and thus free for new economic development. Involvement of such territories in modern economic development may cause loss of traditional economy incomes for the indigenous population, as well as cultural heritage and socio-economic conflicts. Humanitarian geography approaches were used to define cultural landscapes, demonstrate their different patterns in the Russian Arctic. The goal of this study is to reveal the origin of “empty spaces” appearance in the Russian Arctic and demonstrate the importance of cultural landscapes studies to identify and characterize them for the sake of socio-economic stability.

**Keywords:** cultural, landscape, Arctic, indigenous, management, mapping.

## I. INTRODUCTION

Modern humanitarian geography adopted the concept of cultural landscapes developed by K. Sauer [Sauer, 1925], C.O. Schluter [Schluter, 1920], D.E. Cosgrove [Cosgrove, 1998], etc. According to Schluter, a cultural landscape develops from natural landscape fashioned by a cultural group. This concept differs from the traditional approach in Russian landscape studies, where culture is separated from landscape characteristics though anthropogenic transformations are studied. V.I. Vernadsky, known for his doctrine of man and the biosphere, once mentioned that culture presented a new type of biogeochemical energy [Vernadsky, 1991]. This statement somehow linked humanitarian and traditional landscape approaches but traditional landscape science approach is still dominating making its research results far from being clear for public understanding. Besides the mainstream development of a modern post-non-classical period of science focuses at interdisciplinary studies [Ravetz, 1999 Stepin, 2003, etc.]. In Russia, this gave rise to the revival of humanitarian geographical studies relevant to cultural landscapes beneficial for solving sustainable development goals. Complex spatial structure of cultural landscapes in populated regions, in several cases, promote delusion of “empty spaces”

existence, i.e., landscapes not fashioned by a certain cultural group and thus free for new economic development. It happens when a previous historical background of economic development is unknown or ignored. Involvement of such territories in economic development may cause loss of traditional economy incomes, cultural heritage and socio-economic conflicts [Carstens, 2016, McNeil, 2018, Woons, 2014, Krasovskaya, 2011, etc.] The goal of this study is to reveal the origin of “empty spaces” appearance in the Russian Arctic and demonstrate the importance of cultural landscapes studies to identify and characterize them for the sake of socio-economic stability.

## II. STUDY AREA

Cultural landscape studies were carried out for several decades in the Russian Arctic zone. Case studies described in this paper concerned two regions in the European part of the Russian Arctic zone (fig.1). Their indigenous population includes mainly Saami, Nenets belonging to northern minorities and old-settlers– Pomors– Russian sub-ethnic group. Traditional nature use territories (TTNU) includes reindeer breeding, hunting, fishing, wild plants picking. Nenets family-clan territories are still managed according to ethnic traditions in a certain way adapted to modern life.

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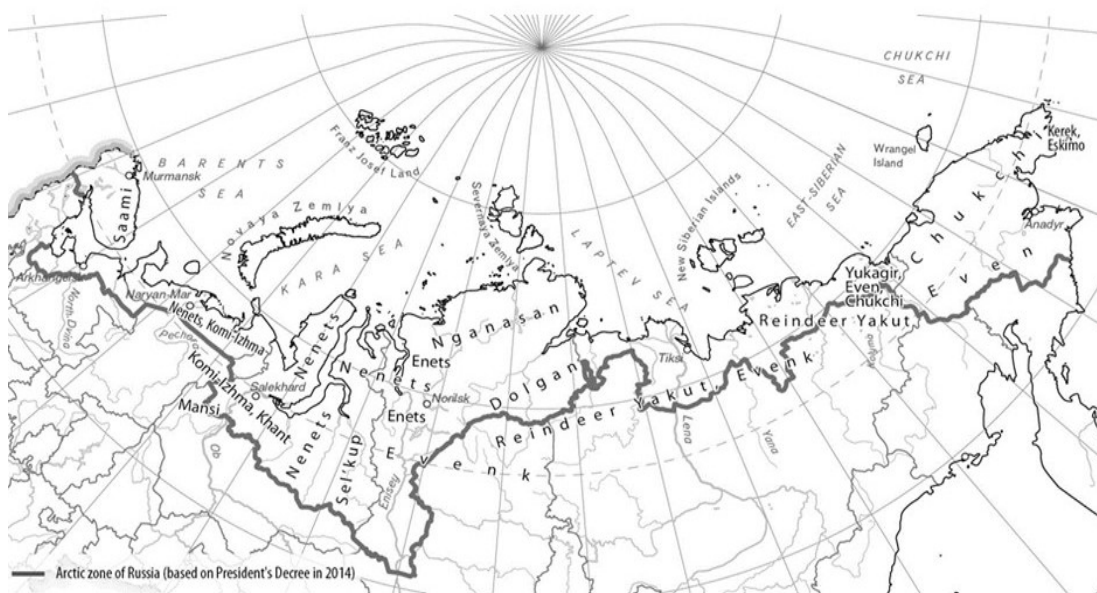


Fig. 1: The Russian Arctic zone and its indigenous population. Case studies territories: 1-Fedorova-Pansky tundra and Babinsky Saami lands, 2-Indiga.

Modern land use types at the studied areas are mainly TTNU and transport. Two areas present parts of the planned zones of advanced economic development; industrial (platinum group ores extraction in Fedorova-Pansky tundra) and transport (the Northern Sea Route port construction in Indiga). New land use patterns may overlap TTNU, thus promoting environment management conflicts development leading to social destabilization.

### III. MATERIALS AND METHODS

Published data supported by our field experiences present materials of this study. The principle investigation method was system analysis.

### IV. RESULTS AND DISCUSSION

#### a) Cultural landscapes composition

A cultural landscape integrated model which reflects the humanitarian-geographical approach includes six components: spiritual culture, local society, local economy, settlement pattern, language system, and natural landscape (fig.2). Their coherent development stimulates mutual adaptation and defines common characteristics of cultural landscapes evolution. Various connections of man and nature are reflected in nature management systems, settling patterns, toponymy, spiritual culture, etc. belonging to local culture.

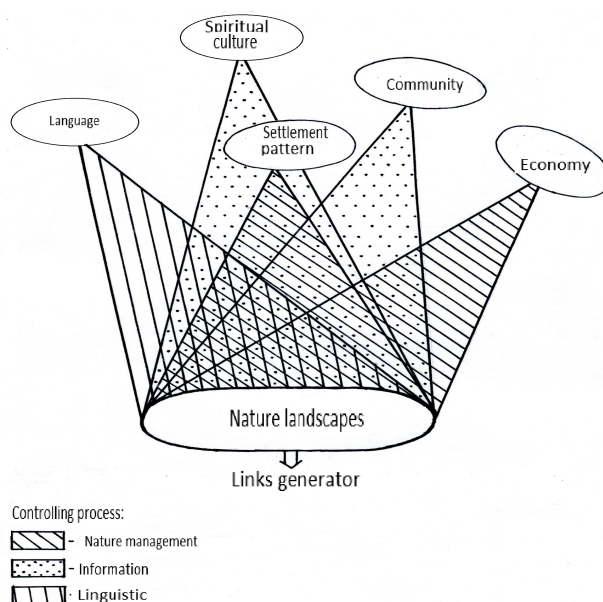


Fig. 2: Correlation links in a cultural landscape and controlling them processes.



Nature management ideology controls methods of natural landscapes economic development.

b) *Cultural landscapes palimpsest*

Cultural landscapes of the Russian Arctic remind a palimpsest where historical spatial fragments are being combined with modern. Very often modern cultural landscapes overlap historical making their existence virtual, known only to the indigenous population. The same happens with different-aged modern cultural landscapes as well, but their virtual variants are known to old-settlers. Different spatial structure, dimensions, and management practice of historical indigenous and modern cultural landscapes explain the present day palimpsest existence.

i. *The historical structure of indigenous cultural landscapes*

Indigenous peoples of the North TTNU represent the initial pattern of cultural landscapes. A similar process was typical for old-settlers- Pomors. Cultural landscapes of indigenous peoples of the North social and spatial structure reflects close connections of culture (spiritual, economic, etc.) and natural environment in the course of nature management (fig.2). Cultural landscapes of indigenous peoples of the North are being visualized in patterns of economic development of a territory preserved till now, their semiotic system, toponomy, and a spatial-temporal characteristics.

These characteristics are as follows [Krasovskaya, 2011]:

- Multi-scale space – the existence of several organizational levels (from a nomadic camp to the entire Arctic);
- Specific “local time” formed by the original cultural, geopolitical, economic environment when local traditional nature management practices and traditional communities appeared;
- Dynamic character: nomadic nuclei centers, patterns of nature management, and seasonal territorial organization of economy;
- A semiotic arrangement that reflects organic unity of man and nature; feeling part of it;
- Low polarization and nature-defined boundaries; and
- Existence of images and symbols formed by regional identity.

Indigenous peoples' historical cultural landscapes occupy the whole region representing multi-scale spatial differentiation: remote territories are often sacral mythological grounds, internal structure boundaries are nature defined traditionally, the indigenous community is a well-developed type of social organization. It controls ethnic mentality, traditions, settling patterns and nature management type. Indigenous cultural landscapes are saturated with symbols and sense almost always invisible to

newcomers. Even more than that, very often, this information is kept secret. Together with natural environment archetypes, cultural landscapes form ideal images known to indigenous population and important to support regional identities. They may be regarded as cultural heritage in our modern world. Loss of cultural landscapes means depletion of the culture of indigenous peoples of the North.

Regarding the structure of indigenous cultural landscapes nowadays one may conclude that all their elements are still being preserved to a certain extent at the territory, but some of them are virtual, known to indigenous population and ethnologists. Fig.3 presents modern Babinsky Saami cultural landscapes map. Their community economy includes reindeer breeding, fishing, and hunting as well as berries harvesting, which form TTNU structure adapted to the environment. Sacral pagan places are still being preserved. There is no more traditional semi-nomadic settling pattern, the language was replaced by Russian, but regional identity exists. This map was compiled using local ecosystems map and manuscript Saami map presenting traditional pattern of reindeer breeding, settlements, sacral places, hunting and fishing grounds, Saami toponomy (ex. “Girvas”- means “reindeer”). This map replaced routine social studies needed for mapping.

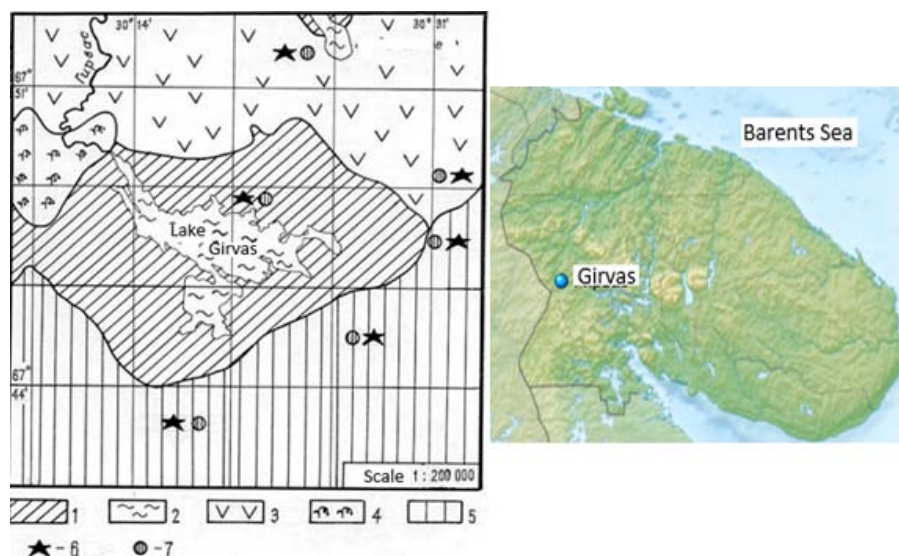


Fig. 3: Cultural landscapes of Babinsky Saami at lake Girvas, Murmansk region.

1- Pasture lands in lacustrine valleys; 2 – lake fishing grounds; 3 Hunting grounds at rolling taiga plains; 4- Berries harvesting grounds at bogged lacustrine and alluvial plains with pine forests; 5 - Combinations of hunting and berries harvesting grounds at hilly taiga plains; 6-sacral places; 7 -settling grounds.

ii. *Modern cultural landscape structure of newsettlers.*

Modern cultural landscapes appeared only at the beginning of the 20<sup>th</sup> c. and were mainly connected with industry development due to rich mineral resources deposits. Newsettlers from Central Russia founded cities, constructed plants, roads, electricity and pipe lines, etc., thus launching radical environmental changes. Newcomers were brought up in a different environment where nature management was based on European cultural canons. They adhere to different from aborigines' world outlook principles (i.e., anthropocentrism); they often do not accept the integrity of aborigine cultural landscapes at TTNU and even ignore their existence treating such lands as virgin. Spatial structure of modern cultural landscapes may be characterized as fragmented and polarized: industrial and transport centers such as Murmansk, Norilsk, Salehard, etc. form core zones surrounded by the anthropogenically transformed environment and vast non-used in modern economy lands.

Thus, sharp contrasts in cultural landscape structure and management are vivid and may provoke nature management conflicts leading to ethnic-social destabilization and cultural heritage loss in case they overlap each other or exist only virtually in the historical memory of the indigenous population.

iii. *Empty spaces in cultural landscapes structure*

Virgin lands for modern developers often appear to be fragments of historical indigenous cultural landscapes. Their different spatial structure and elements belonging to spiritual culture are invisible for

newcomers. Nowadays, cultural landscapes palimpsest includes free spaces connected with the following:

- radical differences in the spatial structure of indigenous and modern cultural landscapes;
- specific "local time" of cultural landscapes formation;
- different perception of space and management ideology;
- inadequate historical and ethnic-cultural knowledge.

These "empty spaces" in modern economic development lead to social destabilization connected with economic losses of indigenous population and violation of their culture. Case studies described below, demonstrate this problem.

*Indiga*

Construction of a new sea port and its infrastructure, enlargement of settling territories will seize TTNU of Nenets and Pomors. Indiga settlement was founded about 100 years ago, but Pomor summer camps appeared there much earlier. Nenets and Pomors cultural landscapes developed in similar natural landscapes (fig.4). Close to traditional economy nature management (reindeer breeding – for Nenets; fishing and hunting – for Pomors) is partly preserved. Their spoken language- Pomor variant of Russian (ex. *Губа-Бай*, but not *Залив* in traditional Russian) and Nenets, local toponomy (ex. "Indiga" means in Nenets "river with fast current" or "misty river"), folklore, traditions (ex. "Reindeer Day" festival) are preserved. A new type of economic development will result in breaking fishing and hunting grounds, reduction of reindeer pastures, thus destroying the traditional economy element of cultural landscapes. Newcomers will compete with the local population for many ecosystems services which pools are limited (table 1, Fig.4). Such activities may lead to natural landscapes degradation, i.e., the basement for cultural landscape may be destroyed.



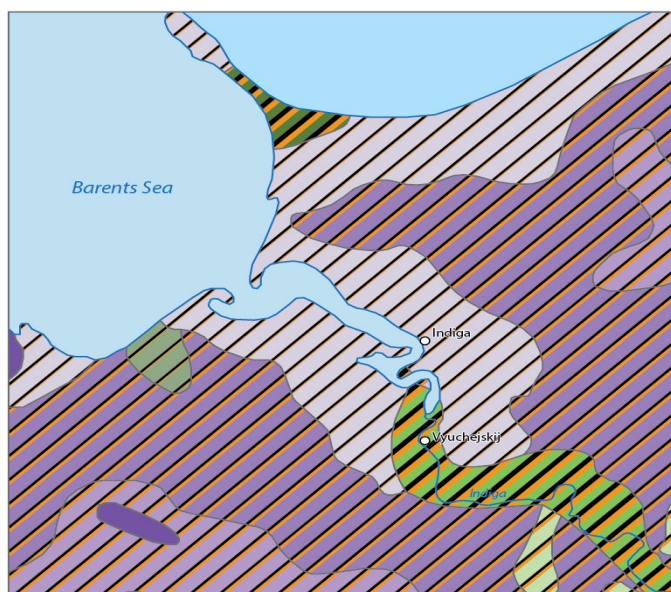
Minor changes began at this territory in 1926 when more than 50 family-clan lands were united in a collective farm. Construction of fish canary followed. But local cultural landscapes experienced no radical changes due to the remoteness of this place. Transit to

a market economy by the end of the 20<sup>th</sup> c. and the economic crisis turned people to their traditional economic activities and lifestyle to survive for many years.

*Table 1:* Competitive relations for ecosystem services exploitation

Ecosystem/ Ecosystem service	Flat bogged marine terraces with tundra	Heightened marine and glacial marine terraces with tundra	Rolling and hilly drained marine plains with tundra	River flood plains with northern taiga	Heightened rolling marine plains with forest- tundra	Low marine terraces with northern taiga	Polygonal tundra peat bogs
Regulating	++	++	++	+++	++	++	++
Provisioning	+	++	++	+++	++	+++	+

The most demanded



#### Landscapes

- Flat bogged marine terraces (second and third levels) with tundra
- Heightened marine and glacial-marine terraces with tundra
- Rolling and gentle hilly drained marine plains (fourth terrace-like level) with tundra
- Heightened dismembered plains on solid pre-Quaternary rocks eluvium and talus with stony tundra
- River flood plains with northern taiga
- Heightened rolling marine plains with forest-tundra
- Low marine terraces with northern taiga
- Polygonal tundra peat bogs

#### Intensity of ecosystems exploitation

- | Regulating |     | Supporting |     |
|------------|-----|------------|-----|
|            | ++  |            | +   |
|            | +++ |            | ++  |
|            |     |            | +++ |

*Fig. 4:* Nature landscapes – donors of competing demands for ecosystem services between indigenous population and new settlers.

Modern economic development pattern will first, change the economic element in cultural landscapes structure; other inevitable changes may be not so vivid. The local population will be involved in the modern economy, disperse among the newcomers and will live in a different cultural background. It is a well-known fact that basic knowledge and skills of the indigenous population are not in demand in the modern economy, thus making it jobless. Local identities are strong enough nowadays but have a chance to preserve only virtual cultural landscapes. No historical studies are being planned, though Pomor population penetrated to these lands as early as in the 18<sup>th</sup> c. from Mezen', established contacts with Nenets, developed cross-cultural communications in different spheres beneficial for both ethnic groups. This nature management and relations patterns present cultural heritage, which needs studies and preservation. Nowadays only the suspension bridge and the old wooden school building

are regarded as cultural heritage. Newcomers may radically change indigenous cultural landscapes destroying their natural basement, spatial organization, community patterns, violate unknown to them symbolic structure. This will provoke nature management conflict of both economic and ethnic-social origin.

#### *Fedorova-Pansky tundra<sup>1</sup>*

The study area is referred to as Saami family-clan lands and presents a typical TTNU in northern taiga natural landscapes. Traditional economy is based on reindeer breeding, fishing, hunting, berries harvesting. The traditional spatial structure includes economically exploited and pagan sacral objects marked by seids (fig.5). Saami language is spoken mainly by the elderly population. Semi-nomadic lifestyle and traditional nature management pattern are being preserved. Thus, the traditional cultural landscape is represented at this territory.



Fig. 5: Saami seid.

The planned platinum group metals extraction and its infrastructure development will occupy about 20 km<sup>2</sup> and overlap TTNU (fig.6).

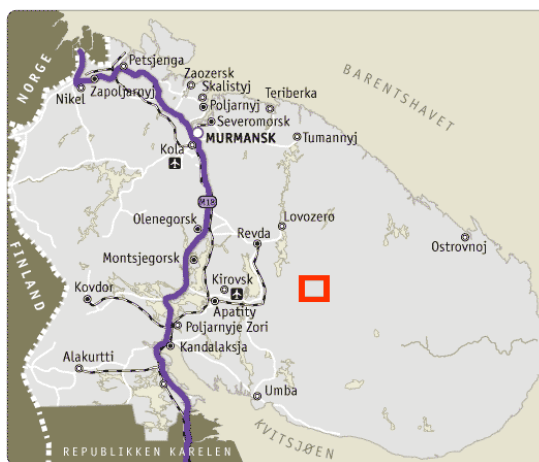


Fig. 6: Fedorova-Pansky tundra future industrial site [www.kolamap.ru]

1. "Tundra" – originates from Finnish "Tunturi" – low mountains.

More than 1000 newcomers will settle at the territory compared to approximately the same total number of Saami rural population in Russia. Ore deposits will be depleted in 20 years. Exploitation period will radically change natural landscapes as it happened in other mining territories of the Kola peninsula-Monchegorsk, Kirovsk, Nickel, etc. Reindeer pastures may experience air pollution load and mechanical disruptions, hunting grounds - reduction of the game because of noise and pollution impact, poaching, etc. During public hearings, Saami stated that this territory belonged to sacral lands not only for the local community. This fact demands a search for a compromise to preserve at least fragments of Saami cultural landscape, keeping in mind that Saami belongs to northern minorities with a shrinking population.

## V. REVEALING AND MAPPING OF CULTURAL LANDSCAPES TO BRIDGE THEIR "GAPS"

The existence of unaltered indigenous cultural landscapes is hardly possible. But even consideration for their fragments may help to preserve indigenous cultural heritage and avoid nature management conflicts. This is also important for improvement of regional nature management planning policies with adequate regard for social-cultural issues. The procedure of revealing and mapping of indigenous cultural landscapes is rather complicated. Firstly historical and ethnological information is needed. It helps to identify different spatial elements of initial cultural landscapes or their virtual boundaries in case they disappeared. When the appropriate database is available, two methods for identification and mapping are possible: traditional (see lake Girvas case above) and with the help of fuzzy classification algorithm [Tikunov, 1997]. This procedure enables one to refer territorial units either to unique categories, or, in the case of their transit character, to several categories with different attributive functions. Clusters of cultural landscapes may be found by expert evaluation of the modelling results. We used this method to compile a small-scale cultural landscapes map for Hanty-Mansi Autonomous Okrug (Federal region) where indigenous peoples of the North live [Krasovskaya, Kotova and Tikunov, 2006].

## VI. CONCLUSION

During the last several decades the legislation on indigenous peoples of the North was formulated in the Russian Federation as a specific multi-sectoral segment. The legislation consists of two blocks of laws and regulations – federal and regional. In some cases regional legislation is more advanced. Indigenous population culture nowadays is regarded in the state Arctic Doctrine as a strategic resource for Russian economy development based on innovations and

knowledge, including the traditional practice of indigenous population nature management. But at the same time priorities are often given to modern industrial and transport nature management. If it concerns TTNU compensatory measures to cover economic losses exist. Lack of adequate knowledge of cultural landscapes palimpsests often make territorial planning procedure free from the preservation of the cultural heritage of the indigenous population and even their natural landscapes which form its ethnic culture. Indigenous cultural landscape studies reveal patterns and methods of sustainable nature management adapted to the Arctic environment. Their modern understanding may benefit the transit to sustainable management practice nowadays. The discussed issues are also of interest for the preservation of historical cultural landscapes of other types (urban, industrial) as cultural heritage.

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## Exploring Vulnerability and Risk Perception: A Case Study of Gwang Khola Watershed, Nepal

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# Exploring Vulnerability and Risk Perception: A Case Study of Gwang Khola Watershed, Nepal

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**Keywords:** natural hazard; landslide susceptibility; flood susceptibility; risk perception; social vulnerability; physical vulnerability.

## I. BACKGROUND

Natural hazard causes enormous damages in the form of human casualties, infrastructure destruction and economic losses and socio-psychological effect at all level in many parts of the world. Nepal is among the 20 most disaster-prone countries in the world and more than 80 percent of the total population of Nepal is at risk from one or another

type of natural hazard (MoHA, 2018). With the fragile geology and topography, the country is highly vulnerable to natural hazards like, earthquake, landslide and flood. During the last 45 years period (1971-2015), occurrence of 3720 flood events, 3012 landslide events and 175 earthquake events have been recorded causing human and physical damages (MoHA, 2016). By the one year period of 2015-2016, number of flood events increased by 230, and 234 more landslide events have been recorded causing increased life and property damages (MoHA, 2018). Natural hazard are spatial phenomena and most are location specific. Chure (Siwalik) region of the country is very fragile and prone to different kind of hazards. The region is classified into different hazard susceptibility zone based on the topography, geology, geo-morphology and climate. More than 34 percent is found to be under the high-susceptible category followed by 41 percent the medium-susceptible category. Similarly, approximately 12% of the total area of the Tarai and Inner Terai lies in the region susceptible to flood and inundation (PCTMCDB, 2017). Risk-informed development and sociologically comprehensive approach for managing disasters are two guiding principles of Disaster Risk Reduction and Management Act of Nepal (MoHA, 2018).

Managing risks rather than managing disasters becomes inherent to the process of development (UNISDR, 2015). Disaster risk reduction and management requires reducing the exposure or vulnerability of communities and assets to hazards through policies, structural measures and planning tools. Managing the underlying risk of disaster is very slow in many countries as it requires understanding of risk and risk management approaches (Zhou et. al., 2016). New risk are generated and accumulated in failing to understand and manage the existing risk. Understanding the frequency, intensity and spatial distribution of hazard events and associated risk augment effective disaster risk reduction and management.

Uncertainty of magnitude and occurrence in space and time makes natural hazard more alarming and hence low risk anticipation and preparedness least prioritized. Risk identification is the first step to disaster risk management for identifying and understanding the scale of problem. Identifying risk and understanding risk perception helps framing and supporting DRM

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policy, mitigation and adaptation strategies. The association between the natural hazard and social vulnerability of local area is emergent natural hazard and disaster analysis issue. Yet, Risk perception tend to be poorly reflected in many social vulnerability indicators (Rufat et. al., 2015).

Increased intensity of monsoon, changes in rainfall pattern and skewed temporal results in hazard like flooding and landslides. Local people in many parts are reliant on and accustomed to traditional/indigenous knowledge and local adaptation practices. However, traditional knowledge and indigenous practices are not yet considered important part of policies for disaster mitigation. Integration of scientific process, along with indigenous, traditional and conventional practices is emphasized for a national and regional policy through a participatory process (Dewan, 2014). Studies on hazard risk perception and understanding exhibit that better understanding ensure knowledge empowerment and effective management to achieve community resilience and sustainability (Rakib et. al., 2017). Public perceptions of risk are equally important as much as technological and scientific risk assessments (Tierney, Lindell and Perry, 2001).

The two major components of vulnerability are physical and social vulnerability to consider while disaster risk management. However, integrated study on physical vulnerability in terms of hazard susceptibility mapping and social vulnerability in terms of hazard and associated risk is less focused, which have direct effect on the disaster risk reduction and adaptation strategy of local people. In this context, the current study is an attempt firstly to assess landslide and flood susceptibility and physical vulnerability of built-up area and to explore the hazard risk perception in terms of type and severity, control factors, exposure and level of risk.

## II. CONCEPT

Risk is regarded as function of hazard, exposure and vulnerability (IBRD, 2014). According to Varnes (1984), risk is referred to as '*the expected number of loss of lives and injuries, damage to property and disruption of economic activity due to a particular damaging phenomenon for a given area and reference period*'. Risk can be quantified as a product of vulnerability for assessing physical loss such as buildings and built up area, amount of the elements at risk and probability of occurrence (van Wasten and van Asch, 2006). Risk perception has been conceptualized as the relationship between risk awareness, worry about risk, and preparedness (Wachinger et. al., 2013).

Vulnerability is defined and understood from various perspectives. Physical vulnerability is associated with geo-physical and locational attributes whereas and social vulnerability is associated with socio-cultural and

economic setting (ADPC, 2010). It describes the characteristics and circumstances of the community (UNISDR, 2015). Spatial analysis tools and GIS are most common tools to analyze physical vulnerability (Brody et. al., 2008). Exposure to hazard is regarded as external side of vulnerability whereas coping capacity and adaptation is regarded as internal side (Bohle, 2001).

Susceptibility is expressed as the potential for hazard occurrence as a function of geo-environmental and morphological controls (Gonçalves and Zezere, 2018). Various approaches are suggested for susceptibility mapping. Three different approaches has been listed for landslide hazard risk zonation, namely, heuristic qualitative approach for small scale, statistical quantitative approaches for medium scale and deterministic approach for detailed studies at large scale (van Westen, 2000). Qualitative/heuristic and statistical and physically based quantitative approaches are most common methods of susceptibility analysis. Spatial distribution of landslides is regarded as the essential element for the analysis regardless of which approach is applied. However, the problem of attempting to quantify landslide risk over larger areas for landslide assessment and hazard zonation is discussed in van Wasten and van Asch (2006).

The relationship between actual and perceived risk is driven by specific types of physical conditions and experiences. The role of place and proximity in shaping the hazard risk perceptions is suggested (Brody et. al., 2008). Bounded rationality, Sense of place and Place attachment is associated to geographic proximity, experience and hazard risk perception (Mishra et. al., 2010). Place attachment contributes to amplifying high probability risks and attenuates the perception of low probability ones (Bernardo, 2013). Four categories of psychological distance namely, spatial, temporal, social, and uncertainty are identified by Spence et al. (2012). Studies show that hazard proximity can influence risk perception among individuals. Studies also show that direct personal experience of damage caused by hazard is one of the most important perceived risk factor.(exposure to hazard). A conceptual framework for the study is developed (Figure 1) based on the aforementioned concepts.

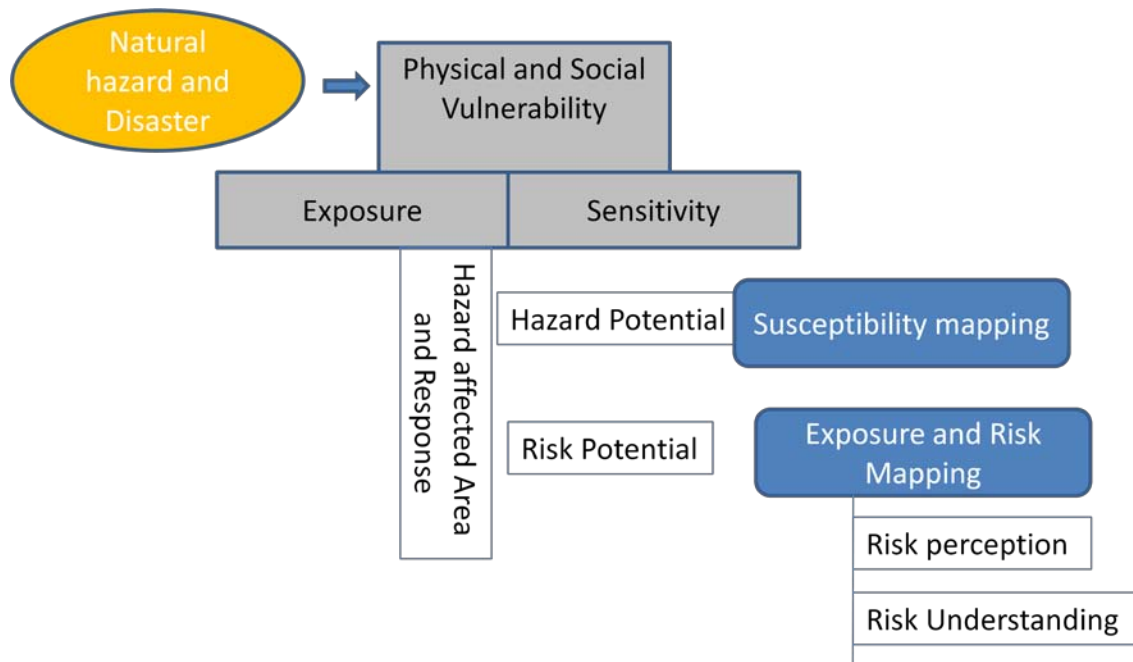


Figure 1: Conceptual framework of the study

### III. DATA AND METHODS

The study is based on a socio-physical research approach and both quantitative and qualitative method has been adopted. Both primary and secondary data sources have been used. The study adopted literature review, GIS based susceptibility mapping and field observation as key methods and tools for landslide and flood hazard risk assessment. Sample household survey using checklist, KIS, FGD and informal discussion and field observation are methods and tool devised to explore risk perception.

#### a) Data and method for hazard risk susceptibility (Physical Vulnerability)

GIS tool is used for mapping landslide and flood susceptibility. Spatial data layers used for

landslide susceptibility include: existing landslides, slope, aspect, geology, soil type, drainage density, distance, land use, historical records. Spatial data layers used for flood susceptibility include: Slope, distance to drainage, Land use, geomorphology, historical records. Spatial data sources include digital topographical data sets from Survey Department, Nepal, Google Earth platform images and field observation.

Susceptibility mapping was based on multi criteria evaluation with density based weighted index suggested by van Westen et. al. (1997) and calculated using Equation 1. Landslide and flood susceptibility was assessed and validated using a bi-variate statistical method. 30\*30 meter grid is used as spatial mapping unit for landslide and flood susceptibility analysis.

$$LSI = \sum_{i=1}^N W_i \quad \text{Where, } W_i = \ln \frac{\frac{L_i}{A_i}}{\frac{\sum L_i}{\sum A_i}}$$

Equation 1

i.e.  $W_i$  = (Density class/Density map) where,  
 $W_i$  = Weight assigned to certain parameters class.  
 Density Class = the landslide density within the parameter class.  
 Density Map = the landslide density within the entire map.  
 $L_i$  = Area, which contain landslide, in a certain parameter class.  
 $A_i$  = Total area, in a certain parameter class.



b) *Data and method for Risk Perception Analysis (Social Vulnerability)*

The purposive random sampling was used for sample household selection in order to analyze the risk perception. Total of 60 household was selected for risk perception analysis 5 from each ward for all six stratified classes. Distribution of sample household is shown in Table 1. The sample was stratified into three groups low, moderate and high risk zone by wards for each hazard

type. Household sample is selected from each which consist the highest percentage of area coverage in terms of susceptibility class. To determine the household location, building location information for each respondent that was collected from GIS database and located in the field. This GIS database of building allowed to locate the geographic coordinates (latitude/longitude), geospatially locate each sampled household.

*Table 1:* Household sample selection for risk perception analysis

Ward	Landslide susceptible zone			Flood susceptible zone		
	High	Moderate	Low	High	Moderate	Low
2			*****			*****
4	*****				*****	
5		*****		*****		
6			*****			*****
7	*****				*****	
11		*****		*****		

The respondents were asked to indicate the occurrence and extent of risk of three hazard types namely: earthquake, flooding and landslides based on a three-point Likert scale. Data and information on vulnerability, exposure and geographic proximity, awareness and knowledge also collected through standard checklist. Besides, 2 key informant who have direct experience of hazard event from each ward were interviewed. Three focus group discussion, FGD was carried out with mixed group of 8 to 10 people in public open space. Informal discussion was also carried out with local ward representatives.

#### IV. STUDY AREA

Gwang Khola, flowing from north to south, is one of the major river of the Kamalamai municipality, Sindhuli district of Nepal (Figure, 1). It joins Kamala river in the south which is the biggest river of the district. Gwang Khola watershed is selected as study area which lies within Kamalamai municipality and accounts the total area of 95.9 Km<sup>2</sup>. Elevation range from 402 to 1595 meter from mean sea level. The watershed has mountainous area crossed by rugged topography with large flood plain towards south. The study area embraces the low hills of inner Churia range (Siwaliks) in the south and Mahabharat range (Lesser Himalaya) in the north composed of younger Cenozoic dominant sedimentary rocks. The climatic condition slightly varies with the topography and elevation. The lower flood plain and Chure area has warm summer and dry winter, while the northern high elevation area has warm summer and dry cool winter. The average precipitation is about 2330 mm. per year, which is greater than national average. The highest rainfall is during four months

(June-September) of monsoon season which causes water induced hazards like landslide and floods in the watershed.

The forest coverage comprises 60 percent of the total watershed. It is followed by cultivation area comprising 29.4 percent. Built-up area constitute only 3.58 percent of the watershed including tiny commercial and institutional area. The spatial coverage of built-up area and population density accounts low level of urbanization in comparison to other parts of the country. The watershed comprises part of six wards of the municipality covering 20 percent of total municipal area. Dense built-up of the municipality is confined to Gwang Khola flood plain which is largest of the municipality. Of the total built-up area of the municipality (8.6Km<sup>2</sup>) 41.6 percent (3.58 km<sup>2</sup>) built-up falls within this watershed. Population density of the watershed is 212 person per Km<sup>2</sup>. Ward number 6 which falls completely within the watershed has the highest population (8976) of the municipality and smallest area (5.9 Km<sup>2</sup>) with 1521 person per Km<sup>2</sup> (DDC Sindhuli, 2018).

In terms of natural hazards, earthquake, landslide and flood are three major hazards risk of the watershed. According to hazard risk assessment report (GoN, ADPC, NGI and CECI, 2010) earthquake hazard risk is high for 100 year return period and moderate for 50 year return period. Ninety-seven percent of the household is exposed to moderate to high earthquake risk. The area will experience the seismic intensity of VI (Strong: slight damage) and VII (Very strong: slight to moderate damage). Flood risk is of greater than 2m depth for 10 year return period. Similarly, risk of earthquake triggered hazard very high and precipitation triggered landslide hazard risk is moderate to high.

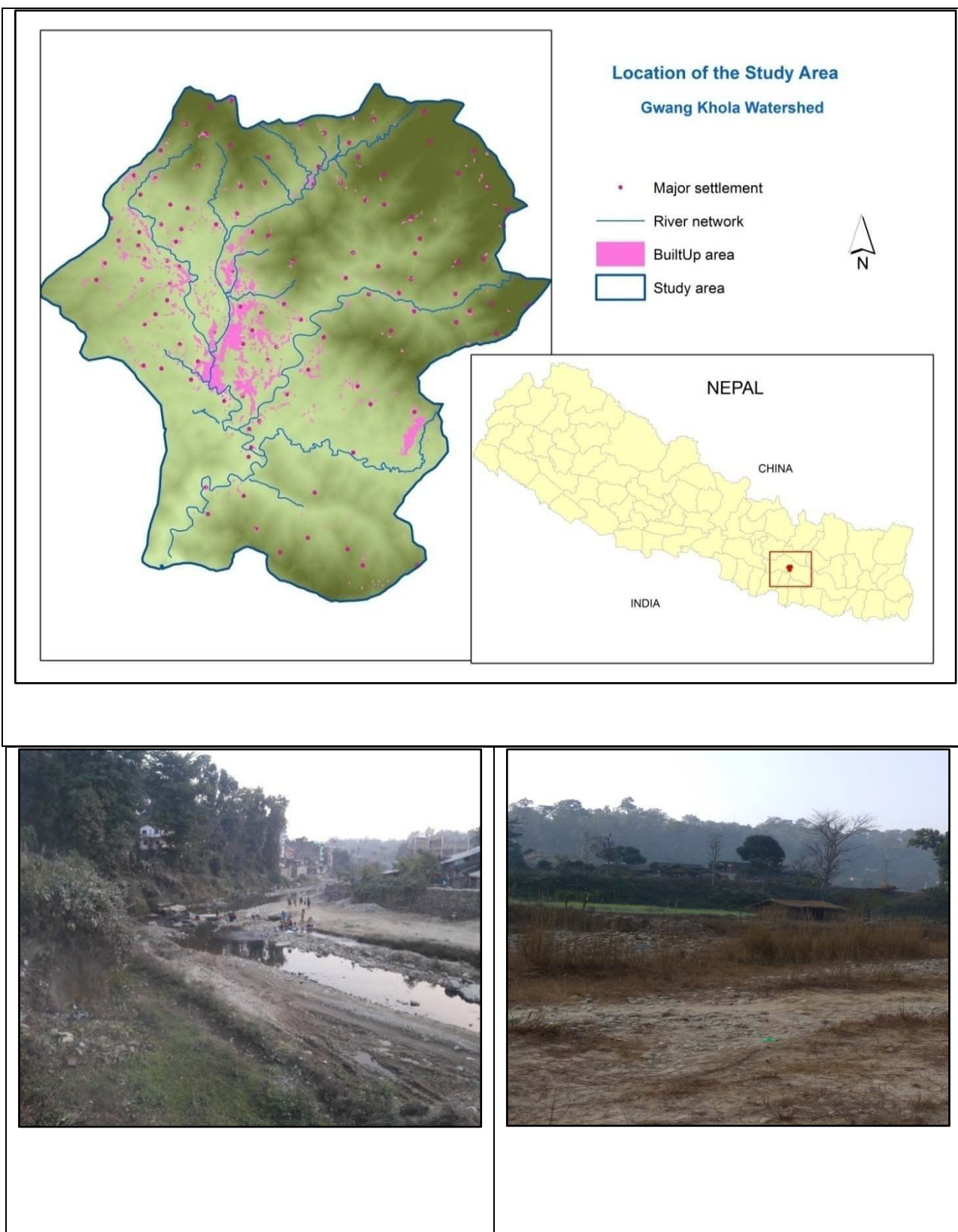


Figure 2: Location of the study area

## V. RESULT AND DISCUSSION

### a) *Physical Vulnerability: Landslide and Flood Susceptibility*

Physical vulnerability was assessed in terms of landslide and flood susceptibility and exposure of built-up and settlement area to different hazard risk zone.

Landslide susceptibility is high in the northern sloping terrains (Figure 3). Of the total watershed, 22 percent area is under high landslide susceptibility. Moderate and low susceptibility account respectively around 39 and 38 percent of the watershed area.

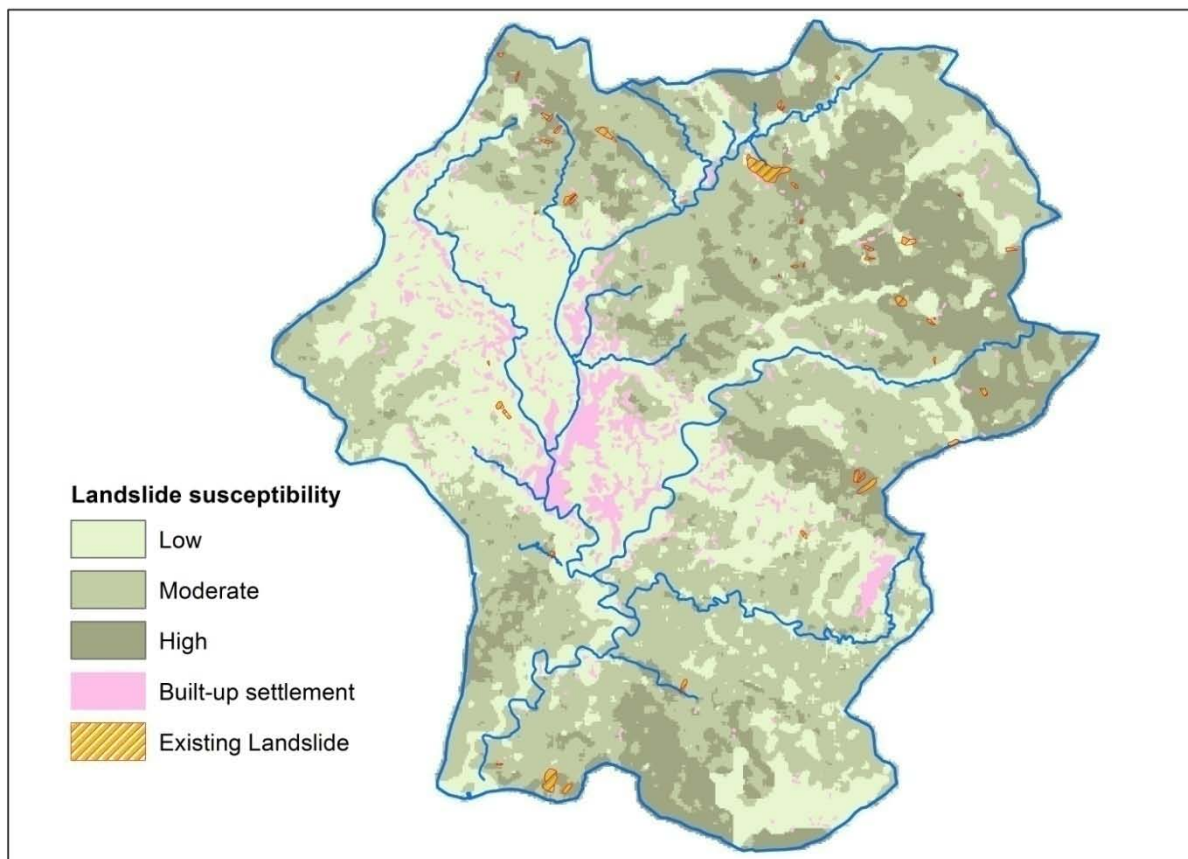


Figure 3: Spatial distribution of Landslide hazard susceptibility

Assessment of exposure of existing built-up show that among total number of buildings (10998), six percent of the existing building (660) are located in high risk zone making them vulnerable to disaster. Thirty-six percent residential building is at risk of moderate and high risk zone. Most of the critical services like health, security and communication are located in low hazard risk zone. Though six percent of the existing building are located in high risk zone, the traditional practice of constructing building on level terraces in most cases show consideration of risk factors by the local people. Spatial distribution of built-up area and landslide susceptibility is detailed in Figure 4. Four percent of the built-up area is exposed to high landslide hazard risk.

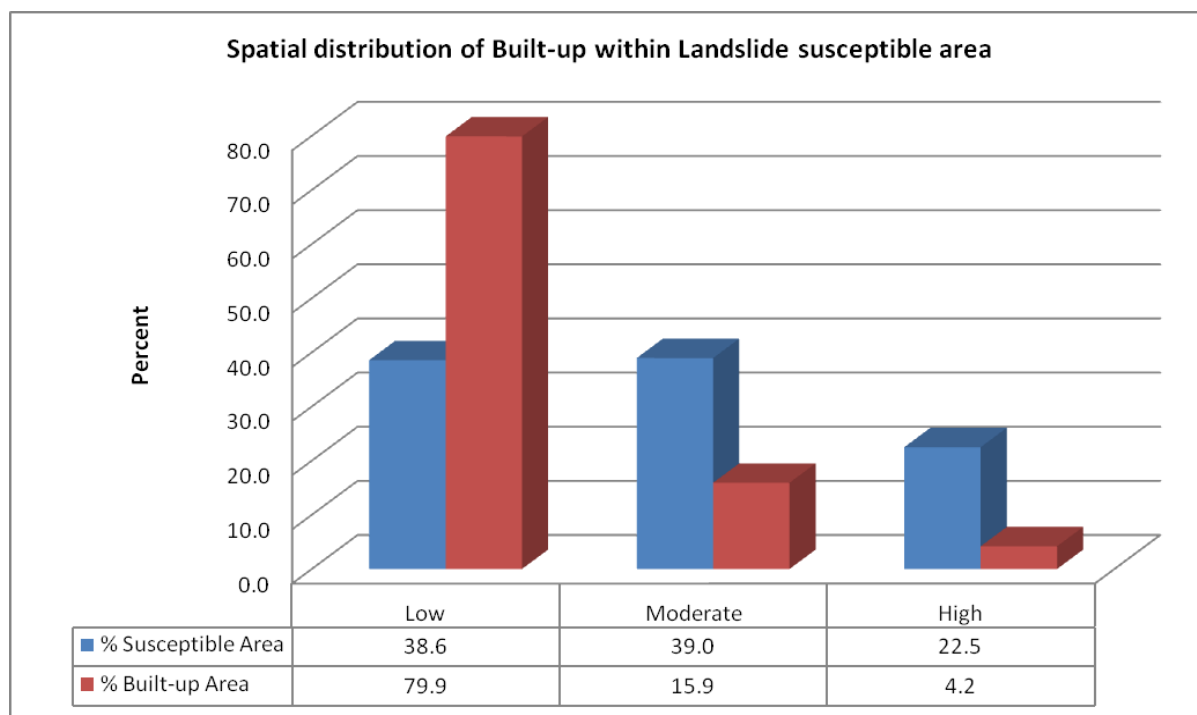


Figure 4: Exposure of built-up area within landslide susceptibility

#### b) Flood Hazard

Flash flood is the most common type of disaster that residents this watershed come across. Flooding history of the watershed show that Gwang Khola has the highest frequency of flood event and the highest flood record is of July 1993 which caused the heavy damage. Flood susceptibility is assessed across 250 meter of the

river and stream. Flood susceptibility is high in the southern flood plain and patches of eastern and northern part of the watershed (Figure 5). Of the total watershed, 41 percent area is under high susceptibility. Moderate and low susceptibility account respectively around 43 and approximately 16 percent of the watershed area.

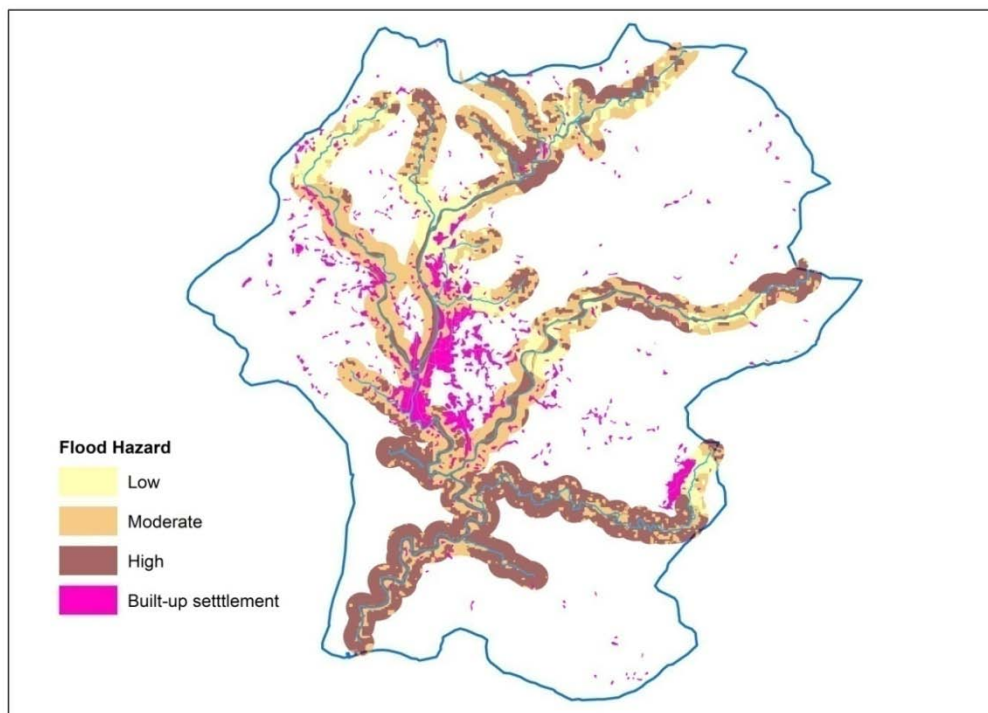


Figure 5: Spatial distribution of Flood hazard susceptibility



Assessment of exposure of existing built-up show that among total number of buildings(5359) within flood hazard risk zone of 250 meters, 5.5 percent of the existing building (298) are located in high risk zone making them vulnerable to disaster. Fifty-seven percent residential building is at risk of moderate risk zone. Most of the critical services like health, security and communication are located in low and moderate hazard

risk zone. Though around 6 percent of the existing building are located in high risk zone, the traditional practice of constructing building in elevated surface is consideration of risk factors by the local people. Spatial distribution of built-up area and flood susceptibility is detailed in Figure 6. More than 8 percent of the built-up area is exposed to high flood hazard risk and more than 68 percent is exposed to moderate flood risk.

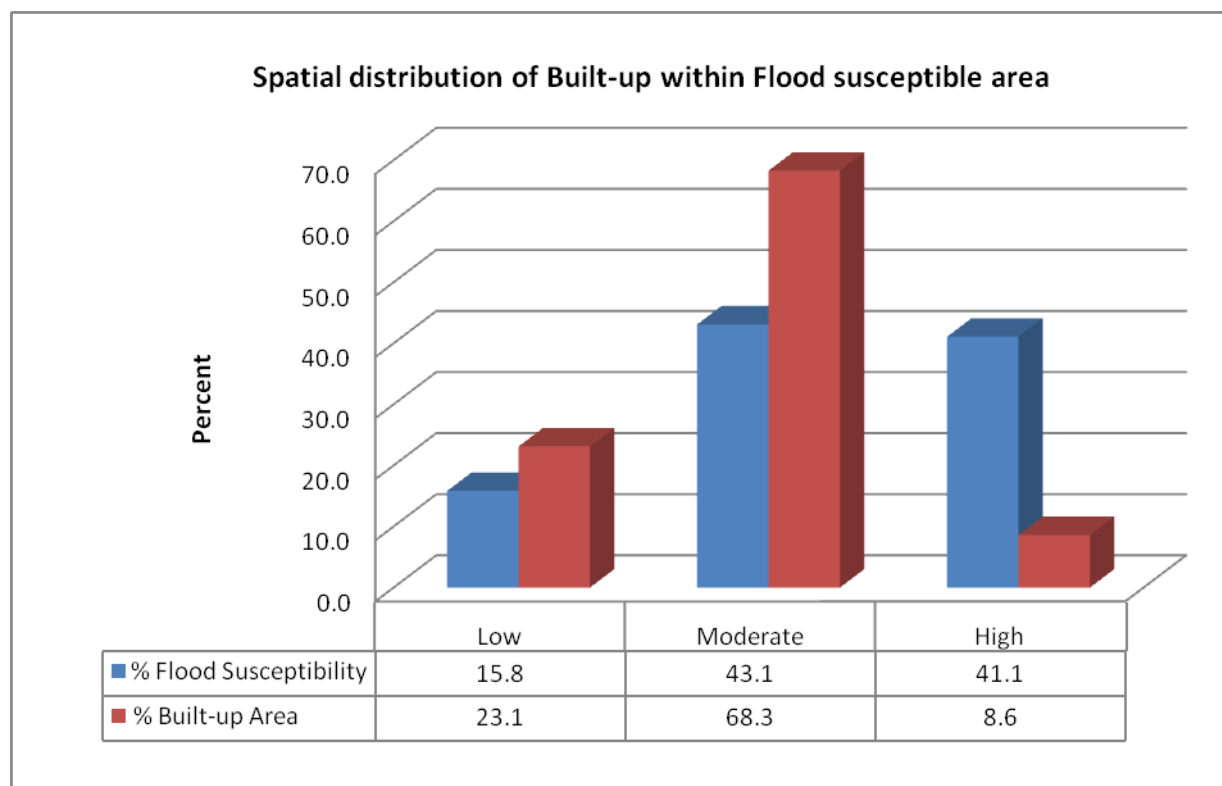


Figure 6: Exposure of built-up area within flood susceptibility

While comparing landslide and flood susceptibility in the watershed, study found that high flood susceptibility is dominant covering 41 percent in comparison to landslide susceptibility with 22 percent of the total watershed area. Exposure of the built-up is also high in flood susceptible area because most of the built-up settlements are confined to flood plain area due to service and infrastructure accessibility and low cost of building construction. The results show that 12.8 percent population resides and 958 buildings exist in the area of the watershed where potential landslide or flood would occur.

### c) Social Vulnerability: Risk Perception and Understanding

#### i Perception on occurrence and risk severity

Due to intensity and relatively recent experience of earthquake event that took place in 2015, landslide and flood hazard risk is perceived as less destructive (Figure 7). Landslide and flood are perceived as regular phenomena and accepted as

habitual to everyday life. Landslide and flood hazard events are perceived as location specific and possibility of temporal prediction of occurrence and hence regarded as less damaging. However, magnitude of both hazard risk is perceived as uncertain though people believe that intensity and duration of rainfall help them to predict magnitude of flood and landslide hazard risk to some extent.

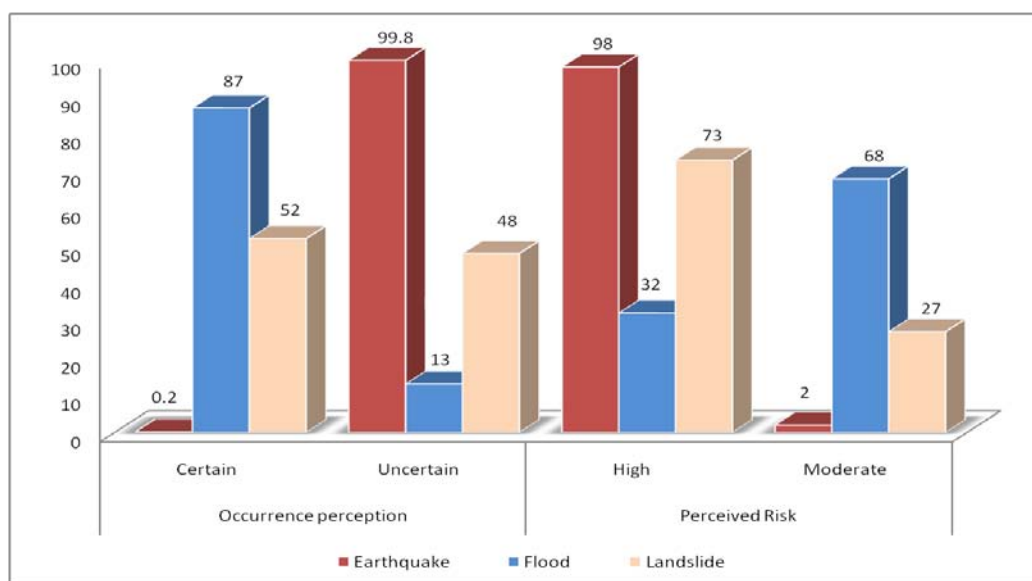


Figure 7: Perception on hazard occurrence and risk level (in %)

The respondents believe that frequency and risk of flood is high in Terai (southern plain of the country) and has caused most damage. Landslide is perceived less frequent than flood but causes more damage in the hill and mountain area due to steep slope and road construction.

ii *Geographic proximity and vulnerability perception*

Perception on physical and social vulnerability is examined across geographic proximity of

respondents to landslide and flood hazard risk zone. Physical vulnerability is explored in terms of built-up area, building and human loss whereas social vulnerability is explored in terms of understanding, capacity and preparedness. Physical vulnerability is perceived as dominant risk, irrespective of the geographic proximity of the respondents to hazard risk zone (Figure 8).

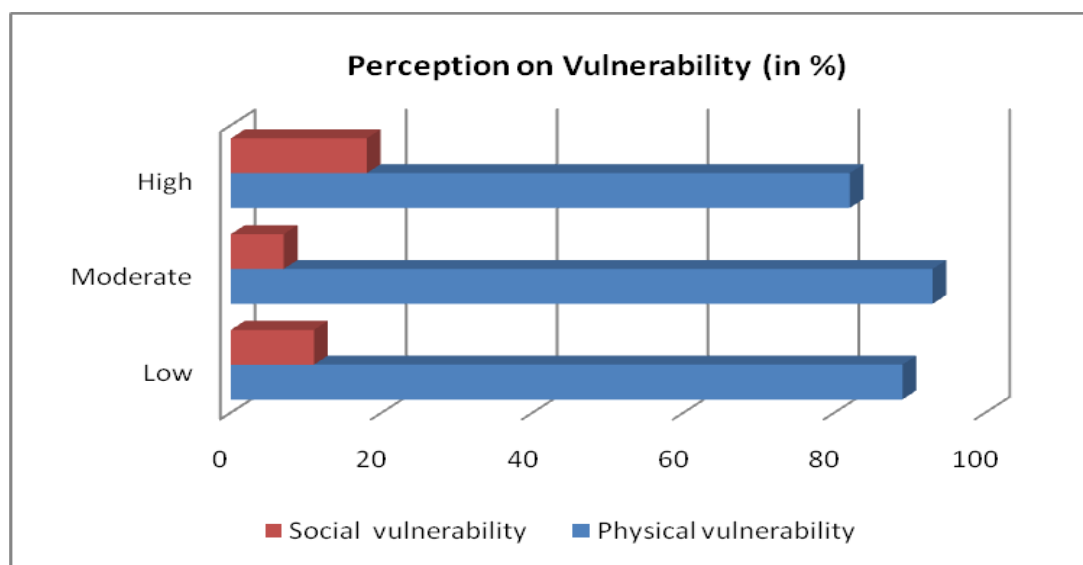


Figure 8: Perception on vulnerability

However, respondents who reside proximately to high hazard risk zone anticipated social vulnerability in comparison to those who reside further to high hazard risk zone. People residing in low hazard risk zone anticipated social vulnerability in contrast to people residing in moderate hazard risk zone.

When geographic proximity and hazard specific perception is considered, variable perception is revealed. Those who are within high hazard risk zone of flood expected that they are exposed whereas in case of landslide exposure it was not alike (Figure, 9). Similarity is found in case of potential risk anticipation.

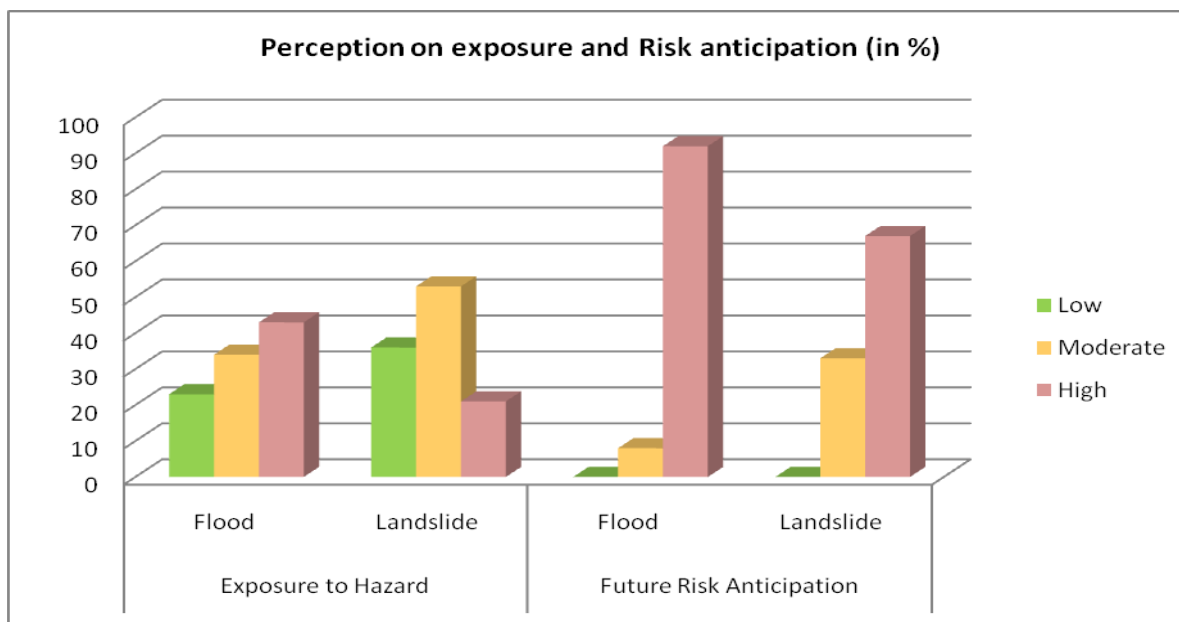


Figure 9: Perception on exposure and risk anticipation

### iii Experience, Knowledge and awareness

Knowledge and awareness is explored based on individual's direct experience to hazard event. The result reveal that knowledge and awareness regarding exposure and control factor is high among those who have directly experienced the hazard event. Human activities and response is regarded as major controlling factor by those who have experienced the hazard event (Figure 10). Agricultural practices and construction on marginal land encroachment and exploitation of natural

resource is identified as major determinant among human control factor whereas topography is considered as major physical controlling factor for flood and landslide hazard events. Risk management and preparedness for potential hazard risk is least admitted even by those who have direct individual experience. Uncertainty of the occurrence of hazard event in particular case of landslide is determinant for preparedness.

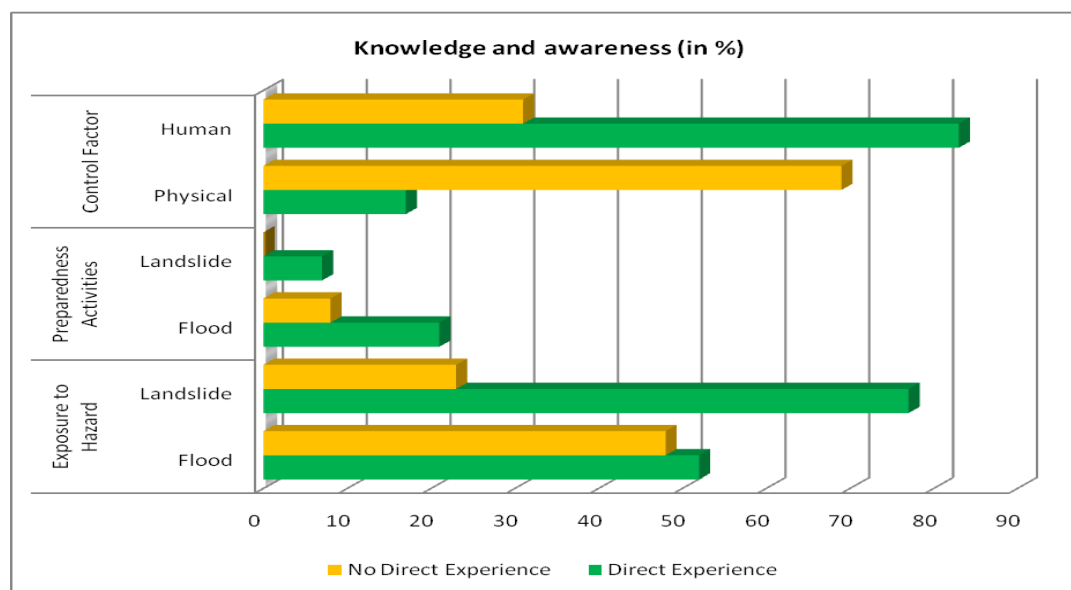


Figure 10: Experience, knowledge and awareness

When structural activities and governance is considered as preparedness and local tax for disaster preparedness considered, local people resist on paying tax as support for disaster risk management to the local

authority. But they accepted on community funding for the preparedness. Trust towards the authority and attitude over knowledge and awareness is dominant in risk preparedness and anticipation.

## VI. DISCUSSION

### a) Knowledge and preparedness

The most damaging hazard regarding affected household in last 45 years in Nepal is flood affecting more than 3 million households. But earthquake is perceived as the most destructive hazard regarding life and property. Forest fire and epidemic are causing more human casualties than earthquake (MoHA, 2018). Natural hazard is perceived as *Daivi Prakop* (Act of God) uncertain, can't be controlled and avoided particularly in case of earthquakes which cannot be predicted. Wachinger and Renn (2010) also found that occurrence of natural hazard can't be prevented and blamed and hence has higher risk perception. In contrast to the finding of current study, technological hazard is perceived more risky than natural hazard in Italy (Salvati et. al, 2014). Studies show that there is significant spatial variation in disaster history in Nepal and localized small-scale disasters collectively are having a greater impact upon society in terms of casualties than national large-scale disasters (Aryal, 2012). However, location specific small scale disaster and casualties are not considered by people while risk perception. It is evident that knowledge in terms of risk perception is localized.

The role of media and local organizations in understanding risk, creating awareness on preparedness is acknowledged though the role of individual household and community are key for implementing the preparedness to reduce disaster loss (Maharjan and Shrestha, 2017). Regardless of the intensity and level of vulnerability, actual damage varies with the adopted mitigation measures and local adaptation capacity to reduce its vulnerability (Walton, 2014). Trust towards the authority and personal attitude surpass knowledge and awareness in case of risk preparedness (Wachinger et. al., 2013, Salvati et. al., 2014).

### b) Experience

Risk perception is higher among people having direct personal experiences (Maharjan and Shrestha, 2017; Wachinger et al., 2013) People's risk acceptance and preparedness is determined by direct event experience in contrast to risk perception of potential disaster. However, risk perception of low severity and rare experienced events is lower which may overlook the preparedness and misjudge the ability to cope.

The relationship between actual and perceived risk is driven by specific types of physical conditions and experiences. it is also hypothesized that if people have greater sense of efficacy and affiliation with the social network, people will perceive a greater risk (Brody et. al., 2008). Perceived risk of the rare events is low and ephemeral. Culture and social environment modulate the perception of hazard risk and action towards preparedness. Information received by

individual or group from different sources also reshapes the risk perception and action towards risk management (Maharjan and Shrestha, 2017). Preparedness over awareness should be hence emphasized to minimize the risk. Similarly, risk assessment tools and mitigation measures is important for reducing risk (Maharjan and Shrestha, 2018).

### c) Geographic Proximity

Most of the research studies have considered role of socio-economic and demographic variables such as age, gender, income, education etc. for perception analysis. Study also reveal that there is an association between cultural belief and sense of place of communities to low risk of awareness and preparedness (Donovan et. al., 2012). Why people resides in the hazard risk area is one of the important underlying social factor imbedded with sense of place and place attachment which shapes the hazard risk management and response system (Askman et.al., 2018). General understanding is that people living closer to hazard risk will be more familiar and possibly more concerned with its severity. Studies also show that location specific physical vulnerability has influence on risk perception (Brody, Highfield, and Alston, 2004). Number of studies have confirmed the direct relationship between proximity and risk perception and identified proximity as determinant factor (Askman et.al., 2018; Arias, et. al., 2017; Lindell and Hwang, 2008). Integration of proximity-based variables such as distance with socioeconomic and demographic variables assist in explaining location based environmental perceptions (Brody et. al., 2004). Attitudes toward and decisions about environmental risk is also associated to importance of place and proximity. Study found that persons residing in higher-risk areas express higher levels of environmental concern, even when adjusting for subjective values (Drori and Yuchtman-Yar's, 2002) Another study found that the greater the distance between the participant's residence (household) and the waterfront, the lower the perceived risk (Arias et. al., 2017). In contrast, other studies have showed that there is no direct relationship and socio-economic and demographic factors controls the proximity Arlikatti et. al., 2006). The current study result showed no significant relationship between geographic proximity and risk perception, regardless of the area of residence of the participant. The contradictory findings is because of different local understanding and ability to understand risk. This is again dependent on the socio-cultural environment one is conditioned and the structural and governance inputs (Lindell and Perry, 2012).

### d) Overall Vulnerability and Risk perception

The tendency of researchers is to focus much on the already built environment with visible past destruction, and less on the social and economic



vulnerability of the city areas at risk and their spatial association. Focus on physical vulnerability according is largely because of lacking comparability and consistency of census data to address social vulnerability dimensions (Armas and Gavris, 2016). Several research have suggested that higher the levels of risk higher the probability or preparedness (Miceli et. al., 2008). Whereas other studies show that people accustomed to occurrence of hazard perceive hazard risk lightly overestimate the personal capacity and ability to control hazard risk (Sjoberg, 2000). In some cases, a higher perception of risk does not necessarily imply a greater preparedness and mitigation actions (Siegrist and Gutscher, 2006).

## VII. CONCLUSION

The study concludes that proximity to hazard event location, magnitude of hazard and repetitive occurrence are determining factors on the intensity of risk perception. Decision to live in a high-risk area is associated with sense of place and place attachment. The relevance of the findings is for understanding risk for community preparedness and resilience in increasing urbanization context. Hazard risk with frequent and similar probability of reoccurrence with similar consequences are perceived as less destructive. Individual risk perception varies with the type of hazard, context and geographic setting. Preparedness is attributed to personal attitude over knowledge, experience and awareness. The study concludes that the findings of the research is relevant to community preparedness planning and resilience in increasing urbanization context.

## ACKNOWLEDGEMENT

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## Women in Artisanal and Small-Scale Mining in the Adansi North District, Ghana

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**Abstract-** In recent times, issues concerning women involvement in small-scale economic activities and reasons for their participation have become topical. In most cases women are regarded as weaker organisms and therefore not capable of partaking in activities that require more energy to undertake. This paper examines the role of women in the artisanal and small-scale mining and how the activity has improved their living conditions. The study was underpinned by the sustainable livelihood framework and employed the qualitative research approach in drawing data from a sample of twenty female miners randomly chosen from four mine sites which were selected purposively. Besides, some family members of the female miners, officers from the mining companies and an official each from the District Assembly and Minerals Commission were sampled for the qualitative survey.

**Keywords:** *artisanal and small-scale mining (ASM), qualitative approach, women empowerment, quality of life, Adansi North District, Ghana.*

**GJHSS-B Classification:** FOR Code: 840299



*Strictly as per the compliance and regulations of:*





# Women in Artisanal and Small-Scale Mining in the Adansi North District, Ghana

Buor, D<sup>α</sup> & Ayim, G.<sup>σ</sup>

**Abstract** In recent times, issues concerning women involvement in small-scale economic activities and reasons for their participation have become topical. In most cases women are regarded as weaker organisms and therefore not capable of partaking in activities that require more energy to undertake. This paper examines the role of women in the artisanal and small-scale mining and how the activity has improved their living conditions. The study was underpinned by the sustainable livelihood framework and employed the qualitative research approach in drawing data from a sample of twenty female miners randomly chosen from four mine sites which were selected purposively. Besides, some family members of the female miners, officers from the mining companies and an official each from the District Assembly and Minerals Commission were sampled for the qualitative survey. Data were analyzed thematically using the manual approach. Results show that the quality of life of female miners, who are comfortable with the occupation despite its hazardous and energy sapping nature, has improved significantly. They have been empowered through the activity, evidenced by their ability to secure fixed assets, provision of nutritious meals and better housing, educate their children, contribute to the family budget and community development and participate in family and community decision-making processes. The occupation holds some risks for the woman including health hazards. Recommendations have been made to ameliorate the risks they face, improve their working conditions, among others. The sustainable livelihood framework has been vindicated.

**Keywords:** artisanal and small-scale mining (ASM), qualitative approach, women empowerment, quality of life, Adansi North District, Ghana.

## 1. INTRODUCTION

In recent years, the artisanal and small-scale mining (ASM) industry has witnessed significant growth all over the world, mostly in remote rural areas of developing countries. In most parts of the world, ASM operations are as relevant as large-scale mining, especially in the case of the number of people who partake in it. Statistics show that an estimated 40.5 million people are directly engaged in small scale mining and about 150 million directly involved in the activity (Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF), 2017). Various scholars have different means by which they define ASM in a comprehensive manner. In a broader

sense, ASM may be referred to as extractive activity undertaken by a person, a large number of persons, and people related or in business which is done manually with less or minimal mechanism, and mostly part of the informal unit of the economy (Hentschel et al., 2002; Villegas et al., 2012). ASM operators are normally independent and work with their personal hand tools and resources (International Finance Corporation 2008). "ASM is regarded by some as dirty, risky, turbulent and therefore should be disregarded whilst others regard it to be beneficial, fruitful and means to move the poor out of marginalization" (Telmer and Viegas, 2009). It is estimated that, at least 20 million people engage in ASM whilst other people numbering about a hundred million are dependent on it as a means of livelihood (World Bank, 2008; Hruschka and Echavarri 'a, 2011).

Although accurate figures are difficult to come by, Hilson (2002) suggests that women could represent roughly one third of the ASM sector, and notes that in several countries such as Guinea, women participation is greater than men. They make up 75% of workers involved in artisanal and small-scale mining, while in countries such as Mali and Zimbabwe women's involvement is around 50%. ASM is mainly an informal economic unit in Third World countries which give out employment to a large proportion of marginalized women in the productive sector. This view is backed by evidence from the colonial era, where oral histories have it that marginalized women had played an active role in the early mines and labored together with men (Gier and Mercier 2006). Blacksmith Institute (2011) also stipulates that, most women involved in artisanal and small-scale mining can be found among the economically and socially marginalized and therefore resort to mining to turn away from unemployment, abject poverty, marginalization and landlessness.

Furthermore, most studies are also concerned with the task of unraveling the understanding of the complex social, environmental and economic effects of mining in local societies (Bech et al., 1997; Earthworks and Oxfam America, 2004; Kitula, 2006; Childs, 2008; Bebbington and Williams, 2008; Owusu-Koranteng, 2008; Carrington et al., 2010; Tsuma, 2010; Barreto, 2011; Earthworks and Mining Watch Canada, 2012; Obeng-Odoom, 2012) and searching into the stages of environmental impact assessments, free and informed prior consent, and community consultations (Whiteman

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and Mamen, 2002; Whitmore, 2006; Macintyre, 2007; Li, 2009). Research has further focused on ASM, as generating as much as one-third of the world's mercury pollution and loss of forest cover caused by the sector's failure to reclaim the lands used (Akabzaa, 2004; Swain et al., 2007; Akabzaa, et al., 2007). However, the reasons why women involve in ASM, impacts of ASM on the empowerment of women have remained unattended to from most of these accounts. Where issues of women participation in ASM are discussed, they are mostly in relation to pollution, health issues and economic impact, among others.

In Africa, the role and participation of women in ASM is crucial, although not so much attention has been given to it. In many mineral-rich countries in Africa, movement towards ASM is believed to have occurred since the 1980s (Hilson, 2010). On the other hand, an understanding of the factors that push women to involve in ASM in Africa, calls for further studies. Researchers have identified that, the proportion of female participants in ASM in Africa is greater across the globe between 40% and 50%. In some regions, women involved in ASM account for about sixty to hundred percent (ILO, 1999; Amutabi and Lutta-Mukhebi, 2001). Unfortunately, cultural barriers and taboos have tended to exclude women from the mining industry (Verbrugge, 2017).

Women involvement in ASM could ensure their empowerment as epitomized in the work of Kabeer (1999) who refers to it as increase in one's ability to strategically make choices in life with regard to rights previously denied. He refers to the need for gender equality in ensuring their empowerment. Kabeer and Mbewe (In Malhotra et al. 2002) refer to the empowerment of women as means by which women come together to improve themselves and fight against subordination. The study is carried within the framework of the sustainable livelihoods as modified by Kranz (2001) and McLeod (2001). The livelihoods comprise capabilities, assets and activities required for a means of living (Chambers and Conway (1992). The assets are natural capital, physical capital, human capital, social capital and financial capital. McLeod includes institutional knowledge and political capital. This approach offers a conceptual framework for sustainable poverty reduction. This study, among other objectives explores whether women could be empowered, involving in ASM, in the Adansi North District of Ghana using the sustainable livelihood framework as a guiding model.

The paper is structured into five sections. Section one examines the demographic characteristics of women in ASM whilst section two discusses the activities women in ASM engage in. Section three discusses factors that drive women in ASM, with section 4 delving into benefits women in ASM derive from the activity. The final section, section five, discusses obstacles to engagement of women in ASM.

## II. METHODOLOGY AND PROFILE OF STUDY AREA

This paper is based on data on Small-Scale Mining and Empowerment of Women in the Adansi North District of Ghana. Data were collected in September 2016. The paper uses the qualitative design to explore the experiences of women in artisanal and small-scale mining in a rural district in Ghana. This paper adopted the qualitative method and the cross-sectional design. The design enabled the researcher to collect data from respondents whereas the qualitative method helped in an in-depth understanding of the issues.

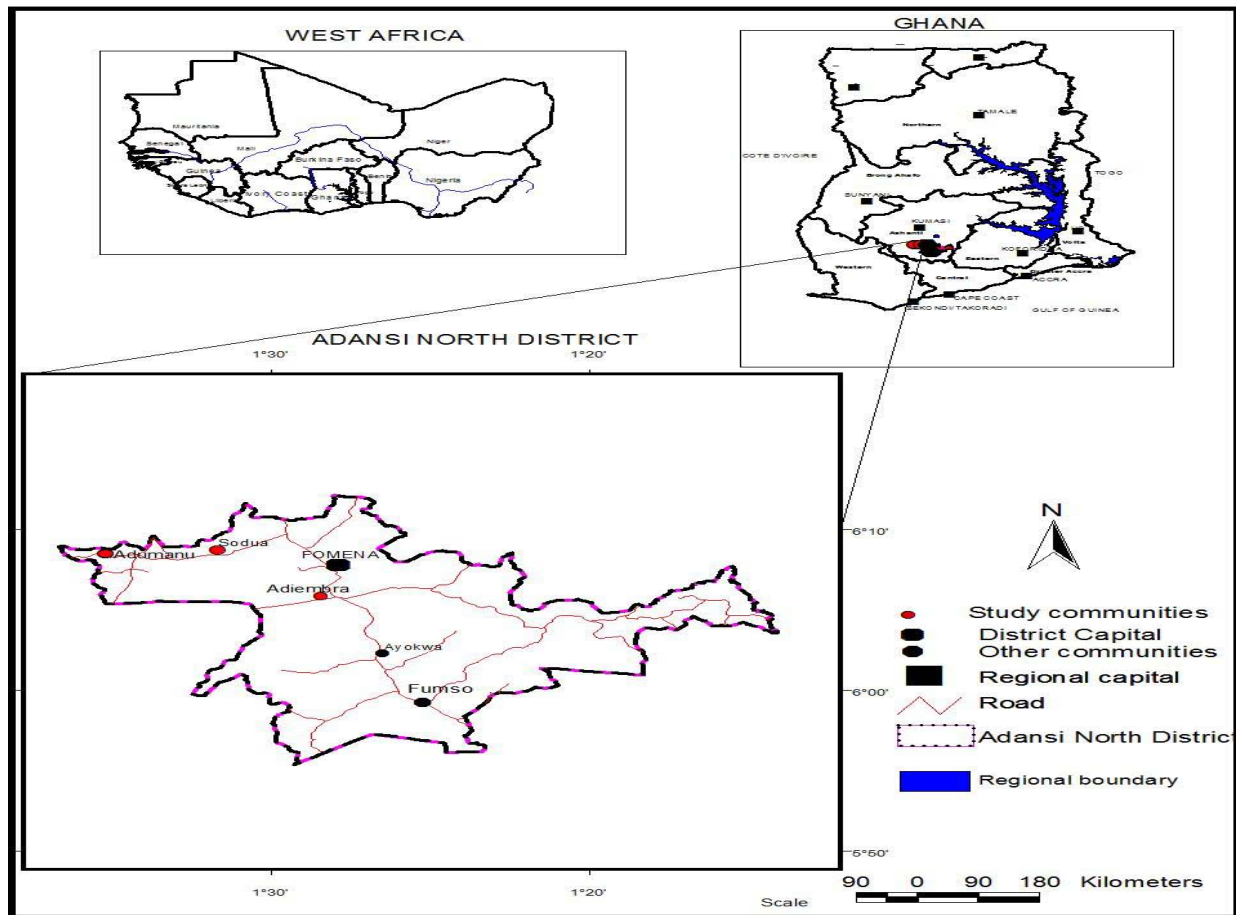
The researcher obtained a total list of seven registered ASM companies from the District Assembly of which four were purposively selected. Purposive sampling procedure was further employed to choose four out of the seven mining companies for the study. The selection was based on the scale of operation. The four selected were very active, operating throughout the year with adequate staff skillful enough to guarantee all year-round operation. The companies were Pelango Adansi Gold Ltd at Adiembra; Star Goldfields Ltd. at Adumanu; Richrock Minerals Ventures at Sodua; and Emperor Gold Investment at Sodua (Figure 1). A total number of 193 women were obtained from the four registered mining companies in the district. The distribution was as follows: 41 for Pelango Adansi Gold Limited; 80 for Star Goldfields Limited; 31 for Richrock Minerals Ventures; and 41 for Emperor Gold Investment. Five respondents were selected randomly through the lottery method from each mining company for the in-depth interview whilst two relatives of two miners from each of the companies were randomly selected for in-depth interviews. Where a randomly selected participant was unavailable or decided to bow out, the same procedure was repeated to replace them. Furthermore, an officer from the District Assembly, an Official of the Minerals Commission and selected Unit Committee Members of the towns where the mining companies were sited were concurrently selected by the purposive sampling method for interviews. It was necessary for the researcher to include these other key informants to ensure comparison and authentication of responses.

The paper employed interview guides as tools for data collection. There were three separate interview guides for the artisanal and small-scale miners, their relatives and the officials. Each respondent was taken through a questionnaire which contained questions generated from the set objectives. Under the supervision of the researcher and two other assistants the opinions of all the respondents were sought by aiding them to answer the questions as required. The key components of the interview guide for the miners were: their motivation to join ASM, their activities at the mines, improvement in their quality of life since joining

the ASM and challenges they face. Interviews were tape-recorded, transcribed and results organized into themes, a main strategy for analyzing qualitative data.

The Adansi North District (Figure 1) is one of the thirty districts in the Ashanti Region of Ghana which

came to existence in 2004 through LI 1758. The Adansi North was carved out of the Adansi East, Adansi West, Adansi South and the Obuasi Municipal Assembly.



Source: Planning Department, Adansi North District Assembly, 2017.

Fig. 1: Map of Adansi North District

The Adansi North lies within an area of 1140 square kilometers making about 4.7% of the total area of the Ashanti Region. The Adansi North is boarded in the South-West by the Obuasi Municipality, the South by Adansi South District, in the South-East by Bosome Freho District and the North-East and West by Bekwai Municipality and Amansie Central District respectively (GSS, 2012). The capital of the district is Fomena on the Kumasi-Cape Coast high way. The Adansi North is made up of 35 electoral areas and Fomena and Asokwa are constituencies found in the district. One hundred and twenty-five major and minor communities can be found in the district with seven area councils.

According to the 2010 Population and Housing Census (GSS 2012), the district has a population of about 107,091 with a growth rate of 2.6% per year. 94 persons per square kilometer make up the population density and male to female ratio is 49.5% to 50.5% respectively. In the working age, the economically active

population makes up 71.3% while the remaining 28.7% are inactive economically (GSS 2012).

The proportions of females and males that are unemployed are 4.6% and 3.9% respectively. Furthermore, the population, 15 years and older who make up the economically active population is about 27.7%. In terms of the exact number of people the mining sector employs in the area, it would be difficult to determine because most of the mining activities are carried out undercover. Whether illegal or legal, the ASM activity provides some sort of livelihood support and empowerment to the people involved; women, men and children alike. Looking at the male-female population ratio (49.5% -50.5%) in the district, it would be unwise to focus on men and their involvement in ASM since they are mostly advantaged when it comes to economic activities and especially extraction of the natural environment. This and other factors like ownership of land, landlessness, unemployment, poverty among

others have led to the women participating in ASM activities. The problem becomes more profound when marginalized women desire to be productive but are impeded by socio-cultural factors.

In the Adansi North District, agriculture, mining, quarrying and the fishing industry make up 66.8 percent of the local economy. Proportionally, male to female ratio in the industry is 66.1 to 33.9 percent respectively (GSS, 2012). Other activities such as the services and hospitality industry and financial administrative activity contribute a little over one percent to the local economy. The foregoing which highlights the economic and social conditions of women in the study area reinforce the need for such a study to unearth bottlenecks to their empowerment and advancement in an economic activity that is easy to access amidst joblessness in the formal sector.

### III. RESULTS

#### a) Factors driving women to engage in ASM

The factors that motivated the women to move into ASM were unemployment, poverty, discriminatory land tenure system, and the dominance of ASM as an economic activity in the area.

##### i Unemployment

The high participation of women in the ASM activity in Ghana is particularly linked to the fact that employable avenues in the formal and informal sectors of the economy are very low and few in proportional terms. In Ghana where annual per capita income in remote areas is as low it is not a surprise for ASM to be a source of income to the population (Dordunoo and Sackey, 1997). Mining activities are not sustainable in the area due to inadequate land for farming and seasonality of the activity. Lands are leased to mining firms to restrict farmers from farming on their lands (Okoh, 2014). The inability of policy-makers to put in place policies that can absorb the teeming unemployed youth graduating from the Basic and Senior High Schools has made ASM an important economic venture to curb the problem notwithstanding its related problems. Responses of some respondents through interviews are stated below:

*I have been unemployed for a very long time, until these people decided to engage my services (23-year-old female miner, Adiembra).*

*Most of the ladies are into ASM because of inadequate employable opportunities (Officer, Adansi North District).*

*There are no other jobs around; if you don't engage in ASM, you'll stay unemployed (23-year-old female miner, Adiembra).*

It was the opinion of respondents that their lack of skills kept them off formal employment. Even though there is scarcity of jobs at the formal sector, they may

have had some jobs to do there but for their lack of skills to facilitate their engagement. This is confirmed by Duflo (2011) in a study on women empowerment and economic development. Studies by Hiese and Meyer (2004) and Faigenbaum, et al. (2015) confirm the narratives by the miners, relatives and officials. Responses from a relative of a female miner, an official each from the Mineral Commission and a female miner are reflections of this factor which drove them into ASM:

*Due to the fact that she did not go to school and also did not learn any trade her only hope now is ASM which requires little expertise (Relative of female miner).*

*The women mostly lack skills and get involved in ASM to raise money for apprenticeship (Official of Minerals Commission).*

*Most of the women do not have any professional training so being employed by these companies is a blessing to them (Officer, Adansi North District Assembly).*

*I didn't go to school and have had no vocational training. I am happy in this employment opportunity (36-year-old mother of four, Adumanu).*

##### ii Land tenure system and land use

The seizure of farmlands by large-scale gold miners has led to the proliferation of poverty in areas where ASM is rife. The effect of this problem has brought about spread of ASM activities in the rural areas. What has worsened matters is the competition for land by miners and farmers in communities where mining takes place (Akabzaa et al. 2007; Amponsah-Tawiah and Dartey-Baah, 20011; Okoh, 2014). Hilson and Garforth (2012) stipulate that 'agriculture poverty' is a major reason why women involve themselves in ASM in Sub-Saharan Africa. The Obuasi community for instance, has more women in ASM over the past decades due to poverty in agriculture and unavailability of land to maintain the rural economy (Banchirigah and Hilson, 2010; Hilson and Garforth, 2012).

Responses from respondents in in-depth interviews confirm the above findings.

*My family head has sold a large portion of our family lands to Chinese and the remaining is not enough for all of us to farm on (35-year old Female Miner, Adiembra).*

*Most of our lands have been destroyed by mining activities (26-year old Female Miner, Sodua).*

*Our family lands have been sold to artisanal miners and now we have no land for crop production (35-year-old Female Miner, Adumawu).*

*Women don't and can't own land in this community. All the lands are vested in the care of the men; even the ones on which they mine (Unit Committee Member, Adumanu).*



### iii Poverty

For most nations in Africa, ASM is usually regarded 'poverty driven', giving instant income and employment to deprived people. It is evident in several studies undertaken by researchers such as Fisher (2007) and Banchirigah (2008) who assert that due to high impoverishment and unemployment people engage in ASM for direct income and employment. Siegel et al. (2009) and Maconachie and Hilson (2011) also posit that due to the inability of illegal mining to elevate the poor from poverty, donor countries and host governments need to formalize the sector to give support to its operators. The following narratives from the respondents in the interviews confirm these positions:

*Do you think I'll be doing this tedious work if I was to be from a well-to-do family (27-year-old female miner, Adumawu)?*

*My family is very poor; I have to do this to earn some money (18-year old Female Miner; SHS 3 Student, Adumawu).*

### iv Dominant Economic Activity

According to the results, another factor that drives women into ASM is that ASM is the dominant economic activity for which the people see as an established way of life. The women see ASM as the occupation in the area that can provide them with sustainability. They see the activity as a heritage handed on to them by their ancestors. Since they saw their relatives indulge in the activity and they are no more, they believe it is their time to continue and sustain it. In-depth interviews revealed this sentiment:

*I am into ASM because it is the only activity I saw my grandmother and mother do; it pays well and fast (33-year old female miner, Adiembra).*

*I was born into this activity and cannot stop the operation; my father introduced me to the owner of the site and now my children too are here. (48-year old female miner, Sodua).*

*My grandmother and mother involved in ASM to cater for us and I am also doing it to survive (23-year old female miner, Sodua).*

### b) Women's Operations in ASM

Most of the women in the ASM are between the ages 18 and 25. Indeed over 65% of the miners, according to the officials are in this age category; thus, giving the impression that the arduous nature of the activity scares women in the middle and old age categories. Most of the women are however married. About 47.7% of them are married and 10.1% widowed. The good number that are married and have ever tasted marriage is due to the fact that in Ghana low education is associated with early marriage. Family sizes, according to the officials, are high; the total fertility rate is estimated at about 5. This is due to the early start of

birthing experience, the people being pro-natalists. The large family sizes may explain the need to enter into an occupation which is deemed to be the preserve of men due to its energy sapping potential.

The activities of women miners in artisanal and small-scale mining include, carrying mineral bearing ores and quarry materials to the milling machines; minor digging; shovelling and collection of mineral bearing ores and quarry materials; processing the ores by panning, washing and mineral separation; operating the milling machine; recording the number of pan-fuls of quarry materials and mineral bearing ores to the milling machine and catering and laundry services (IGF, 2018).

Interviews with the women miners revealed that a few operate the milling machine. They are confined mainly to non-machine areas apparently because of the risk and energy sapping nature of this area of operation. The women miners have been in small-scale mining businesses from a period ranging between 3 months and 5 years. Nineteen of the miners have been working for the mining organisations for five years whilst 23 have been with the companies just for three months. Given the number of women miners the conclusion we could draw is that women do not stay in the mining job for a long time apparently due to the stress and risk involved. Benefits derived from the mining activities

Narratives from the women miners indicate that the activity has improved their livelihoods and quality of life so measures must be taken to improve their conditions in the mines and reduce the risk and other challenges they face. The following responses from the respondents are indications of their improved conditions through their involvement with ASM:

*I was nobody before joining ASM. I could not even pay for the small school fees of my children neither could I assist with the chop money. Even my husband had to buy me underwear (Female Miner, Sodua).*

*I do not think the wage is too bad, so far as I am concerned, it is not bad at all (25-year-old Female Miner).*

*My sister's condition was not good at all before she became a miner. She had to depend upon her husband for all her needs, Things are different for her now (Relative of a Female Miner).*

*I was the one giving her money to cater for her basic needs prior to her involvement in ASM, but now things have changed (Relative of a Female Miner).*

A Unit Committee Member (Lowest level of Local Government) testified to the improved condition of the Female Miners as follows:

*Indeed, the financial condition of the female small-scale miners I knew was not good at all. They are a little better since they became miners.*

Miners have seen improvement in their finances and could educate their children without dependent on their husbands since joining the ASM, as depicted in the following statements:

*I can now see a level of improvement in my finances (Female Miner, Sodua).*

*Starvation and borrowing are now things of the past in my life (Female Miner, Adumanu).*

*I can now educate my children. I have no problem paying their school fees. My husband is not burdened with payment of our children's school fees (Female Miner, Sodua).*

Assets acquisition is a remarkable achievement made by female miners. Several of them reported they acquired household and fixed assets to enhance their quality of life. The following statements bear testimony to this achievement:

*I have been able to acquire assets such as sophisticated cooking utensils, room and furniture. Indeed, we have started building a small house (Female Miner, Adumanu).*

*What else can I say? We are building our house as I speak. My wife supports me with what she earns from ASM. The days of our quarrel are over. Give me money for this and that are no more. I love my wife more (Husband of Female Miner, Adumanu).*

*I have been able to acquire a lot of things including expensive household utensils, room furniture, a small television, expensive clothing, a bicycle for my children, etc. (Female Miner, Sodua).*

With their contribution to the family finances and community improvement, the female miners could now boast of participation in decision making in the home and community. This is borne out by such assertions:

*My husband involves me in decision making in the home because he sees that I am contributing a lot to keep the home (Female Miner, Adiembra).*

*Because I contribute a little towards community improvement, my views are sought for in community gatherings (Female Miner, Sodua).*

These findings give indication that participation of women in ASM empowers them. They earn good income through this economic activity. With this they are able to acquire assets including household assets as well as fixed assets such as houses. Besides they are able to take good care of their children's education hence, involve in long term investment.

#### Challenges facing Women Miners

The female miners expressed some challenges they face. The problems include inadequate wages, risks of health, housekeeping and marital issues. They narrated these problems as follows:

*The monetary returns should increase. I am convinced we are not paid well for our services. Even*

*though as women we are not made to go into the very dangerous aspects of the operation, there are some risks involved [Female Miner, Sodua].*

*Given the risks we face in this work, the monetary returns are not enough. Even though our wages are better than when we were in some other occupations, we need more compensation for our services [Female Miner, Adiembra].*

*We need more protective equipment to save our health. We have nothing when we give birth. The processes are energy sapping, too much for women to bear but what else could we do? [Female Miner, Adumawu].*

*Our health is at risk. We suffer from diseases including respiratory tract infections, eye and skin infections [Female Miner, Sodua].*

*Sometimes we have the problem of taking care of our children because we sometime close very late from work. Besides, we have some problems with our husbands. We do not close early enough to cook for our husbands [Female Miner, Adiembra].*

## IV. DISCUSSION AND CONCLUSION

Results of this study have demonstrated that the quality of life of women improves when they involve in ASM which, hitherto, had been the preserve of men. This occupation has guaranteed a good quality of life of women. It has enhanced their socio-economic benefits. Conclusions drawn by researchers in the empowerment of women through this activity have been confirmed in the Adansi North District. Through this activity, they have gained enough income to build assets including domestic equipment and fixed assets such as houses. Their nutritional status, as well as their housing conditions, have improved. They could support their husbands in taking care of the home and in some instances, they are heads of household. The education of their children is not in jeopardy. Another area of interest which enhanced the status of women is their participation in decision making in the home and community. They gain recognition in the home and community for their monetary contributions to the running of the home and community development. They are thus empowered through the activity. The study confirms works on the empowerment of women through their activities in ASM (Hinton, et al., 2003; Gier and Mercier (2008); Blacksmith Institute (2011). Their empowerment and for that matter improvement in their quality of life depends on their ability to decide for themselves (Petit 2012) own assets such as lands, cars, houses, etc. (World Bank 2000). These depend on their ability to work and earn income (Hilson and Potter; Beall and Piron, 2005). Their empowerment ensures improvement in their quality of life and that of their families. Perceptions on their ability to engage in mining

activities must thus change. The sustainable livelihood framework has been vindicated. Women who enlisted in the ASM have gained assets and improved their quality of life. There are bottlenecks to their full realisation of benefits that must be addressed. Measures must however be taken to ensure that challenges they face in their mining operations are addressed. The risks they face must be ameliorated by the provision of occupational protective gadgets. Besides, it must be ensured that they are paid reasonable wages and appropriate risk allowances and not to work beyond the number of hours prescribed in the labour laws. Finally, there must be a policy to ensure that the health problems emanating from their operations in the mines are addressed expeditiously. There must be a reasonable health policy to guarantee safe health of the women workers. Finally, there must be skills development policy to improve the skills of the female miners to ensure increased productivity.

#### Conflict of Interest

No conflict of interest was involved.

#### Ethical Issues

No ethical issues were involved.

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## Analysis of Computer based Design in Architectural and Convectional Drafting Methods in Schools. The Case of Auchi Polytechnic, Auchi

By Akharia O.O, Bada A.O, Eremiokhale J.I & Olatunde M.B

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**Keywords:** computer-aided design in architecture, manual drafting, educational tools, curriculum.

**GJHSS-B Classification:** FOR Code: 080302, 020199



ANALYSIS OF COMPUTER BASED DESIGN IN ARCHITECTURAL AND CONVECTIONAL DRAFTING METHODS IN SCHOOLS THE CASE OF AUCHI POLYTECHNIC AUCHI

*Strictly as per the compliance and regulations of:*



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**Keywords:** computer-aided design in architecture, manual drafting, educational tools, curriculum.

## I. INTRODUCTION

**D**rafting is the accurate presentation of information in a drawing. This can either be drafted manually or drawn by the use of Computer Aided Design. Manual drafting is the process of producing by hand, drawings for the purpose of documentation, presentation and construction. In presentation, it involves the production of drawings by hand for information and decision making. During construction, these hand drawn drawings are used as guide to enable

the builder know what to build and how to build it, to what dimension and specification. Computer Aided design on the other hand involves the use of computer software to produce drawings for the purposes mentioned earlier (Guney, 2014). Computer based design tools offer significant advantages over traditional design practice. In fact, they allow performing design operations in ways that have never been possible before (Guney, 2014). Whereas manual drafting requires a relatively large work space, takes more time to produce drawings, is more difficult to correct errors or to take off from a particular sheet, and is becoming relatively obsolete. Computer aided architectural design (CAAD) is becoming more popular and requires less use of space for setting up, faster in execution and there are a variety of software available giving architects the opportunity to explore new and more flexible forms in architectural design. Some have argued that the initial take off cost of CAD is relatively high when you compare the cost of procuring personal computers, laptops, printers, scanners (Hargrove, 2011; RIBA, 2005).

The current trend is that the students of Ordinary National Diploma (OND) are restricted from using CADD; but the drawing boards and tee squares while at Higher National Diploma (HND) level they have the option of using CAAD as the design tool. According to Botch way *et al.* (2015) 'CAAD offers the means of evolving design ideas in a three Dimension (3D) space that addresses all design issues that would have otherwise been ignored in two Dimension (2D) drawings on the sheet.

The purpose of this paper is to compare the design studio experience of manual drafting studio critics vis a vis the computer aided design studio critic in order to propose the best system to adopt in modern day architectural schools indigenous to our particular environment.

### a) Level of CAAD Training in Auchi Polytechnic

In the Department of Architecture, at Auchi Polytechnic, Auchi, Nigeria CAAD has been introduced into the curriculum of architectural design for the Higher National Diploma (HND). However, the students of

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Ordinary National Diploma (OND) are restricted to basic hand drafting.

#### b) Computer Aided Education in Architecture

All CAD and CAAD systems employ a database with geometric and other properties of objects; they all have some kind of graphic user interface to manipulate a visual representation rather than the database; and they are all more or less concerned with assembling designs from standard and non-standard pieces (Salman *et al.*, 2014). Currently, the main distinction which causes one to speak of CAAD rather than CAD lies in the domain knowledge (architecture-specific objects, techniques, data, and process support)

embedded in the system. A CAAD system differs from other CAD systems in two respects:

- It has an explicit object database of building parts and construction knowledge.
- It explicitly supports the creation of architectural objects (Lawson, 2005)

When generating models of buildings on computers, the only aspects that can be modeled are those which can be quantified, it is on these quantifiable elements that the evaluation will take place. Generally, it consists of three operations; measuring the model, performing calculations on those measurements and comparing the results with targeted performances (Guney, 2014).



(A)



(B)

Source: Gunney, 2014

Fig.1: Hand sketch and CAAD drawing

#### c) Computer Aided Design in Architecture and Creativity

Creativity is a process that is naturally exhibited or developed based on interest, critical reasoning and thinking. The ability to think visually is a skill that distinguishes architects from other professionals (Proctor, 2001). However, it is important for the CAAD lecturers to establish the relevance of application of CAD-CAAD tools for upgrading their creativity skills in architecture. All creative processes require profound previous knowledge of the phenomenon or product to be developed incremental creativity involves long-standing and significant knowledge, ripened through self-reflection, experience and evaluation of the generated elements (Suleiman *et al.*, 2015). Presently, the mode of teaching CAAD in the department does not encourage the use of CAAD at the conceptual stage (Botchway *et al.*, 2015). The penetration of computer modeling, design and application has been very useful in most courses in our higher institution of learning. Based on this, it is greatly encouraged that our CAAD should be taught at early stages (e.g OND level) and the students would have had good understanding of CAAD before they proceed to the higher level of learning (HND).

## II. MATERIALS AND METHODS

The present study focuses on studying the effect of the CAAD use on architectural design projects in schools of architecture in Auchi Polytechnic, Auchi, Nigeria. A quantitative approach was used to sample the opinions of students and educators. Structured questionnaires were used to extract the opinions of eighty (80) students (40 OND students and 40 HND students) on the current curriculum on CAAD in the department and its impact on the decisions they make, regarding their pursuits of architecture as a profession were ascertained (Botchway *et al.*, 2015). Using unstructured interviews, the opinions of CAAD lecturers in the department, in respect to the state of CAAD in the department and the way forward were obtained. This study used a case-study approach to assemble the main data through the following: (a) Interviews and Questionnaire Surveys (b) Qualitative in-depth interviews (Michael and Phoeas, 2012).

According to Michael and Phoeas (2012), the questionnaire comprised a number of questions with 5 different scores for each answer. The students evaluated each of the standardized answers on a 5-step scale from very high to very low (each of them had an

assigned numeric value to calculate the sum for each answer). To compare the answers, each sum was divided by the number of times that a specific answer was chosen.

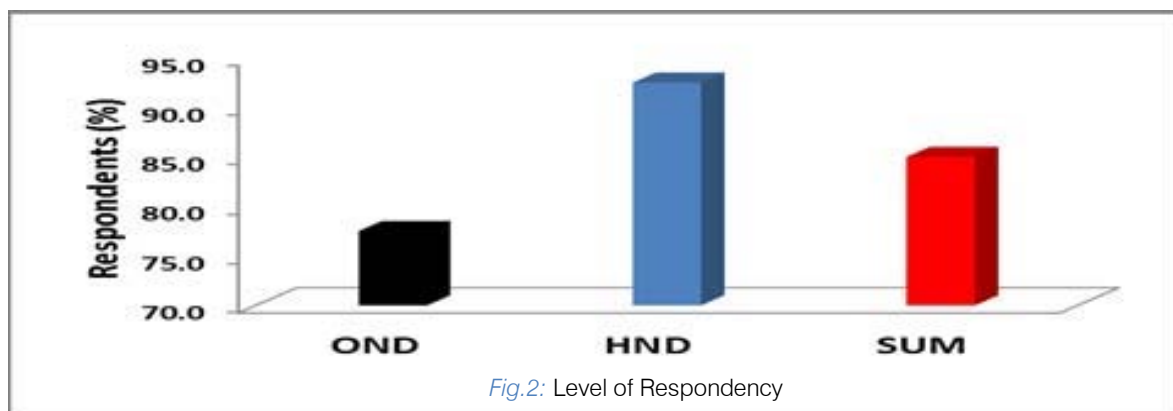
a) *Description of Department of Architecture, Auch Polytechnic, Auch*

The study was conducted at the Department of Architecture at Auch Poly. The department is the pioneer school of architecture in the Nigeria.

### III. RESULTS AND DISCUSSIONS

A total number of 80 (eighty) structural questionnaires were administered to the students in the Department of Architecture which was divided to 40

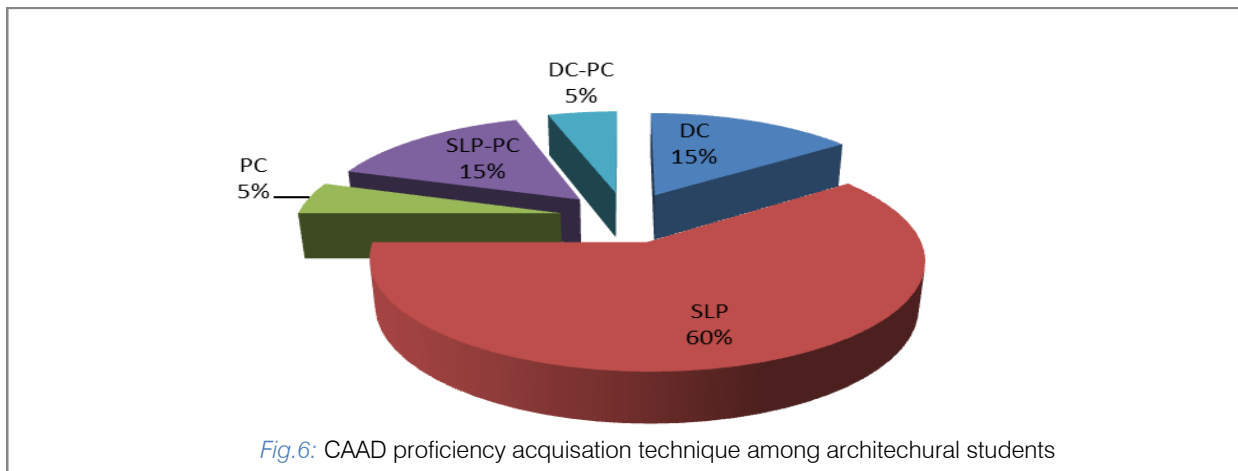
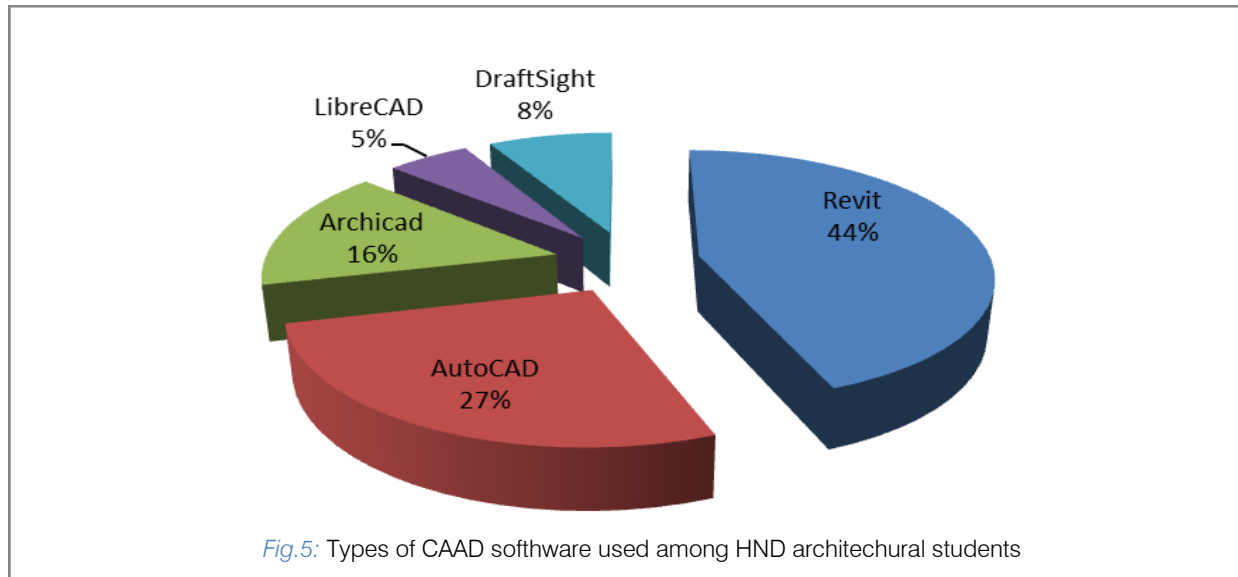
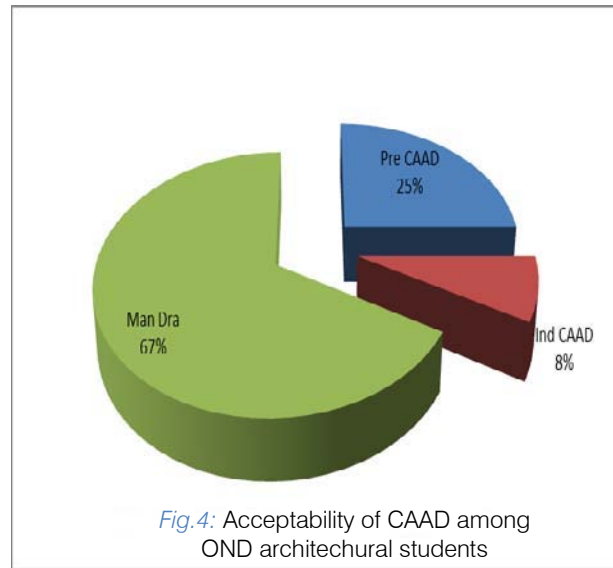
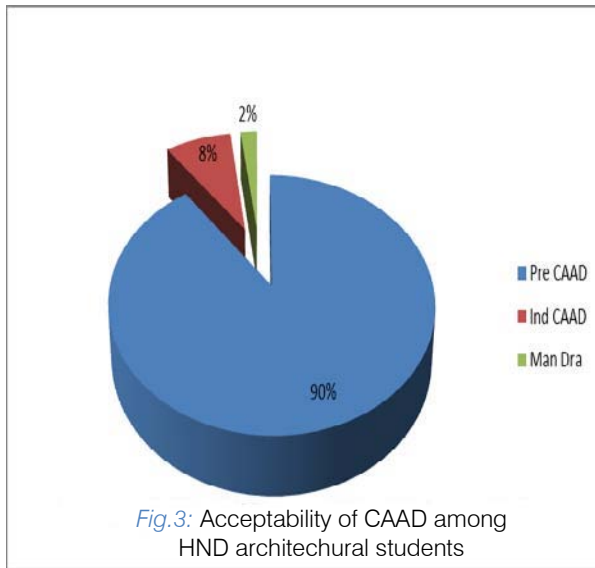
units of a questionnaire for the OND and also 40 units for the HND respectively. However, CAAD is mainly taught at HND and students at this level apply CAAD for various studio activities, but this study tried to understand whether the students in OND have awareness of the course. The total number of respondents at OND level was 31 (Thirty-One) representing seventy-seven point five percent (77.5%), while the number of respondents at HND level increased to 37 indicating ninety-two point five percent (92.5%). Therefore, the summary or general respondents from the students of both programs (OND and HND = SUM) revealed eighty-five percent (85%) and this corresponded to a total number of 68 respondents as shown in Fig.2.



It is generally clear that HND students are strongly aware of the inclusion of CAAD courses in their academic curriculum. Conversely, the effectiveness of CAAD courses was evaluated. Majority of the respondents in HND (90%) indicated a strong preference for the CAAD (Pre CAAD) compared to the manual drafting, while 2% preferred manual drafting (MD) and 8% of the respondents are indifferent as shown in Fig.3. However, most of the respondents of OND were not aware of the importance of CAAD. 8% of the respondents were indifferent (Ind. CAAD), while 25% preferred CAAD to manual drafting traditional method for their studio studies and 67% preferred manual drafting (Man Dra) as indicated in Fig.4. The possible reason for the high rate of unawareness among the OND students may probably due to the fact that the CAAD course is not included in their OND curriculum. As a result of the awareness of CAAD for the two programs at the Department of Architecture in Auch Polytechnic, Auch; the majority of HND students actually wanted the CAAD courses to be restructured and extended to the OND program. Most of the respondents for the HND program believed that if the CAAD courses had been introduced from the elementary stage, this would have prepared the students very well before they proceed to their HND program.

The results extracted from the respondents' responses showed that students used different software for their studio and design project. Among the 37 respondents, 20 students (44.1%) used Revit. However, (27%) of the student used AutoCAD architecture, followed by Archicad (15.4%), Libre (5.4%) and Draft Sight (8.1%) respectively. AutoCAD and Archicad architecture are mostly taught at the Department and the students generally prefer to use Revit Software for their studio and design project as shown in Fig.5.





The outputs from the respondents showed that students gained CAAD skills and proficiency from the departmental courses (DC), self-learning & practices (SLP), private classes (PC) and combination of these approaches. The result in Fig.6 shows that 60% of the respondents gained proficiency through self-learning, while 15% and 5% gained their CAAD skill through departmental courses and private classes respectively. However, 15% also gained CAAD skills through the combination of SLP-PC, while 5% of the respondents gained their CAAD skills through a combination of DC-PC. This finding shows that the students are highly interested in learning and applying CAAD in the studio and project design; having discovered that CAAD proficiency through self-learning approach was estimated to be the highest out of the five considered techniques.

After a critical analysis of the respondents' feedbacks, it is generally clear that students were faced with numerous challenges when it comes to acquiring CAAD skills and proficiency. The largest number of students totaling twenty-two 22 (59.4%) out of the thirty-seven (37) said rigorous training exercises (RT) to be skillful in CAAD is a major challenge. Also, eight (21.6%) students ascribed complex algorithm (CA) of CAAD software as a limitation, while the students who learned CAAD through self-learning and training indicated no challenge (NC) and this accounted to 18.9% of the respondents (Fig.7). However, most of the respondents (85%) claimed that CAAD produces a better quality (BQ) of project work compared to manual drafting.

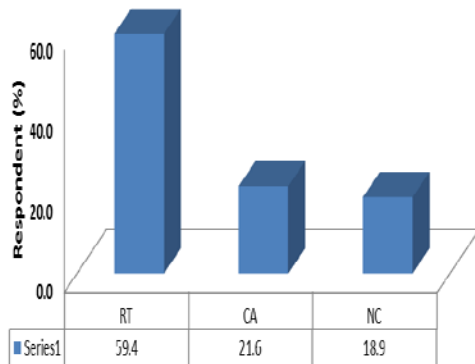


Fig.7: Challenges in CAAD training among architectural students in AuchiPoly

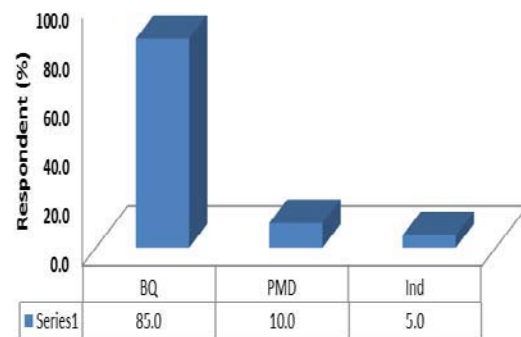


Fig.8: Preference in CAAD training among architectural students in AuchiPoly

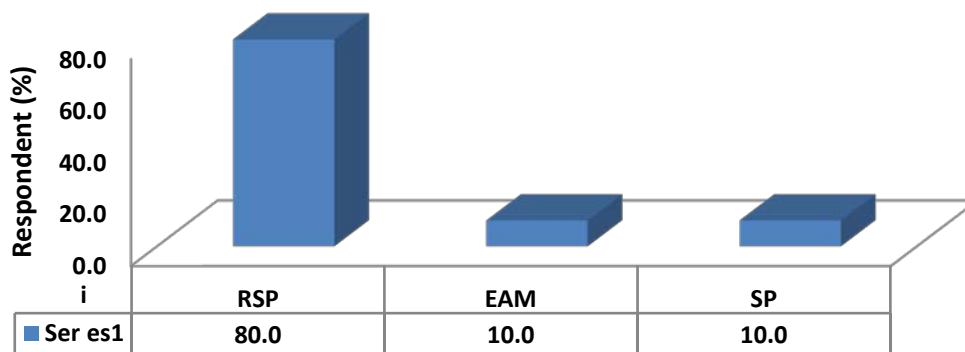


Fig.9: Advantages of CAAD over convectional method among architectural students in AuchiPoly

Although, 10% of the respondents still preferred manual drafting (PMD) to CAAD, claiming that manual drafting has higher originality values. Meanwhile, the remaining (5%) of the respondents were indifferent (Ind) (Fig.8). Thus a strong relationship exists between the quality of the project work produced by CAAD and the advantages of using the software in studio study and project designs. The study also showed that 80% of the respondents claimed that using CAAD make them produce work under a relatively shorter period (RSP) than the conventional method. In addition, 10% of the respondents said that it is easy to edit, analyze and manipulate (EAM) project design using CAAD software, while the remaining 10% are of the view that CAAD application has strong potentials (SP) over manual drafting in areas such as visualization, conceptualization, and beautification.

#### IV. CONCLUSION

This paper evaluated the effect of CAAD tools and manual drafting on the superiority of the architectural end product at schools of architecture in Auchi Polytechnic, Auchi. It is observed that the method of architecture design education in the Department involves the combination of both conventional method of design education to modern methods of design education (CAAD) during different academic stages. Presently, the mode of teaching CAAD in the Department does not incorporate the CAAD education at lower class (OND), but at advanced stage (HND). The result of the findings indicated that the larger number of OND students preferred manual drafting to CAAD education. The possible reason for the high rate of unawareness among the OND students may probably due to the fact that the CAAD course is not included in their OND curriculum. CAAD education and training is greatly encouraged by the department, and the HND students showed interest in developing themselves with this digital means of conceptual design creation.

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## The Role of Agroforestry on House Hold Income of Rural Communities the Case Soddo Zuria Woreda; South Ethiopia

By Bruk Molla

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**Abstract-** The study was conducted to see the role of agroforestry income diversification of rural house- holds in upper kokate marachare kebele of soddo zuriya woreda. The objective was mainly to assess the role of agroforestry for rural households in the study area. Both primary and secondary sources were used on the research where 32 respondents were directly involved on filling questionnaire and key informant interview with field observation were part of data collection tools employed. The major findings were; agroforestry have significant role on income diversification, avocado is the second most important fruit which generate income for households next to common cereals of the area, the reason behind participating on agroforestry was linked with sustaining livelihood of growing family size and poor access to extension service on agroforestry and finance were the major challenges.

**GJHSS-B Classification:** FOR Code: 070599



*Strictly as per the compliance and regulations of:*





# The Role of Agroforestry on House Hold Income of Rural Communities the Case Soddo Zuria Woreda; South Ethiopia

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**Abstract-** The study was conducted to see the role of agroforestry income diversification of rural households in upper kokate marachare kebele of soddo zuria woreda. the objective was mainly to assess the role of agroforestry for rural households in the study area. Both primary and secondary sources were used on the research where 32 respondents were directly involved on filling questionnaire and key informant interview with field observation were part of data collection tools employed. The major findings were; agroforestry have significant role on income diversification, avocado is the second most important fruit which generate income for households next to common cereals of the area, the reason behind participating on agroforestry was linked with sustaining livelihood of growing family size and poor access to extension service on agroforestry and finance were the major challenges.

## 1. INTRODUCTION

Agroforestry is a system of natural resources management that integrates trees on farms and in the agricultural landscape to diversify and sustain production. Agroforestry is a collective name for land-use system and technologies where woody perennials (trees, shrubs, herbs bamboo etc.) are deliberately used on the same unit of land management as agricultural crops/ or animals in some form of spatial arrangement or temporal sequence (BBS, 2006).

The World Bank estimates that over 1.2 billion people derive their livelihoods from agroforestry systems (World Bank, FAO and IFAD 2009). Agroforestry is recognized worldwide as a sustainable system characterized by the production of multiple species narrowly arranged in several overlapping canopy layers and in association with livestock (Peyre, 2006). Agroforestry is also a collective system of production throughout Africa (Zomer,). For example, in Kenya and Uganda, the proportion of households in which women managed fodder shrubs was over 80% (Franzel et al. 2002a; Nyeko et al. 2004).

Agroforestry farming system plays an vital role for the whole world poor societies especially for women since the majority of the worlds poor are women who accounted over half of the worlds poor live in rural areas and depends heavily on natural resources for survival.

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They have also faced little or no access to resources such as land, credit, less access in information, scarcity of improved variety, and extension service (UNDP, 2006).

A change from the present or default agricultural system towards an agroforestry system that combines sustainable crop yields with the potential to remove greenhouse gas emissions as well as additional ecosystem services that are provided in the agroforestry systems as opposed to monoculture systems could potentially be financially attractive option for farmers, land-owners, and governments. The results below highlight for different scenarios, whether agroforestry systems are economically attractive. From a REDD+ perspective, agroforestry can be regarded as one of the five REDD+ activities considered under the UN Framework Convention on Climate Change (UNFCCC), namely 'enhancement of forest carbon stocks.'

Despite its apparent ubiquity, farmland agroforestry has been poorly defined in the scientific literature. Existing classification schemes distinguish agroforestry practices primarily by the spatial arrangement of trees (Sinclair 1999), or by the predominant features of the tree components (Schoene et al. 2007). The systems environmental adaptability or socio-economic performance and management intensity serve as further dimensions to classify such systems (Nair 1993). However, these classification schemes only weakly discriminate between the deliberate retaining of naturally occurring trees on cropland and other practices of the tree growing on farms, such as planting of eucalyptus trees on plot contours as a woodlot or the retaining of naturally regenerated *Croton macrostachyus* around homesteads. In the absence of a clear definition, various terms have been used in the scientific literature to refer to this practice, such as 'multipurpose trees on farms' (Nair 1991), 'farmer-managed natural regeneration' (Haglund et al. 2011), 'agroforestry parkland systems' (Bayala et, 2011) and 'silvoarable agroforestry' (Graves et al. 2017) to name but few.

The conceptual ambiguity can potentially affect an accurate assessment of these systems.

Given that the environmental effects, economic costs, and benefits as well as the socio-cultural implications of the various agroforestry practices are

determined by their particular characteristics and hence may differ between the locations, more precise differentiation and detailed understanding of these practices is needed (Tolunay et al. 2007).

In Ethiopia, smallholders practice various agroforestry practices depending on the socioeconomic and biophysical conditions which, have livelihood implications (Abiyu et al. 2016). The deliberate retaining of naturally occurring trees on farmlands is a common land use practice carried out by these smallholders for monetary, material, environmental, and cultural uses (Jamala et al. 2013; Iiyama et al. 2017).

However, the practice of farmland agroforestry is declining in many agricultural landscapes in Ethiopia due to increase in fuel wood demand and degradation of nearby forests (Onyekwelu et al. 2015), agricultural intensification, the increasing popularity of exotic tree species which generate larger economic benefits for farmers (Teshome 2009), and the fact that land proclamations do not specify clear instructions for farmers on how to manage and conserve indigenous trees.

Accordingly, agro forestry land management has been practiced in Ethiopia since time immemorial by villagers on farmlands. Home garden agro forestry in SNNPRS is characterized by the unique combination of two main native perennials, Enset (*Ensete ventricosum*) and Coffee (*Coffea arabica*) which grow in association with food crops, various trees and livestock in a multilayer story agro forestry system (Tesfaye et al., 2010).

#### a) *Statement of the problem*

Motiur et al. (2005) indicated that agroforestry is the combination of multi-components including plants, animals, and human habitats in the tiny pieces of land. Plant includes trees, shrubs, and herbs, growing in or adjacent to the homestead. All of these are planted and maintained by household members especially by female members with the view of household consumption; they have considerable ornamental value and provide shade to people and animals. It aims at meeting the basic needs of a small family having less holding and very slight capacity for investment. The form of agroforestry is very extensive and denoted by very corporate terms using, homestead agro forestry, mixed-garden horticulture, home garden and, homestead forest (Motiur et al. 2005). Moreover, homestead agroforestry can be capable maintaining sound ecological basis for increased crop and animal productivity, more dependable economic returns, and greater diversity in social benefits on a sustained basis. Ethiopia home gardens offer a practical response to the following challenges: massive degradation and depletion of forest resources; the rural energy crisis; optimum utilization of already scarce land and environmental improvement and landscape enhancement (N, 2001)).

Increasing population pressure and subdivision of farms have led to the fragmentation of land, a decline in the area under coffee and enset (Tsegaye and Struik 2001; Abebe 2005) and gradual replacement of the age-old diverse system. A major change is the expansion of a mono-cropping system of khat (*Catha edulis* Forsk) at the expense of enset-coffee home gardens (Tsegaye and Struik 2001; Abebe et al. 2010). Khat is grown for its economically important leaves and tender twigs, which are chewed for their stimulating effect. Due to the decline in enset cultivation, many households have become more dependent on the food market (Amede and Diro 2005). Market dependency on family food is further exacerbated by decreasing farm area and productivity of food crops (Amede et al. 2001). In countries like Ethiopia, where smallholder farmers have no access to insurance, market dependency increases the vulnerability to economic or environmental shocks. The replacement of enset has also induced a shortage of livestock feed with direct repercussions on herd size, herd composition, livestock production and hence, the nutrition quality of human diets (Tsegaye and Struik 2001).

Most studies on the home gardens of southern Ethiopia claimed that expansion of khat has resulted in homogenization of the structure and composition of the traditional land-use systems (Abebe et al. 2010; Dessie and Kinlund 2008). Yet, little is known about the rate at which those systems have shifted to monocropping systems, how that differs across the region, and which factors could explain it.

(Herrero et al. 2009; Ebanyat et al. 2010) suggest trends in institutional support, resource endowment, prices, social conditions and technology as drivers of farming system change, but these have not yet been investigated for the particular case of home gardens in southern Ethiopia.

Similar to many other areas in sub-Saharan Africa, SNNPRS is characterized by a great diversity in farms and farming systems, even though they are grouped under the common term home gardens. Recognizing this variability within and among farming systems and localities is the first step in the design of new technologies to improve agricultural production (Giller et al. 2011; Descheemaeker et al. 2016).

Agroforestry is central in rural livelihoods and national economies and compared to annual crop or livestock systems, it is known to be resilient to climate and market shocks (Tscharnke et al. 2011; Kerr 2012; Nguyen et al. 2013), ensuring ecosystem benefits such as carbon storage, soil improvement and biodiversity conservation in addition to food and fibre. It can be a viable way of ensuring sustained flow of tree-based ecosystem services as demand for agricultural production expands with the growing population.

So the main concern of this paper is to describe how much agroforestry plays in diversifying the house

hold income of rural community where the practice is diminishing from time to time mainly due to population pressure, deforestation of the area, land use land cover change, erosion and salinity of the area because of the slope.

#### b) Objectives of the study

##### i. General Objective

The General Objectives of this study is to assess the role of agro forestry on household income in rural community the case of Kokate Marachare Kebeles, Soddo Woreda.

##### ii. Specific Objectives of the study

- To identify the role of agro forestry practices in household income
- To identify the foremost roles agro forestry in increasing house hold income of a rural community
- To describe problems linked with diversification of income through agroforestry

##### iii. Research Question

1. To what extent does agroforestry is practiced in the rural community of soddo, woreda
2. What are the major roles of agroforestry in the household income of rural community in soddo, woreda?

#### The Scope of the Study

The study will limit itself to upper Kokate near to mount Damota agroforestry role in house hold income of rural community in Kokate Marachare.

## II. REVIEW OF RELATED LITERATURE

#### a) Agroforestry management Concepts and approaches

Agroforestry is a system of natural resources management that integrates trees on farms and in the agricultural landscape to diversify and sustain production. The World Bank estimates that over 1.2 billion people derive their livelihoods from agro forestry systems (World Bank, FAO and IFAD 2009).

In line with this (Motiur et al. 2005), indicated that agro forestry is the combination of multi components including plants, animals and human habitats in the tiny pieces of land. Plant includes trees, shrubs, and herbs, growing in or adjacent to the homestead.

All of these are planted and maintained by household member's especially female members with the view to household consumption; they have considerable ornamental value and provide shade to people and animals. It aims at meeting the basis needs of small family having less holding and very little capacity for an investment. The form of agro forestry is very wide and denoted by very common terms using, homestead agro forestry, mixed-garden horticulture,

home garden and homestead forest (Motiur et al. 2005).

Home garden Agro forestry Traditional agro forestry land use should be viewed as a household strategy for providing food, fuel wood and fodder that could serve as a model for sustainable forestry and agricultural practices (Badege & Abdu, undated). It has been practiced in Ethiopia since time immemorial by villagers on farm lands. It is recognized worldwide as a sustainable system characterized by the production of multiple species closely arranged in several overlapping canopy layers and in association with livestock (Peyre et al., 2006).

This integrated land use systems are believed to enhance agriculture due to the association between multiple crops and trees on one hand, and various ecological and economic benefits on the other. According to Tesfaye (2005) homegarden agro forestry in SNNPRS is characterized by the unique combination of two native major perennials enset (*Ensete ventricosum*), and coffee (*Coffea arabica*) which grow in association with food crops, various trees and livestock in a multilayer story agro forestry system (Tesfaye et al., 2010; Almaz, 2001)

Home garden agro forestry has supported populations of 500-1000 person per square kilometer in SNNPRS for centuries (CSA, 2011; Tadesse, 2002) and provided food security for many Ethiopians (Tesfaye et al., 2010; Almaz & Niehof, 2004). The main factors that contribute to this stability according to (Admasu & Struik, 2002) are the diversity of the system and the ability of the main staple food in south west Ethiopia, enset to produce a relatively large amount of food per unit area. Trees, crops and livestock are identified as main components of ecosystem stability in the home garden agro forestry, which is related to the three scientific disciplines of agronomy, forestry and animal husbandry (Tesfaye, 2005).

The presence of trees in home garden agro forestry gives multiple services of timber, firewood, food and fodder Kumer and Nair (2004) and it is important for improving the ecosystem and improving its nutrient cycle through litter fall and decomposition. The livestock component in the system provides food for the household, and the manure is important for improving soil organic matter and fertility.

Presently, tree growing on farm is considered as a promising farming strategy to adapt to climate change and contributing to mitigate global warming by their potential of absorbing atmospheric carbon dioxide (World Agro forestry, 2009). Nyong et al. (2007) also emphasizes the importance of agro forestry land use in climate change mitigation through carbon sequestration.

## b) Significance of Agro forestry Management

### i. Use of Fodder Shrubs to Boost Milk Production

Most livestock in Africa are found in mixed smallholder farms characterized by their small size, limited production resources and low income levels. The shortage of fodder coupled with the low quality of feed is the greatest constraint to improving livestock productivity and reproductive performance, especially during the dry season (Winrock International 1992).

Despite demonstrated advantage of the use of herbaceous legumes as high quality fodder, their use has not been widely adopted by small-scale farmers. The low adoption has been partly attributed to the scarcity and high cost of the legume seed (Paterson et al. 1998). In contrast, there has been considerable adoption of fodder shrubs in the highlands of East Africa to provide the much-needed protein to dairy cows (Franzel and Wambugu 2007; Wambugu et al. 2011).

### ii. Soil Fertility Improvement

One of the most serious constraints to the sustainability of agriculture in sub-Saharan Africa is declining soil fertility. In the past, African farmers managed soil fertility on their farms by fallowing their land. As population increased, fallowing of land declined, with many farmers adopting intensified land use practices that required fertilizers to replenish nutrients. Many African states subsidized fertilizer prices to stimulate fertilizer application, but these subsidies were later removed. The removal of such subsidies, due to structural adjustment policies (SAPs), has substantially increased costs for many farmers who now cannot afford fertilizers (FAO, 2001).

This has exacerbated the problem of declining soil fertility, leading to reduced crop productivity (Sanchez et al. 1997). To address these challenges, scientists have in the past two decades experimented on low cost agro forestry options for soil fertility replenishment. Three of the most promising options are the use of improved tree fallows, biomass transfer and mixed intercropping (Niang et al. 1996; Sanchez et al. 1997; Ajayi et al. 2001; Thangata and Alavalapati 2003; Kiptot 2008).

Improved tree fallows are the deliberate planting of fast growing leguminous trees or shrubs in rotation with crops. Biomass transfer is a technology where biomass from shrubs/trees grown on or off the farm, is cut and incorporated in the soil as green manure when planting crops. Mixed intercropping involves planting nitrogen-fixing trees that can tolerate continuous and heavy pruning, in a regular pattern with crops such as maize. By providing nutrients to crops, these technologies can potentially help farmers improve their soils and incomes, thereby improving food security.

### iii. Indigenous Fruit and Vegetable Production and Processing

Food insecurity, poverty and malnutrition are some of the major challenges that face sub-Saharan Africa. In Nigeria for example, 70% of the population lives below the poverty line (Bird and Dickson 2005), while in Cameroon the figure is 40%, rising to 55% in the forest region (Schreckenberget al. 2006). In addition to poverty, Africa is facing a serious problem of not being able to feed its people (FAO 2006). As a matter of fact, it is estimated that 60–80% of rural households in Malawi, Zambia and Mozambique run out of food for as long as 3–4 months per year (Akinnifesi et al. 2004).

Those most at risk are women and children. Through the ages, most of these people have relied on wild plants for food during periods of famine. In addition, they provide other products such as medicine, spices, and livestock feed. In a survey conducted in Malawi, Zambia and Zimbabwe, 26–50% of households confirmed to have reduced vulnerability by collecting indigenous fruits from wild plants (Akinnifesi et al. 2006).

Several studies have acknowledged the fact that indigenous fruits are rich in nutrients in addition to having the potential to generate income to many rural households. In Zimbabwe, for example, wild fruit trees represent about 20% of the total woodland resource use by rural households (Campbell et al. 1997) with women and children being the main beneficiaries. They collect, consume in both fresh and processed form, sell and use the proceeds to buy food and other household goods (Ramathani 2002).

### c) Measures to Protect Agro forestry

Many countries in Africa are presently facing severe shortages of fuel wood, poles for construction and many other forest products due to increasing human and livestock populations that have led to massive deforestation and land degradation. In Kenya, for instance, the area under plantation forests is expected to decrease from 164,000 to 80,000 ha by the year 2020 (KEFRI 1999).

It is further estimated that if the current utilization and demographic factors remain unchanged, then the demand of wood and non-wood forest products is going to outstrip the supply by very big margins. This deficit is likely to manifest itself mainly in fuel wood, a burden that will be borne by women.

To overcome this problem, many development agencies in sub-Saharan Africa have been promoting planting of woodlots, an agro forestry technology which aims at improving fuel wood supply and poles to rural communities, income generation and alleviating environmental degradation.

A woodlot refers to planting of trees in sole stands on farm to provide wood for fuel and construction poles (Otsyina et al. 1999). For the past two decades, woodlots have been promoted in rural areas



of Africa as a means of improving wood fuel supply and poles in rural communities. A number of countries such as South Africa (Ham 2000), Tanzania (Shanks 1990) and Ethiopia (Jagger and Pender 2005) initially promoted communal woodlots, but due to labour constraints and lack of autonomy many farmers prefer individual woodlots planted on their own parcels of land. In recent years, many non-governmental organizations (NGOs) have been encouraging farmers to plant woodlots through agro forestry so that they can be self sufficient in wood product requirements.

Modifications of the woodlot technology include trees along farm boundaries or intercropping with other tree crops. In Kenya, planting of woodlots is widespread in high potential areas of western, central and eastern Kenya. Species commonly planted in western Kenya are *Eucalyptus* spp. and *M. lutea*. At the coastal region of Kenya, the species mainly planted in woodlots is *Casuarina equisetifolia*. In western Uganda species commonly planted are *Senna spectabilis*, *M. lutea*, *Eucalyptus* spp. and *Melia azederach* (Buyinza and Wambede 2008).

#### d) *Agro forestry in Southern Ethiopia*

Most studies undertaken about agro forestry in Ethiopia have been in design and productivity aspects (Poschen, 1986; Asfaw and Agren, 2007). Directly concerning diversity and the system properties Negash et al. (2012) undertook a study about the potential of indigenous, multi-strata agro forests for maintaining woody species diversity in the south eastern Rift Valley.

In his work, Kanshie (2002) describes the ecology of Southern Ethiopia and the farmer's natural resource management. A report about indigenous agro forestry practices and their implications for sustainable land use and natural resources management points to the problem of land limitation and population growth in Gedeo (SLUF, 2006).

However, little emphasis has been placed on socio-economic aspects regarding the farmers' livelihoods and their income. The paper of Negash (2007) investigates indigenous knowledge on the management of trees and their contribution to improve the farmers' livelihoods. In his finding trees are major income sources as fuel wood, poles, timber, fodder and human as well as veterinary medicine.

Findings showed that compared to other land use practices of the study area, vegetable based agro forestry was found to be most promising, which led to being adopted by farmers from other areas. Overall information is inadequate when it comes to how agro forestry contributes to the livelihood growth and how recent growth in population might affect farmer's livelihood.

#### e) *Categorization of home garden agroforestry in Ethiopia*

Ethiopia is one of the tropical countries in which home garden agroforestry is ubiquitous in the highlands. Agroforestry is the major component of Ethiopian farming systems. On the basis of the components, Gedeo agroforestry is categorized as the agrosilvo pasture type (Nair 1993) where trees, crops, and animals are part of the system. The three common types of agroforestry practices are home garden, parkland, and woodlot (Aklilu et al. 2015).

In the cereal crop-based farming system, staple food crops such as barley, teff (*Eragrostis tef*, a small grain), wheat, and maize are grown in the outer farm with trees while vegetable species and fruits are grown in the home garden. This type of agroforestry system is known as parkland agroforestry. Parklands are the traditional agroforestry systems of central and northern Ethiopia where naturally growing, valuable trees are protected and nurtured on cropping and grazing lands. The second type of agroforestry system is perennial-crop based home garden agroforestry systems, in which perennial crops, fruits, spices, vegetables, trees, etc. are grown in the home garden.

The third type of agroforestry system in Ethiopia is woodlot agroforestry. An example of woodlot agroforestry is the bamboo-based agroforestry in the Dawuro zone (Madalcho & Tefera 2016).

#### f) *Ecological benefits of home garden agroforestry*

The ecosystem services and ecological benefits of agroforestry are often masked by farmers' mere expectation of maximum yield from the mono crop farm (Shibu 2009). The home garden as a traditional agroforestry system in many regions has shown great value in maintaining high degree of diversity.

In country such as Ethiopia where the deforestation rate is extremely high, agroforests serve as a refuge for many plants and animals. For instance, Negash, Yirdaw & Luukkanen (2011) identified 58 woody species belonging to 49 genera and 30 families on 60 agroforest farms of the Gedeo zone. Similarly, in a study conducted in Gununo Wolayita, 32 woody species belonging to 19 families were recorded (Bajijo & Tadese 2015). A total species of 50 plants of 35 families was recorded (Negash 2013) in a home garden of size 100m<sup>2</sup> in the Gedeo zone. In general, the Gedeo agroforestry is endowed with nationally and globally significant biodiversity and genetic resources.

The diversity of plants in the home garden, associated with other organisms, contributes to the formation and maintenance of soil structure and the retention of moisture and nutrient levels and promotes the recycling of nutrients (Verchot et al. 2007). This is particularly important in hillside farming, where agriculture may lead to rapid loss of soil. According to Tadese (2002) for instance, agroforestry land use is

suited to the mountainous Gedeo area, as it protects against erosion. The agroforestry system plays a significant role in soil fertility maintenance. A study by Madalcho & Tefera (2016) in Gununo Wolayita showed that the chemical property of the top soil is significantly high in home garden agroforestry. Its nitrogen content also far exceeds that in other types of agroforestry.

#### g) *Factors affecting agroforestry and income diversification*

Agroforestry is influenced by complex sets of socioeconomic, demographic, technological and institutional factors reported that farmer-centered scientific experimentation, agricultural extension service, local institutional capacity and market conditions influence agroforestry. Farmers' experience and cultural diversity were also found to influence conservation of agro- biodiversity's.

Social custom, farmers' resource endowment, perception of tenure security, land-use preferences and exposure to mass media were also found to determine agroforestry practice (Lambert and Ozioma 2001) indicated that crop pests, diseases and wildlife associated with the tree-crop interface influence agroforestry adoption.

Multiple motives prompt households and individuals to diversify assets, incomes, and activities. Diversification may be derived by limited risk bearing capacity in the presence of incomplete or weak financial systems that create strong incentives to select a portfolio of activities in order to stabilize income flows and consumption, by constraints in labor and land markets, and by climatic uncertainty (Kassie, 2016 Kassie, G. W. (2016).

The main deriving factors for livelihood diversification include the heterogeneity of labor markets that come from the differences in household culture, location, gender, and technical skills (Davies & Hossain, 1997 Davies, S., & Hossain, N. (1997). Livelihood adaptation, public action and civil society) advocated the existence of livelihood diversification in developing countries due to the low credit access rate across the farm household; and cash to smooth consumption.

Simtowe, Asfaw, (2016) considered many literatures on justifications for farm income diversification and grouped into four broad categories: (i) self-insurance against risk, (ii) an ex-post coping strategy, (iii) inability to specialize due to incomplete input markets and (iv) consumption diversification where there are incomplete output markets.

In Wolayta significant number of rural households engage in diverse income generating activities away from purely crop and livestock production. According to the study, it is increasingly becoming clear that the agricultural sector alone cannot be relied upon as the main activity for rural households as a means of improving livelihood, achieving food

security and reducing poverty in the study area. Income diversification is gaining prominent role in rural households' income and food security. Even though, regarding the rural economy in Ethiopia, policy makers give more attention to agricultural sector. Nevertheless, there is growing evidence that the rural sector is much more than just farming.

### III. RESEARCH METHODOLOGY

#### a) *Research Design*

This study is intended to assess the role of agroforestry on household income some selected catchment areas of upper kokate of sodo woreda. In order to get realistic information mixed approach will be employed having both qualitative and quantitative in mind.

#### b) *Types of data and the sources*

Data will be obtained from. Primary and secondary sources .Primary data from participants will be collected through questionnaire, Focus Group Discussion (FGD) and personal field observation and secondary data will be reports from Agriculture Office, related works and journals will be used as source material for the study.

#### c) *Sample size & Sampling Technique*

The study will involve numbers of house hold heads, extension service, workers woreda agriculture & rural of developers upper kokate, marachare kebel.

There are about 326 house- holds in the current arrangement kokate marachare in to four local units or (mender) of which 10% that is 32 house-holds were considered as the sample of the study. Furthermore, 2 extension service workers were used as key informant.

Totally 34 respondents were the sample size of this study.

Questionnaire with close- ended and open-ended question to gather pertinent data from households was collected. The questionnaire was administered to the 32 hh in the study area

Key informant interview was held with 2 extension officers of the kebele so as to substantiate the data collected from house-hold through questionnaire.

#### d) *Data Analysis techniques*

Data was analyzed both qualitatively based on the KI interview and personal observation of the study area and quantitatively to triangulated the information from collected questionnaire from the households. Descriptive statistics like percentage and mean were employed to quantitatively analyze the data.

### IV. RESULT AND DISCUSSION

#### a) *Demographic Characteristics of the Respondents*

Different studies show that the demographic characteristics of an individual have a significant influence on practices and challenges of agro forestry

management often depending on the age, sex and level of education of the individuals in charge. Taking this into consideration, therefore, household age, marital status, family size, level of education and experience of the respondents were shown to indicate the general demographic conditions of the respondents under the selected agroforestry kebele.

#### b) Age

As the age distribution in Table 4.1 is concerned, majority 50 % of the respondents were within the age category of 46 and above years, followed by 35-45 years 28% and rest 22% of the respondents were between 26-35 (see Table 4.1). This shows that majority of the respondents were adults and aged people which gives them ample experience on the practice of agroforestry and income diversification of households. The least group also have the chance share experience from their family and neighborhood on the implementation of agroforestry to support their livelihood and diversify income.

*Table 4.1: Age Distribution*

No.	Age Distribution	Age group	No. of Respondents	%
		20-25 year		
		26-35 year	7	22
		35-45 year	9	28
		46- and above	16	50
		Total	32	100.0

#### c) Marital Status and Family size

As can be inferred from table 4.2 below, of total 32 sample respondents, 71%, 3.1% and 6.25 of them were married, divorced and widowed respectively.

*Table 4.2: Marital Status and Family Size of the Respondents*

No.	Marital status	No. of Respondents	%
1	Single	-	-
2	Married	29	90.6
3	Divorced	1	3.12
4	Widowed	2	6.25
5	Polygamy		
	Total	32	100
No	Family Size	No of respondents	%
1	1-3 members	6	18.75
2	4-6 members	23	71.87
3	7-9 members	3	9.3
4	Above 10 members	-	-
	Total	32	100

As to the survey results from Table 4.2 above (71%) the family had 4-6 family members while the rest family's 18%, and 9% were registered as 1-3 members, and 7-9 members respectively (see table 4.2).

As can be inferred from the table above the average family size is five which imply there is high population density as the area is mountainous and land is fragmented to agricultural activities on the area in comparison to its carrying capacity.

#### d) Educational background of respondents

The uptake of new technologies is often influenced by farmers' contact with extension services. Several studies have shown that women have lower access to agricultural extension than men. While the provision of vocational and technical training for women farmer create positive impact on improving technical and managerial skills of homestead agro forestry practices (Katungi et al. 2008).

As to the survey results from Table 4.3, 34.3% of respondents had grade 1-4 25% had education from grade 5-8 28% unable to read and write 6.25% read and write and 6.25 % who had completed high school. From the table it is clear that the majority of respondents fail under primary education but most of them can read and write. As observed during data collection it is clear that the kebele distance to the town and nearby school played role to achieve at least primary education.

*Table 4.3: Educational background of respondents*

No.	Educational status	No. of Respondents	%
1	Unable to read & write	9	28.1
2	read and write only	2	6.25
3	grade 1-4	11	34.37
4	grade 5-8	8	25
5	high school complete	2	6.25
6	certificate and above	-	-
	Total	326	100.0

For question number 6 about participation on agroforestry to family income diversification all the respondents agree on its importance but all they vary on their practice of agroforestry based on their size of land, labor and income situation of their family. The non -farm activities and agroforestry in general plays key role in family livelihood and income diversification as depicted from the respondents and KII. Almost all the household engage themselves on more than two activities on agroforestry and non -farm activities to diversify and secure their family income.

As table 4.4 reveals, out of the total surveyed 32 women more than two third 90%% of them use mixed farming system as the major components in the home garden agro forestry. While the rest 6.25% were

engaged in enset and coffee, and 3.1% engaged on trees and coffee cultivation (see table 4.4). None of the respondents involved on mono cropping to secure their livelihood from agriculture on the study area.

Based on the survey result, it was possible to conclude that majorities are dependents on mixed farming system of agro forestry practices i.e. integrating crops such as wheat, barley bean avocados and enset with native trees and livestock (See table 4.4). Further KI interview revealed that based on season farmers try to cultivate different crops and trees to diversify their family income. As the kebel is in the hinterland to sodo town seasonal things like cabbage support the livelihoods of the family in addition to dairy products from the livestock's.

**Table 4.4:** Main Components of the Home garden Agro forestry

No.	Components of Agro forestry Species	No.of Respondents	%
1	Engaged in mixed farming (avocado. trees and livestock)	28	90.65
2	Planting mono-cropping only	-	
3	Enset and coffee agro forestry	2	6.25
4	Trees and coffee cultivation	1	3.1
	Total	32	100

**e) Motive to be engaged in agro forestry management and major Agro forestry products**

There are a lot of motives forced the farmers to engage in agroforestry. Studies, for example, Elevitch and Wilknson (1998) have reported that farmers get engaged in agroforestry as it contributes to food security, energy and cash income through selling of tree products.

The primary reason or motive to be engaged in agro forestry management activities is presented in Table 4.5. As the table revealed, the overwhelming majority 68.75% were engaged in the agro forestry activity is to meet family food needs. The primary motive for about 18.75% agroforestry was to generate income and the reason for 12.5 %of the respondent was their family background.

Based on the survey result, it was possible to conclude that majorities engaged in agroforestry management activity to meet family food needs and generate cash income through sale of various agro forestry products including tree products.

It was indicated during FGDs that some farmers were trying to diversify agricultural practices so that they could raise their income through improved crop and tree yields. They believed that they could generate cash income through sale of various agro forestry products including tree products. Further the key informant noted that agroforestry activities are considered as means for cash money for daily socio-cultural issues of the family.

**Table 4.5:** Motive to be Engaged in Agro forestry and major types

No.	Response for the Main motives to be engaged in agro forestry	No.of Respondents		%
		Yes	No	
1	Family background	6		18.75
2	To create employment opportunity	-		-
3	To meet family food need	22		68.75
4	To have ecologically sounding environment	-		-
5	To generate income	4		12.5
	Total	32		100

No.	Main types of agro forestry products	No. of Respondents		%
1	Avocados	23		71.85
2	Mango	2		6.25
3	Coffe	2		6.25
4	Livestock products	5		15.62
5	Banana			
	Total	32		100

All the respondents have their own plot of land to practice the agroforestry activities even though their plot is very small to accommodate different types of crops, trees and livestock.

The dominant income for a family on the kebele from agroforestry comes from Avocado tree 71.85 and livestock products 15.62. A single avocado tree may provide in thousands of birr for a house hold when market value is high and fruits of the tree is better in production. Dairy products are key for the livelihood of the farmers in the kebele because they buy products from market in daily to weekly basis from the income they get from livestock products. Coffee is not significant to income but it serves for home consumption for those who have the tree. Mango is not well practiced on the study area except for few farmers. The above description is keeping in mind the annual cereals like wheat, barley and bean seen as common agricultural products for main stay of the livelihoods of the farmers on the study area. KI noted that diversification of income is highly recognized by the farmers to satisfy growing demand of the family and some family members also work as daily labors in the town to support their family livelihood.

Regarding their income from the agroforestry most of the respondents does not clearly know how much it is mainly due to they use them on daily basis on one side and some of the products are seasonal so that



they are not sure of their net income but in average those who have avocado tree gained 3-4 thousand birr per annum where market price is high.

f) *Contribution of agroforestry for income*

As can be seen from the table below half of the respondents believe agroforestry is increasing their income by diversifying. But still some consider the involvement and productivity of agroforestry activity to income diversification of the family has been decreasing from time to time mainly because the productivity of the land is decreasing there by land is fragmented when it is re distributed to children from the central family. Some of the respondents are not clear with whether change is there or not and they hope the change is not seen significantly yet.

No.	Contribution of agroforestry to income of the family	No. of Respondents	%
1	Has been increasing significantly	16	50
2	Decreasing from time to time	7	21.5
3	Not significant change yet	9	28.5
	Total	32	100

g) *Agroforestry contribution to income diversification*

Almost all the respondents replied that they clearly know the social values of agroforestry as the daily connection of the family with others depend on what they get for the agroforestry activities. Idir, Ikub and other social issues are covered mainly from what they get from their land.

h) *Challenges of agroforestry*

No.	Circle the problem that you consider as the most frequent challenges of agro forestry practices according to their weight	No. of Respondents	%
1	Lack of awareness	2	6.25
2	Scarcity of improved variety	2	6.25
3	Limited information on high value fruits	-	
4	Limited access in finance	8	25
5	Lack of market	11	34.75
6	Extension services	6	18.75
	Total	32	100.0

Lack of market, limited access to finance and extension services are considered to be the major challenges with 34%, 25% and 18% respectively. When there is production on high level on seasons market value for crops is declining and farmers not granted with any financial access to involve on agroforestry and the extension service give due emphasis to permanent agriculture of cereal production on annual basis.

In relation to training most of the respondents replied they did not take specific training on agroforestry by extension workers or other government agricultural office.

## V. CONCLUSION AND RECOMMENDATION

a) *Conclusions*

- Agroforestry is core for income diversification and family livelihood in the study area. As the kebele is near to the town and its approaching diversification of income on small and fragmented land become must not optional.
- Next to common cereals which are produced annually avocado is the dominant tree with high value for income of the house hold when market value is better and livestock products (dairy) are vital to get income for the family to involve actively on the socio cultural aspects of the society.
- The central reason to involve in agroforestry activity is linked with meeting the ever increasing demand and need of the family thereby generating income to sustain livelihood of the family.
- Lack of market, access to finance and poor extension service were the major challenges to practice agroforestry for income diversification of house- holds.

b) *Recommendations*

- Extension workers must give due emphasis to agroforestry activity as it have two side advantage. While it diversifies income and increase security of livelihood on one side it has critical advantage on the ecological benefit for the area.
- Farmers need to focus on high market value products to secure their livelihood and diversify income.

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Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.



### ***Manuscript Style Instruction (Optional)***

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

### ***Structure and Format of Manuscript***

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

- a) A title which should be relevant to the theme of the paper.
- b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
- c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
- d) An introduction, giving fundamental background objectives.
- e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
- f) Results which should be presented concisely by well-designed tables and figures.
- g) Suitable statistical data should also be given.
- h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

- i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
- j) There should be brief acknowledgments.
- k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.



## FORMAT STRUCTURE

***It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.***

All manuscripts submitted to Global Journals should include:

### **Title**

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

### **Author details**

The full postal address of any related author(s) must be specified.

### **Abstract**

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

### **Keywords**

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in a research paper?" Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

### **Numerical Methods**

Numerical methods used should be transparent and, where appropriate, supported by references.

### **Abbreviations**

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

### **Formulas and equations**

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

### **Tables, Figures, and Figure Legends**

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.



## Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

## PREPARATION OF ELETRONIC FIGURES FOR PUBLICATION

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

## TIPS FOR WRITING A GOOD QUALITY SOCIAL SCIENCE RESEARCH PAPER

Techniques for writing a good quality human social science research paper:

**1. Choosing the topic:** In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

**2. Think like evaluators:** If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

**3. Ask your guides:** If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

**4. Use of computer is recommended:** As you are doing research in the field of human social science then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

**5. Use the internet for help:** An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow [here](#).



**6. Bookmarks are useful:** When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

**7. Revise what you wrote:** When you write anything, always read it, summarize it, and then finalize it.

**8. Make every effort:** Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

**9. Produce good diagrams of your own:** Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

**10. Use proper verb tense:** Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

**11. Pick a good study spot:** Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

**12. Know what you know:** Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

**13. Use good grammar:** Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

**14. Arrangement of information:** Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

**15. Never start at the last minute:** Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

**16. Multitasking in research is not good:** Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

**17. Never copy others' work:** Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

**18. Go to seminars:** Attend seminars if the topic is relevant to your research area. Utilize all your resources.

Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

**19. Think technically:** Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.





**20. Adding unnecessary information:** Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

**21. Report concluded results:** Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

**22. Upon conclusion:** Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

## INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

### **Key points to remember:**

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

### **Final points:**

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

*The introduction:* This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

### **The discussion section:**

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

### **General style:**

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

**To make a paper clear:** Adhere to recommended page limits.



### *Mistakes to avoid:*

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

### **Title page:**

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

**Abstract:** This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

*Reason for writing the article—theory, overall issue, purpose.*

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

### **Approach:**

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

### **Introduction:**

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.



*The following approach can create a valuable beginning:*

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

#### **Approach:**

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

#### **Procedures (methods and materials):**

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

#### **Materials:**

*Materials may be reported in part of a section or else they may be recognized along with your measures.*

#### **Methods:**

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

#### **Approach:**

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

#### **What to keep away from:**

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.



**Results:**

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

**Content:**

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

**What to stay away from:**

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

**Approach:**

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

**Figures and tables:**

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

**Discussion:**

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."



Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

#### **Approach:**

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

### THE ADMINISTRATION RULES

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

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CRITERION FOR GRADING A RESEARCH PAPER (COMPILATION)  
BY GLOBAL JOURNALS

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals

Topics	Grades		
	A-B	C-D	E-F
<b>Abstract</b>	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
<b>Introduction</b>	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
<b>Methods and Procedures</b>	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
<b>Result</b>	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
<b>Discussion</b>	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
<b>References</b>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



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