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Urban sprawl and informal settlements in Wolkite town, Central Ethiopia

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This study attempted to analyze the factors affecting the escalation of informal settlements in Wolkite town. The study also explored the land use/land cover changes of the study area for the last 30 years, which is 1984-2014. Both primary and secondary data were used for the purpose of this study. Primary data sources include questionnaire, interview and observation while secondary data sources were reports, researches, books and different year satellite images of the town. The collected data was analyzed through SPSS, ArcGIS 10.3 and ENVI 4.7 softwares. The empirical findings revealed that informal settlements have expanded alarmingly in the study area at the expense of the nearby agricultural fields and the effects are witnessed in the town causing disorganized infrastructures and spontaneous network of villages. Monthly income of respondents, previous residence, occupation and mode of accession of respondent’s current holding are found to be the factors determining the nature of settlement in the study area. Therefore, the municipality should revise its procedures and control the spontaneous expansion of settlements.

Key words: Informal settlement, land use change, participatory mapping, Wolkite town.

INTRODUCTION

Urban sprawl refers to the migration of a population from populated towns and cities to low density residential development over more and more rural land. The study of Konishi (2015) revealed that today 54% of the world’s population lives in urban areas, a proportion that is expected to increase to 66% by 2050. Yet, the speed and scale of urbanization brings challenges. Demands for housing, basic services, functional transport systems, and jobs continue to surge. As cities fail to keep pace with the rapid urbanization, informal settlements grow (UN, 2014; Konishi, 2015). The report of UN (2014) also substantiates the above statement in Africa currently in which 40% of the population lives in urban areas. This figure is expected to reach 54% by 2030, meaning that the urban population of the continent would likely triple over the next 40 years, from the current 340 million to some 900 million people. A marked phenomenon of rapid urbanization in Africa has been the proliferation and uncontrolled spread of the so called spontaneous or informal settlements (United Nations Centre for Human Settlements (UNCHS), 2009, cited in UN, 2014).

The study of Tamirat (2011) revealed that only about 20% of the East African people reside in urban areas and the rest live as agrarian or pastoral rural communities.

The rate of urbanization, however, is more than 3.5% on average, which is very high (Tamrat, 2011). Ethiopia is
among those countries which have been characterized as having high rate of urbanization. Rapid urban growth is occurring in Ethiopia, a country least able to cope with the resultant pressure on jobs, services and the like (Admit et al., 2009).

Established in 1912, Wolkite town is expanding alarmingly. However, the town does not have a master plan till date; rather it only has a structural plan. According to the report of Wolkite town Municipality Department of Land Development (2016), there were 3,436 informally established built ups until 2012. In addition to this, in 2015 (from February up to May), there were about 450 to 500 built ups which were marked as informal settlements and decided to be demolished by the town municipality (Interview, Manager of Wolkite Town Municipality, 2016). The researcher observed a number of informal houses built here and there inside the agricultural fields around the suburbs of Wolkite town. They have no infrastructure; they look disorganized, and there is a complex network of electric wires that makes them look like the suburb of a “refugee camp”. The town is expanding in all its four directions, illegal land transactions especially the agricultural fields are becoming new villages without following formal plan.

Although large amount of studies have been performed on urban sprawl in developed countries, few studies have been conducted on reasons and influential factors affecting urban sprawl in developing world. Besides these, the causes of informal settlements and adverse effects are rarely researched. Recently many research papers are conducted on change detection especially on land use land cover changes. For instance, Sayeh (2014) examined the characteristics of urban expansion and land use and land cover change and its effects on the land tenure security situation of the suburb population. Tahir et al. (2013) studied the consequences of urban sprawl on agricultural land loss, while the environmental impacts of urban land use land cover changes was also studied by Bamlaku (2009). Therefore, to the best of the researcher’s knowledge, urbanization impacts of escalating informal settlements and the forthcoming causes and the effects are not well researched in Ethiopian urban centers.

The focus of this paper was to assess the spatial and temporal land use and land cover changes, investigate the determinant factors for the escalation of informal settlements and analyze the causes and consequences of increasing informal settlements in Wolkite town, central Ethiopia for the last 30 years. Since it shows the rate of change dynamics during the previous years through matrix analysis this study will be very helpful for developmental planners, environmentalists, policy advisors and local community at broader to design appropriate interventions in the future land use land cover pattern in the study area and to improve the urban sprawl in controlling informal settlements pattern in the study area and to improve the urban sprawl in controlling informal settlements.

MATERIALS AND METHODS
Study area

According to the data gained from Guraghe Zone Department of Culture, Tourism and Government Affairs (GZDCGTA, 2012), Guraghe zone is situated in the northern tip of Southern Nations, Nationalities and People’s Regional State (SNNPRS, 2014), and covers an area of 5,932 thousand sq. km. Among the 14 zones and 4 Special districts in the region, Guraghe is one of them. It is bounded by Hadiya Zone in the South, Silti in the East, Oromia Region in the North and South East and Yem Special districts in the West. In addition, the zone is divided into 13 districts and 2 reform city administrations. These includes Soddo, Meskan, Mareko, Kebeda, Abeshge, Gedebanogutazerwellene, Cheha, Ezda, Muhimakille, Gunmer, Geta, Enenormaener and Endegagn district as well as Wolkite and Butajira city administration. Wolkite is the administrative center of the zone which lies 155 km south west of Addis Ababa and 430 km from Hawassa, the capital of the region. There is no exact written information about the establishment of Wolkite town. But there is a belief that it was around 1912. Still some of the residents said that the town was established before the mentioned period and it served as one of the transitional center for the long distance trade across Ghibe. The nomenclature was given by Abba Jiffar the II, the then king of Jimma kingdom. When he was traveling to Addis Ababa he decided to rest in Wolkite, which then was believed to be the center given as Wolquitumaa in Affan Oromo by the king (Wolkite town Administration, 2014). The town has a municipality since 1943, and AtoYirga Abebe was the first mayor one. There is a belief that the total area of the town during this period was only 3 hectares. Wolkite town served as the capital of Goro Wereda and Cheha Awraja during the emperor H/Selassie and the Derge regime, respectively. Currently, the town is the capital of Guraghe zone under SNNPRS administration (ibid). The town is located at a distance of 158 km south-west of Addis Ababa between 8° 16’ N to 80° 18’ N latitude and 37° 45” E to 37° 48” E longitudes. Its proximity to Addis Ababa Jimma and Woliso town is a good opportunity for the future development of the town (Figure 1). It is structured into six kebeles (sub-districts), namely; Gubre 01 and 02, Edget Ber, Addis Hiwot, Edget Chora, Menharya, Seba Kuteba and Selam Ber. Wolkite has access road that links the town with Addis Ababa, Jimma, Woliso and Hossana towns (Ethio-GIS, 2004). It is among the few towns in the region that has good infrastructural facilities such as, hydropower electricity, pipe borne water supply, modern telephone, banking facilities, educational, health and other services. To promote the investment of the private sector in industrial investments an industrial zone has been demarcated and facilitated (Southern Nations, Nationalities and People’s Region, 2011).

According to Guraghe Zone Bureau of Finance and Economic Development (BoFED, 2016) projection, the total population of the town during 2013/14 was 42,812. Among these 8,241 were household heads. The percentage of female population was 21.116 (49.3%) and that of male was 21.696 (50.7%). The average altitude of study area is 1480 m above sea level. Teff, chick pea, beans, sorghum, oil seeds, maize and chili are the most important crops which are cultivable in the suburbs of Wolkite. The average annual rainfall and temperature of the study area for year 2015 is 27 mm and 30°C, respectively (Guraghe Zone BoFED, 2015).

Spatial data acquisition and processing

For this study, topographic map and multi-temporal images of
Wolkite town was used. Images including thematic mapper (TM) of 1984, enhanced thematic mapper (ETM+) of 1999 and systeme probatoire d'observation de la Terre (SPOT) of 2014 for Wolkite town were acquired from image of United States Geological Survey (USGS) and Ethiopian Mapping Agency (EMA). The year 1984 was selected purposively to review the nature of urban sprawl in Wolkite town during the Derge regime (1974-1991) and to compare with the current regime, Federal Democratic Republic of Ethiopia (FDRE); 1991 onwards, 1999 and 2014 years were also taken purposively to analyze the urban sprawl for the last 30 years (1984-1999). Overlay of these three time period satellite images was done after resampling to compute the change detection matrix. Resampling technique enables the images to have the same resolution so that accurate classification and change detection can be made. The resolution of the first Landsat images was found to be 30 m × 30 m and for the SPOT it was 5 m × 5 m resolution.

The 1:50,000 topographic maps of the study area was scanned, geo-referenced and projected to UTM coordinate system, map zone 37°N of clack 1880 spheroid and Adindan datum. The satellite images were geo-referenced to topographic map. Then the study area was clipped from satellite images after doing image classification. The most important steps followed in the laboratory work includes geo-referencing of topographic map, delineation of kebele (sub-district), clipping the study area, satellite image enhancement, band composite, supervised land use classification and change detection matrix.

More specifically, in the preprocessing stage the 1984 TM and 1999 ETM+ data were first calibrated. Calibration is one type of radiometric correction methods to enhance the quality of the satellite images through converting the image's Digital Number (DN) which is in the range of 0 to 255 for image reflectance value. To do this ENVI 4.7 image classifier software was used. The Meta data shows that the 1984 image has 30 m × 30 m resolution, acquired from USGS (April12/2016) with datum WGS-1984, UTM, Zone 37 North projection and the sensor type was landsat7 ETM+. The path and row number was 169 and 54, respectively.

In the 1984 image, Bands 1 to 7 were used for calibration, but to reduce noise and disturbance in the image band 6 is not included in the calibration. Then layer stack was done to ease classification. Unsupervised classification (ISO DATA) was done prior to the
supervised classification to know the number of classes which could be generated from the map. Calibration for the 1999 image was done with 8 bands; band 6 and band 8 were excluded in the calibration to avoid noise and disturbance in the image. Then layer stacking was done before running unsupervised maximum likelihood classification. After atmospheric, radiometric and geometric corrections were applied on satellite images gained from different sources, maximum likelihood supervised classification algorithm was used since it assists in the classification of overlapping signatures; pixels are assigned to the class of highest probability. Accordingly, four land use land cover (LULC) classes were developed from the remote sensing images which include: forest, built-ups, crop land and open land. Forest refers to the land under natural, tree cover with good canopy cover, it includes all forest plantations. Forest is available in south and south western part of the study area. Built-ups are land usage types referring to residential, commercial or other types of buildings, settlements and construction of any type. Crop land is another class identified which refers to different agricultural crops. Open land is the type of land use that is open and no activities are underway. It may also include barren lands, reserved areas for future expansion etc.

Change detection matrix is important to compare the change in land use land cover changes and to identify which land use or land cover is changed to the specific class under consideration. It gives a figure where there is fullest land use land cover change since it enables to calculate the rate of change. Change detection matrix for two consecutive 15 years was calculated from satellite images of 1984, 1999 and 2014.

For the purpose of accuracy assessment, a total of 200 points (50 per each class) were collected through GPS. Then accuracy assessment was calculated through cross checking the collected points with the classified image (as shown in Table 1).

**Socio-economic baseline supplementary data**

In addition to the laboratory based GIS data, some socio-economic quantitative and qualitative data were generated by using survey questionnaire and key informant interviews.

Household questionnaire survey: among the most important data collection tools which were used in the undertaking of this research include household questionnaires survey. Addis Kifleketema is selected on the severity of the problem and the existence of many informally established built up compared to the other areas. The total number of households resided in this Kifleketema is around 5,525. Among these, the number of informally settled households after 2014 is found to be 800 according to the report of the town municipality (2016). The reason for not including those informal settlements built before 2014 is that they are termed as legal by the new SNNP region urban land proclamation. Therefore, the sample size was determined as follows by using (Yemane, 1967) sample size determination formula.

\[ n = \frac{N \cdot \left( e \right)^2}{1 + N \cdot e^2} \]

With \( e = \pm 5\% \) precision value, \( N \) refers, number of total population = 800. \( n \) refers, number of total population = 800. \( n \) = Sample size (n) = 267

Therefore a total of 267 respondents were addressed by questionnaire for the multiple regression analysis. The survey used was self-guided questionnaire and conducted by two enumerators. The reason for employing self-administered questionnaire was due to the speculation that most of the residents in the suburbs are not able to read and write. Binary logistic multiple regression model was used to present the results of the data and to show the relationships between and among different dependent and independent variables. This model was selected because the dependent variable is a discontinuous dichotomous one and there are both continuous and discontinuous independent variables. Households nature of settlement (0: informal settlement, 1: formal settlement) is a dependent variable. The following are lists of explanatory variables:

- \( x_1 \): Age of the respondent
- \( x_2 \): Educational status of respondent (0: Not read and write, 1: Read and write)
- \( x_3 \): Household family size
- \( x_4 \): Occupation a respondent
- \( x_5 \): Respondents' monthly income
- \( x_6 \): Residential landholding size of respondents in \( m^2 \)
- \( x_7 \): Previous residence of respondent (0: Outside Wolkite, 1: Wolkite)
- \( x_8 \): Respondents mode accession of their current holding (0: Buying from farmers, 1: Lease holding, 2: Gift, 3: Non-lease municipal holding)
- \( x_9 \): Broker's agitation on respondents to buy informal land (0: No, 1: Yes)
- \( x_{10} \): Response of municipality to formal land access requests from respondents (0: No, 1: Yes)

The overall methodologies followed by the researcher are presented in Figure 2.

**RESULTS**

To calculate the LULC dynamics of the study area for the last 30 years, three time period satellite images were used, they are Landsat image of 1984 and 1999 and
SPOT image of 2014. According to ENVI 4.7 classification and analysis, the existing forest cover in the nearby town is depleted through time as a result of the expansion of the town and agricultural lands for the last 30 years (1984-2014). As indicated in Table 2, forest coverage shows a continuous decrease from 19.39% in 1984 to 11.6% in 1999 and 5.9% in 2014. On the other case, built-up experiences a dramatic increase with three time intervals; it was 14% in 1984, 26.11% in 1999 and 26.7 in 2014. The area covered under crop land had also experienced an increase from 31.87% in 1984 to 38.7% 1999 and 32.9% in 2014, unlike the decrease in the area of grass-land from 34.7% in 1984 to 24.15% in 1999 and increased to 34.4% in 2014. The increasing trend of grass land from 1999 to 2014 from 24.1% to 34.4% is due to the incorporation of nearby rural sub-district to expand the city as a result of the revised urban boundary land lease policy in 2002. Therefore those reserved areas (expansionary areas) have remained as grass lands.

**Rate of LULC changes and trend analysis**

LULC change trend analysis is important to identify the rate of change of LULC per annum. Therefore, it is useful to compare the average rate of change that happened in
Table 2. Summary of LULC Change of the Study Area for 1984, 1999 and SPOT 2014.

<table>
<thead>
<tr>
<th>LULC</th>
<th>1984 Pixels</th>
<th>Area (HA)</th>
<th>%</th>
<th>1999 Pixels</th>
<th>Area (HA)</th>
<th>%</th>
<th>2014 Pixels</th>
<th>Area (HA)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>4040</td>
<td>363.3</td>
<td>19.4</td>
<td>2326</td>
<td>209</td>
<td>11.6</td>
<td>1234</td>
<td>111.1</td>
<td>5.9</td>
</tr>
<tr>
<td>Built-up</td>
<td>2924</td>
<td>263.2</td>
<td>14</td>
<td>5441</td>
<td>489.7</td>
<td>26.1</td>
<td>5563</td>
<td>500.7</td>
<td>26.7</td>
</tr>
<tr>
<td>Crop land</td>
<td>6639</td>
<td>597.5</td>
<td>31.9</td>
<td>8035</td>
<td>723.2</td>
<td>38.6</td>
<td>6863</td>
<td>617.7</td>
<td>32.9</td>
</tr>
<tr>
<td>Grass land</td>
<td>7229</td>
<td>650.6</td>
<td>34.7</td>
<td>5030</td>
<td>452.7</td>
<td>24.2</td>
<td>7172</td>
<td>645.5</td>
<td>34.4</td>
</tr>
<tr>
<td>Total</td>
<td>1874.88</td>
<td>100</td>
<td></td>
<td>1874.88</td>
<td>100</td>
<td></td>
<td>1874.88</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

Table 3. Summary of LULC Rate of Change and Trend Analysis for different years

<table>
<thead>
<tr>
<th>LULC</th>
<th>Change 1984-1999 Change (ha.)</th>
<th>Rate (%/year)</th>
<th>Change 1999-2014 Change (ha.)</th>
<th>Rate (%/year)</th>
<th>Change 1986-2014 Change (ha.)</th>
<th>Rate (%/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>-153.9</td>
<td>-42.4</td>
<td>-98.3</td>
<td>-3.1</td>
<td>-252.2</td>
<td>-69.4</td>
</tr>
<tr>
<td>Built-up</td>
<td>226.5</td>
<td>86.1</td>
<td>11</td>
<td>0.1</td>
<td>237.5</td>
<td>90.3</td>
</tr>
<tr>
<td>Crop land</td>
<td>125.6</td>
<td>5.7</td>
<td>-105.5</td>
<td>-0.9</td>
<td>105.2</td>
<td>3</td>
</tr>
<tr>
<td>Grass land</td>
<td>-197.9</td>
<td>-30.4</td>
<td>192.8</td>
<td>2.8</td>
<td>-5.1</td>
<td>-0.8</td>
</tr>
</tbody>
</table>

Source: Author


<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Forest</td>
<td>Built-up</td>
<td>Crop land</td>
</tr>
<tr>
<td>Ha</td>
<td>%</td>
<td>Ha</td>
<td>%</td>
</tr>
<tr>
<td>----</td>
<td>-----</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>Forest</td>
<td>170.6</td>
<td>46.9</td>
<td>21.9</td>
</tr>
<tr>
<td>Built-up</td>
<td>164.4</td>
<td>45.2</td>
<td>215.6</td>
</tr>
<tr>
<td>Crop land</td>
<td>26.7</td>
<td>7.4</td>
<td>20.8</td>
</tr>
<tr>
<td>Grass land</td>
<td>18</td>
<td>0.5</td>
<td>4.9</td>
</tr>
<tr>
<td>Class total</td>
<td>363.3</td>
<td>100</td>
<td>263.2</td>
</tr>
<tr>
<td>Class change</td>
<td>192.9</td>
<td>53.1</td>
<td>47.6</td>
</tr>
<tr>
<td>Image difference</td>
<td>-154.3</td>
<td>-42.4</td>
<td>226.5</td>
</tr>
</tbody>
</table>

Source: Researcher

different years of interest. It can be calculated by dividing the rate of change with the number of years in which the change happened. It was calculated based on Long et al. (2007) cited in Sayeh (2014) land cover change equation that is:

\[ \Delta = \frac{(A2 - A1/A1)*100}{\text{number of years}} \]  \hspace{1cm} (1)

Where:
\( \Delta \) = Land cover change (%);
\( A1 \) = amount of land cover type in time 1; and,
\( A2 \) = amount of land cover type in time 2.

In Table 3, built-up expanded with 5.7% annual rate on the first analysis period that is, the first fifteen years from 1984-1999. This may be attributed to the adoption of the first national urban lease law in 1994. In the same analysis period, forest coverage reduced with annual rate of 2.8%. During the second analysis period, 1999-2014 (the second 15 years) built-up area continued to increase with annual rate of 0.1% against the 3.1% annual decrease of forest. Over the study period, built-up area has been increased by 3% per annum against 2.3 and 0.03% per annum decrease of forest coverage and grass-land, respectively. However, the 0.1% annual increase of crop land is registered through depletion of forest coverage and grass land.

LULC change detection matrix of Wolkite (1984, 1999 and 2014)

Table 4 shows that the reduction of forest coverage from 363.3 ha in 1984 to 208.4 ha in 1999 is over taken by 8.4,
0.0 and 2.5% by built-up, crop-land and grass-land, respectively. The boost of built up area from 263.2 ha in 1984 to 489 ha in 1999 is at the expense of 45.2, 0.8 and 16.25% of forest, crop-land and grass-land, respectively. The increase of crop-land from 498.96 ha in 1984 to 723.2 ha in 1999 is contributed by 7.4, 7.9 and 27.2% forest, built-up and grass-land, respectively. This means built-up and crop-land was found to be increasing at the expense of forest and grass-land a little bit. The researchers observation and data gained from key informants interview, especially those residents in the suburbs of the study area, confirmed that the nearby agricultural fields and forest areas are changed to settlements.

As shown in Table 5, the decrease of forest from 208.4 ha in 1999 to 111.06 in 2014 is contributed by 4.9, 0.75 and 0.3% of built-up, crop-land and grass-land. However, built-up experienced an increase of 486.3 ha in 1999 to 500.7 ha in 2014 at the expense of 19.2, 17.4 and 16.8% of forest, crop-land and grass-land, respectively. In addition, the reduction of crop-land from 718.9 ha in 1999 to 610.4 ha is at the expense of 19, 26.8 and 49.8% forest, built-up and grass-land, respectively. The Maximum likelihood supervised classification in Figure 3 shows how Wolkite town experienced various LULC changes with the past 30 years.

### Determinants of informal settlement in Wolkite town: Multiple linear logistic regression analysis

Among the selected ten independent variables (IVs), monthly income of respondents, previous residence, occupation and mode of accession of respondent’s current holding were found to be statistically significant and determinant factors for the nature of settlement of households at 95% confidence level. It means the formality and informality of residents is relatively determined by the aforementioned variables.

\[ Y = -(3.697) + 0X_2 + 3.543X_8 + .985X_9 + 1.406X_{10} \]

### Causes and consequences of informal settlements in the study area

The causes for escalation of informal settlements in the study area as it was explained by interviews includes, brokers agitation, involvement of richer people in the process, low response of the municipality, ownership clash between Kebena and Guraghe ethnic groups over the territory. These are the most important ones. Brokers are misleading the farmers and inspiring them to sell their plots otherwise the government will expropriate their property without compensation. The low awareness of farmers about the urban land lease laws makes them to be deceived such that they engage in selling their plots so that they get relief with the money gained. The question of ownership for Wolkite town is one of the causes for the expansion of informal settlements in the study area which is mentioned by the informants during the interview. Kebena ethnic group claim that the town and expansionary areas belong to them; while the other ethnic groups like the Guraghe and other minorities are considered as emigrants. However, on the contrary the Kebenas are not allowed to construct buildings by the town municipality which is dominated by Guraghe and non-Kebena groups. On the other hand there are settlements constructed by the Kebenas themselves and these are considered informal and void by the municipality since they are constructed without following the master plan of the town.

Informal settlements caused deterioration of the image of the town. A network of electric wires here and there, unfinished roofs and walls, built-ups with no fence makes the village look like a refugee camp. The network of electric wires can be a source of danger and risk.

### CONCLUSION

Three time period satellite imageries with GIS and RS analysis tools supported with observation and household questionnaire survey were used to study the factors for
the escalation of informal settlements in Wolkite town since 1984 for the last 30 years. The study clearly indicated that there was land use land cover change conversion and modification shown by the results of satellite image classification and analysis.

The LULC rate of change shows that built-up expanded with 5.7% annual rate in the first fifteen years from 1984-1999. This may be attributed to the adoption of the first national urban lease law in 1994. In the same analysis period forest coverage reduced with annual rate of 2.8%. During the second analysis period, 1999-2014 (the second 15 years), built-up area continued to increase with annual rate of 0.1% against the 3.1% annual decrease of forest. Over the study period, built-up area has been increased by 3% per annum against 2.3 and 0.03% per annum decrease of forest coverage and grass-land, respectively. However, the 0.1% annual increase of crop land is registered through depletion of
forest coverage and grass land.

The researcher's observation and information gained from key informants interviewed, especially those resident in the suburbs of the study area shows that the nearby agricultural fields and forest areas are being converted to settlements. According to the participatory mapping, forest coverage was highly reduced accompanied with the slight decrease in the agricultural plots. Informants explained that Wolkite town is expanding alarmingly to the nearby open fields and agricultural areas. They added that the urban expansion is attributed mainly to the fear of expropriation of the nearby rural land by the government after the urban land lease law was enacted in 1994. There were combinations of factors found to influence the escalation of informal settlements in the study area such as monthly income of respondents, previous residence, occupation and mode of accession of respondent's current holding. Accordingly, among the significant explanatory variables previous residence of respondents is 34.6 times more likely to determine the respondent's nature of settlement.

During field observation by the researcher, it was found that most of the informally constructed houses have no access for infrastructures like, road, electricity, water supply. However, street light problem is common for all parts of the town; informal houses even lack electricity for lamp light at home. Many of them are trying to access it from remote locations through thin wooden poles.

**RECOMMENDATIONS**

The escalation of informal settlement is currently a serious problem in Wolkite town. It is even possible to say that almost half of the total housing units are informal. The problem is worse in the northern and eastern part of the town. The absence of clearly demarcated boundary for the town, and the absence of master plan is a challenge to control the spontaneous growth of settlements. The municipality was demolishing informally established settlements in June, 2015. But it resulted in clash between the community and security forces and the demolishing process was stopped with the loss of two individuals, one civil and one police force. Based on the results of the study in general, the researcher would propose the following to control the expansion of informal settlements and for the sustainable development of the study area.

- The municipal authorities should establish clear set of guidelines and set up standards to monitor and regulate the sustainable development of the town.
- It should consult communities before taking actions or measures because it has socio-economic costs on the society and the nation at large.
- Integration is required by institutions which are delivering social amenities for sustainable and better urban development. Therefore, the municipality of Wolkite town should work in consultation with other client institutions.
- The municipality should understand its responsibility of designing and preparing the master plan, since it is a base for the integrated development of the town.
- There should be a transparent way of addressing the issue of those informally constructed settlements.
- The government should create conducive conditions especially for the low and middle income sections of society for access to shelter.
- Finally, the concerned bodies especially the city administration and the municipality should work together with NGOs, private organizations and the community at large to solve the problems of housing inadequacies and control informal settlements.

**CONFLICT OF INTERESTS**

The author has not declared any conflict of interests.

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