

Pushing Agricultural Land Out of the Village: The Land Use Change in South-eastern Botswana's Otse, 1986-2002

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Abstract

This study contributes to the land use planning and policy in the tribal land areas of Botswana. It focuses on land use change in Otse, south-eastern Botswana. The traditional land tenure system, which is found in peri-urban and rural areas, accounts for a larger proportion of the land resource management in the country. The developments in these areas are not directed and planned as in state-owned land, save for the physical planning developments in village expansion layout plans which remain limited to 'dimensional analysis'. Consequently, the land with the best agricultural soil is getting lost to construction of residential houses or 'build-up' areas. Quantitative and qualitative methods were used to acquire, analyse and present data for this paper. The detection of land use change relied heavily on the use of Geographic Information Systems (GIS). Questionnaires and interviews were administered and conducted on the residents of Otse and relevant stakeholders to find out the land use change over time, and how this has affected the livelihoods of the local people. Official government documents and policies were also consulted. Results from the research showed that there has been a great change in land use in Otse from the 1980s to the turn of the new millennium.

Introduction

Rapid urban growth and the extension of built-up areas onto tribal land have become major concerns in Botswana (Nkambwe 2003) and in many developing countries due to intra-rural migration and the effected changes on settlements (Silitshena 1983). A high rate of urbanisation, both in areal extent and in population numbers, puts pressure on land resources (Hill 1986 and United Nations 1992). In many cases, the land that is changed for urban use has the best soils for agriculture (Levia 1998; Platt 1985; Nelson 1992) whereas fertile soils account for a small proportion of the total land area in Botswana (Nkambwe and Totolo 2005). In Botswana the rate and pattern of expansion of built-up areas varies because of the nature of the land tenure system and land use (Silitshena 1981). Of these, land tenure is the more important. Botswana's urban areas are on state or government-owned land. However, the expansion of built-up areas in tribal land, which makes up almost three-quarters of the total land surface area in Botswana, has special significance. It disrupts the tribal land tenure system, which has supported sustainable livelihoods and food security for the majority of Botswana for generations (Silitshena 1996).

The traditional land tenure system or customary land tenure is divided into residential, ploughing and grazing land (Republic of Botswana 1983 and Kalabamu 2003). As the expansion of the built-up areas takes away the best agricultural land, food production at the household level is seriously compromised and this affects food security. This is most evident in the peri-urban villages like Tlokweng and Mogoditshane which are adjacent to Gaborone –the capital city. Many residents from the peri-urban villages are employed in the cities and commute to work on a daily basis. However, some of them supplement their food purchases with growing crops. Botswana's peri-urban villages have experienced the most rapid growth in population since the 1980s (Republic of Botswana 1992). In the process they have lost a great amount of agricultural land as they absorb the pressure from shortage of land in Gaborone (Nkambwe and Arnberg 1996). Tlokweng experienced a population increase of 67% between 1991 and 2001 and Mogoditshane registered 61% in the same period (Republic of Botswana 2001). The peri-urban villages attract migrants

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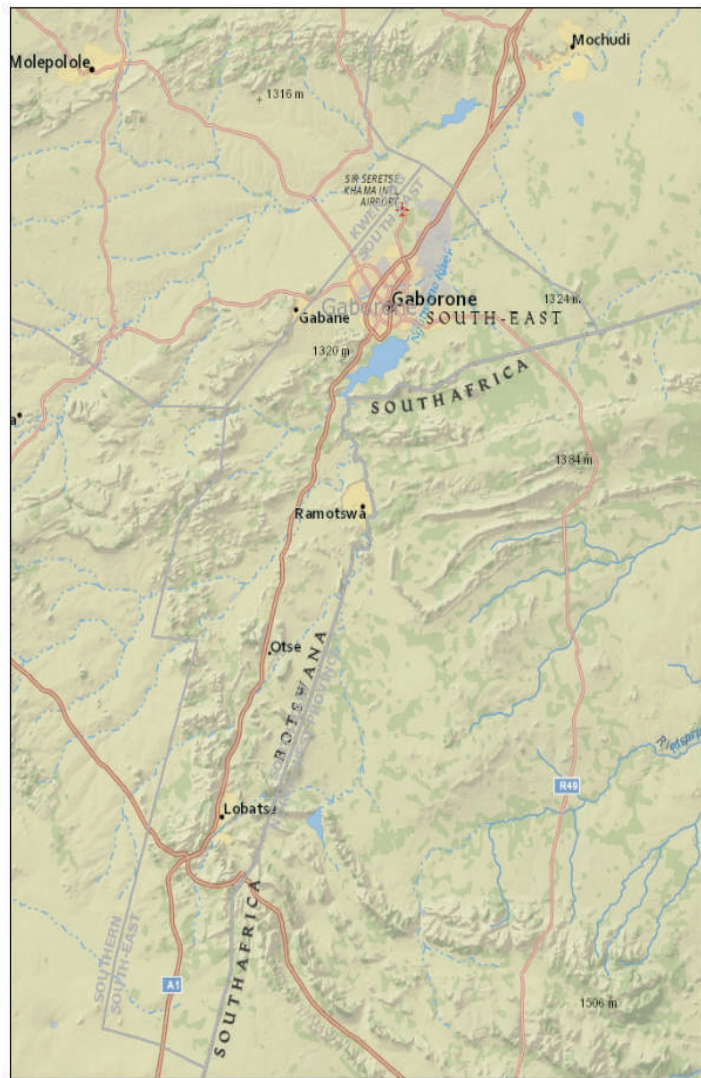
from all over the country and even beyond. This is mainly because, in theory, principle or law, land parcels for both agricultural and residential use are come at no cost as opposed to those in the city.

From the 1970's to the late 2000s, developments in the peri-urban villages were not planned, though planning documents were directed at planning measures for State land. Planning efforts for Tribal Land began in the period from 2010 onwards, with emphasis on major villages. This has made planning control difficult especially in the older parts of the peri-urban villages. There are many problems that have been experienced in Tlokweng and Mogoditshane. According to the findings of the Kgabo Report of 1991, land grabbing by some members of the political elite and others in Tlokweng and Nkoyaphiri was evident. The report uncovered widespread malpractice and illegality in the acquisition of plots of land, associated with several cases of corruption committed especially by the Botswana Democratic Party (BDP) leaders. In another Report by the Lesetedi Commission of 2011 also presented findings on BDP elites' involvement in corruption cases in collusion with businessmen. This allegedly involved the allocation of additional land to that which had already been approved for allocation, as well as the lowering of the purchase price of land. This was the case in the development of Goalestown estate in Maruapula location. This also extended to allocating land without subjecting the process to tendering. Similar problems seem to be already manifesting themselves in the peri-rural villages located within the greater Gaborone area, such as Otse, Gabane and Kumakwane. Over time the peri-rural areas have also experienced a population boom as they provide accommodation to workers commuting to urban centres such as Gaborone and Lobatse. In this context, the administration of tribal land in the peri-urban and peri-rural villages presents a serious challenge to the land authorities, specifically the land boards which administer tribal land.

This study contends that the villages within commuting distances of urban areas in Botswana experience an influx of people from urban, peri-urban and rural areas (Silitshena 1999). As the urban and peri-urban areas grow and their populations spill over into peri-rural villages, the local people are affected as they are highly dependent on the land for agriculture for both arable and pastoral use. Generally, most community members in the rural areas lack the skills required for more sophisticated employment beyond subsistence agriculture. As more land is lost to the built-up areas to accommodate migrants, these villages face the challenge of land shortage to maintain their livelihoods. Therefore, this study investigates the land use changes in the peri-rural village of Otse, and evaluates how these changes have impacted the livelihoods of the local people.

The study area is easily accessible through Botswana's primary road, the A1 Highway, which traverses Otse from Gaborone to Lobatse. There are secondary gravel or country roads and tracks within the village. Moreover, a railway line from northern Botswana to South Africa passes through Otse. The expansion of Otse village along the east-west axis is limited because of the hilly topography. As a result, the village will expand in the northerly direction. This is the area with the best agricultural land in Otse because it has been used for arable agriculture for generations. Tribal land administration in the study area is under the Balete Land Board, which is headquartered in Ramotswa, the tribal capital. It has been allocating residential plots on the land previously used for agricultural activities. Some of these land parcels have natural springs that have, for a long time, provided water for livestock and people in the cultivation areas. Map 1 below illustrates the location of Otse on a small scale map, whilst Map 2 depicts the large scale map.

Map 1: The location of Otse



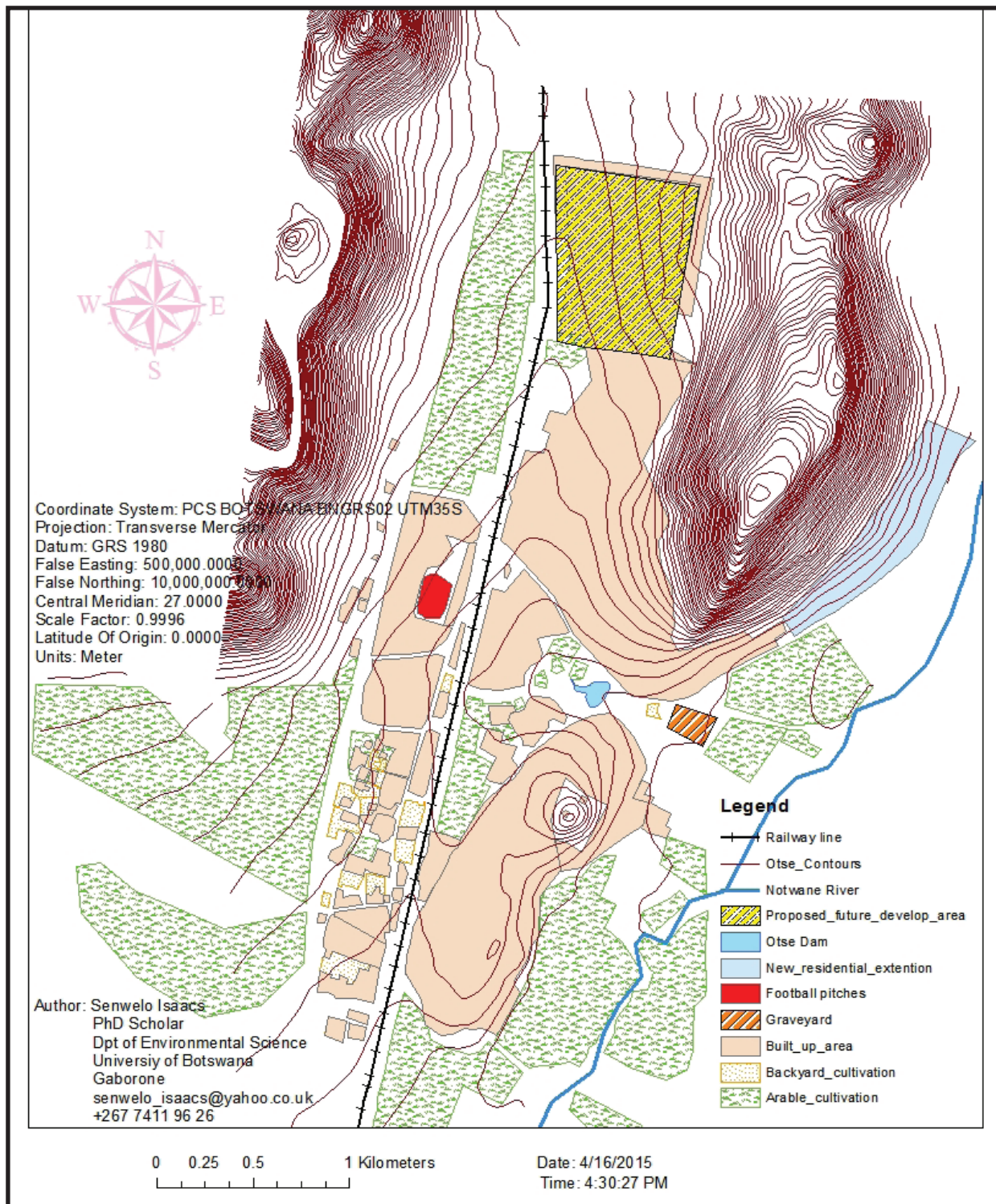
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
 Projection: Mercator Auxiliary Sphere
 Datum: WGS 1984
 False Easting: 0.0000
 False Northing: 0.0000
 Central Meridian: 0.0000
 Standard Parallel 1: 0.0000
 Auxiliary Sphere Type: 0.0000
 Units: Meter



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Source: ArcGIS Web base map, 2016

Map 2: Depiction of the location of Otse on a larger scale



Spatial Data

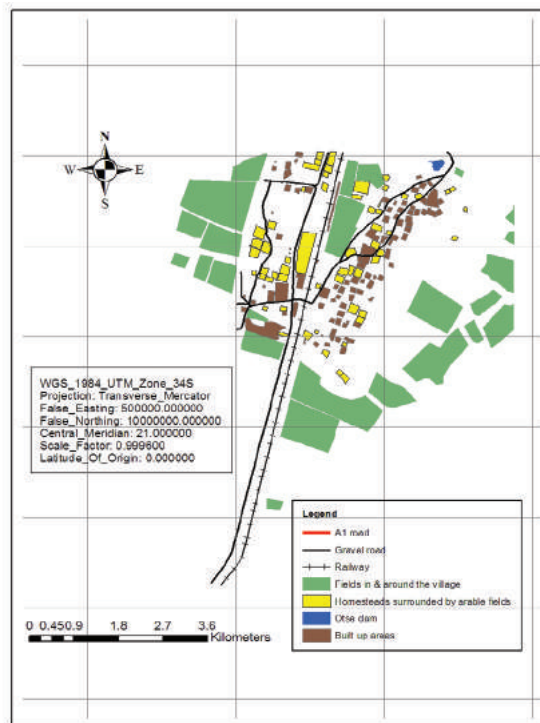
The analysis was done using Geographic Information Systems (GIS) spatial techniques. GIS is a system which captures, analyses, stores and retrieves geographical data. The socio-economic data was analysed using socio-economic statistical techniques. The hardcopies of the aerial photographs were scanned and geo-referenced. Computer-aided and manual digitising, interpretation and comparison of land use change

were done in order to produce land use classification maps. The 1986 aerial photograph obtained from Department of Surveys and Mapping was used as a guide on what Otse looked like then (1980s), while the 2002 Orthophoto (digitised aerial photograph with 3 Dimensional value) showed the land use during that period. The analysis showed how the land resource has changed overtime and the nature of change.

Maps 3 and 4 below are land use classification maps of the study area in 1986 and 2002, respectively, and they illustrate changes in land use. It is evident from these maps that arable agricultural land covered a larger area in spatial extent than the built-up area in the unplanned section of the village in 1986 compared to the same area in 2002, which is now become a built-up area with reduced arable agricultural land. In addition, in 1986, though the population was 5,192 (CSO, 1991) in Otse, the land use pattern was such that there were more homesteads surrounded by arable fields and the homesteads were in a scattered pattern which created 'open spaces'. This means that the built-up area occupied less land area. This is referred to as a mixed pattern of land use and includes grazing since livestock was also kept at the same location.

However, in 2002, with a population of 5, 599 (Statistics Botswana 2016), there were fewer homesteads surrounded by arable land and the built-up area formed a nucleated pattern. The reason for this is two-fold. First, it has to do with inheritance. In most cases siblings have sub-divided the land parcels where arable agriculture was once practised and have built houses. Second, in the early 2000s the Baletse Land Board started allocating residential plots on the 'open spaces' in the unplanned section of the village. In 2002, land use in Otse reflected a pattern of growth in the area extent and the built-up area, as illustrated in Map 4. There has been a high demand for residential plots as indicated by the records of allocation (less than five years), behind Moeding College and the proposed expansion plan designed for Seuwane layout plan. The evidence of land use change in 2002, as compared to 1986, is also indicated by the existence of some land uses which were not there in the 1980s, such as football pitches and civic and community areas.

Map 3: Land Use Map of Otse in 1986



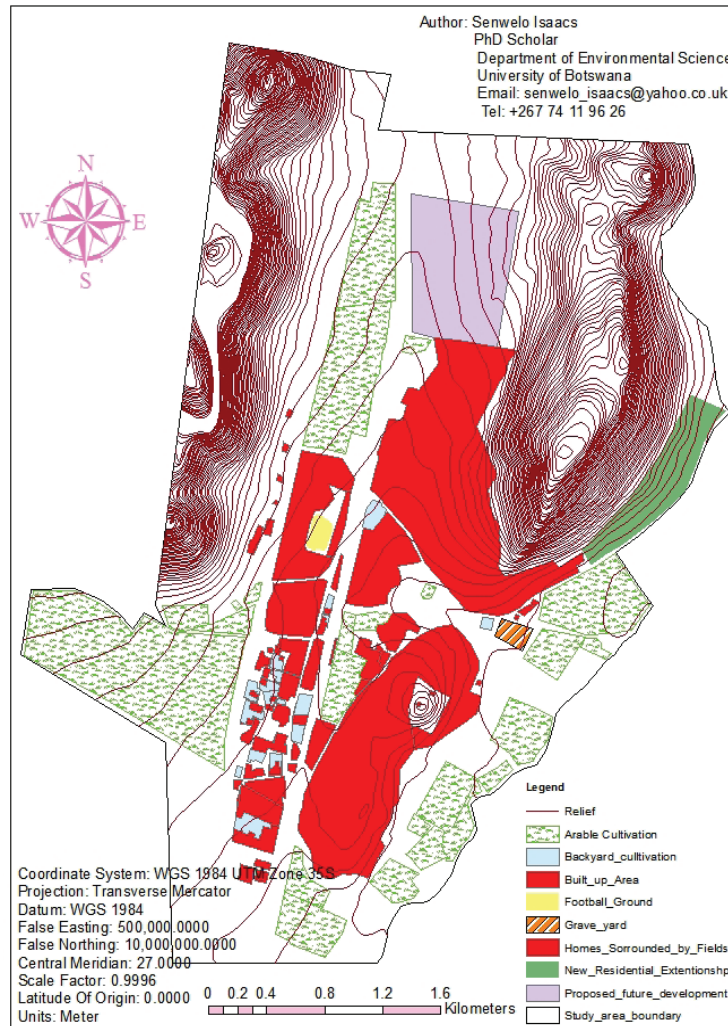
Source: 1986 Aerial Photograph obtained from Department of Surveys and Mapping in 2008

The change in land use from 1986 to 2002 was mainly from agricultural land to residential and commercial as well as civic and community. In an interview, the District Agricultural Officer (DAO) informed this author that the change in land use from agricultural to residential would continue to lead to low agricultural produce and ultimately poverty. For example, the area earmarked for future development (Seuwane), formerly used for cultivation, has a layout plan designed for physical developments (Balete Land Board 2009) with no new allocations to replace repossessed farming land. All the owners of the fields that are repossessed for village development are compensated in monetary terms as per the Tribal Land Act 1968, section 33.

Another important factor to consider in relation to low crop production is that for many years, many fields have remained fallow, thereby contributing to the overall low crop production. Cattle rearing has also declined within the village boundaries, possibly because some farmers have relocated to more open areas where it is possible to keep large herds. Some have simply moved their livestock to the arable lands outside the village. This move started in the 1990s when the Balete Land Board advised the community to relocate *masaka* (kraals) from within the boundary of the built-up area. Such areas were re-allocated for residential purposes, further reducing available grazing land (Balete Land Board 2009). The Balete Land Board (2009) has stated that there is no waiting list for plot allocation for Otse. The 'no waiting list' scenario is explained by the fact that the land board has ceased allocation pending the provision of services at Seuwane and not necessarily because there was no demand for land for residential purposes.

The homesteads surrounded by arable land have significantly reduced between 1986 and 2002. This suggests that the land-use has changed and the community has moved away from being actively involved in agricultural activities or are forced to have farming land elsewhere outside the village. The village was rather more clustered in 2002, with less open spaces, as seen from the land use pattern of 1986. The arable land east of the railway line has been greatly reduced. The newly allocated plots or areas also show a more organised settlement pattern than that in the old part of the village. This should certainly make things easier for providers of services such as water and electricity, among others.

Map 4: Land Use Map of Otse in 2002



Source: 2002 Orthophoto obtained from Department of Surveys and Mapping in 2009

Socio-economic Survey

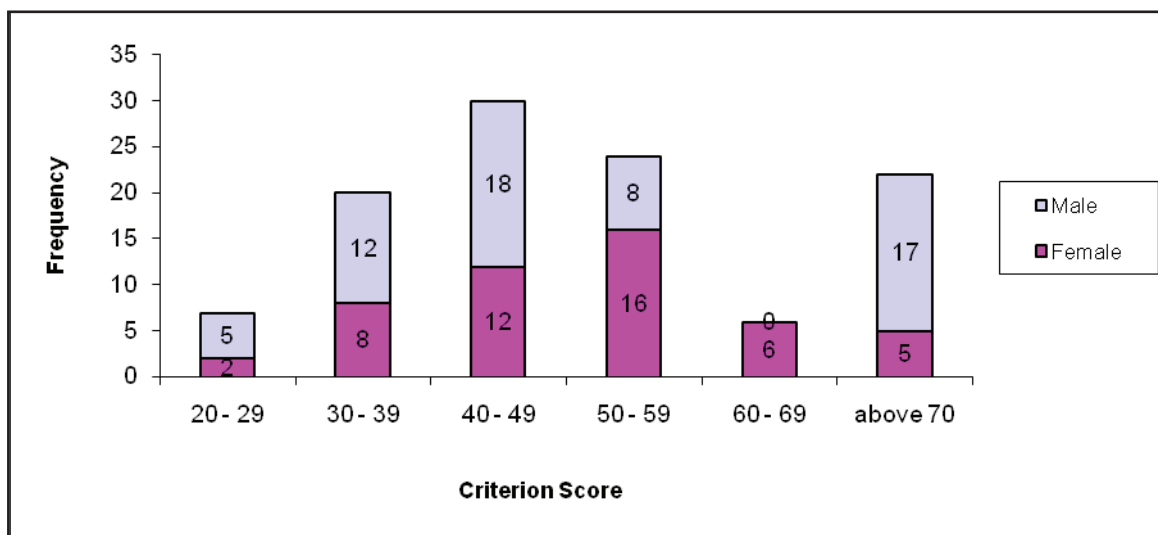
The findings of the survey indicate that male-headed households constituted 51% of the respondents, whilst female-headed households accounted for 49% of the respondents from the representative subset of the sample population of 100 households in line with the major wards within the village, such as Lesetlhaneng and Lekubung wards, as demonstrated in Table 1 below. Generally, this statistic is also representative of the general pattern in Botswana and is thus not necessarily peculiar to Otse.

Table 1: Ratio of respondents by household

No. Female headed households	No. Male headed house holds	Total (household sample size)
49	51	100

Figure 1 below graphically depicts the age of the respondents by household in terms of land ownership. Male-headed households were more dominant in terms of land ownership in all the age categories, except the 50-59 and 60-69 age categories.

Figure 1: Age of the Respondents

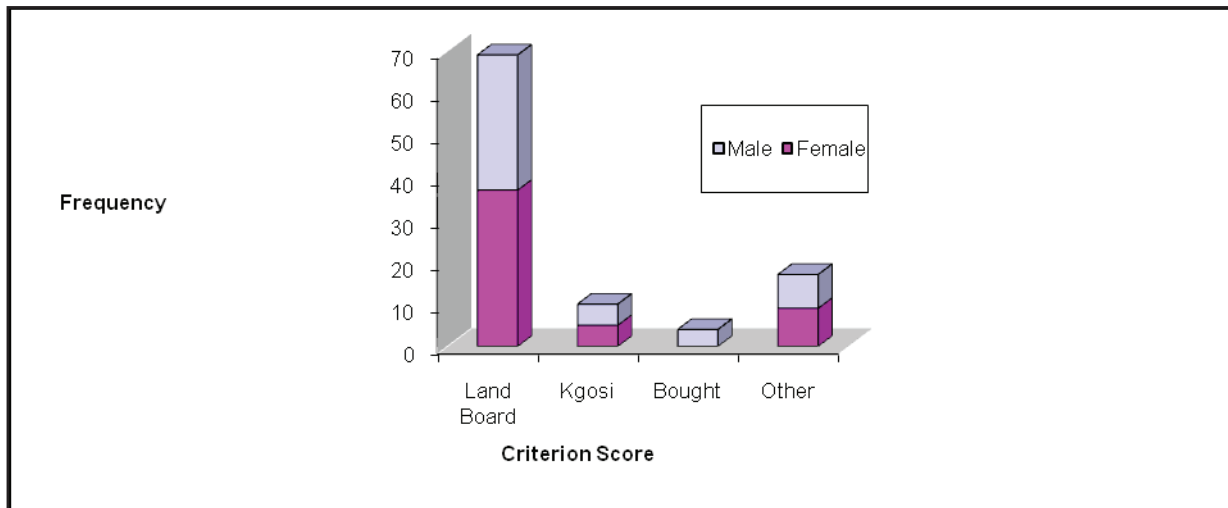


The length of stay in the plot was determined for the purpose of assessing the nature and consistency of land use of residential plots by respondents. The length of stay at a plot also indicates whether people sought land parcels for residential or agricultural purposes. It demonstrates that the longer the occupation period, the more likely that the respondent was a ‘native’ of Otse, whilst the shorter the length of stay demonstrated recent allocation. Table 1 shows the length of stay at the plots by respondents. The results displayed on length of stay by respondents reveal that 60% of the sample population lived in Otse for 10 years and more. Again, there was a trend that 19% of the respondents had stayed at their plots for five years and less, suggesting recent land allocation.

Figure 2 below indicates that four types of land acquisition were investigated in order to determine how people were allocated land over the years. The land administrators responsible for allocating land are the Land Board and the *Kgosi* (Chief) for the pre-1970 period, but anybody could and can still acquire land by purchasing it. This scenario also suggests that the residents of Otse acquired their plots legally on the basis that the plots were allocated by the *Kgosi* for those who acquired their plots before the establishment of the Land Boards in 1970 and by the latter after this date.

Figure 2 also shows that the *Kgosi* allocated plots in the past in line with customary law and the landowner had exclusive rights to the land. There was also an indication through the interviews that plots were being bought for residential and other purposes. The buying and selling of tribal land is a criminal offence under the Tribal Land Act 1968. What were sold are developments on the land not the land itself. The paper does not dispute that there are some illegalities taking place (the buying and selling of land). The findings of this study are that, even if one was initially allocated a plot by the *Kgosi*, it was later on registered with the Land Board. Plots allocated by the land board in the years between 1986 and the present were originally part of agricultural land. This study has established that this development has been haphazard and undirected, and that the lost agricultural land has not been quantified. There were only a handful of residents whose plots had been allocated by the *Kgosi*. With such a small number of households from chiefly allocation, it was possible for the residents to have a mixed type of land use.

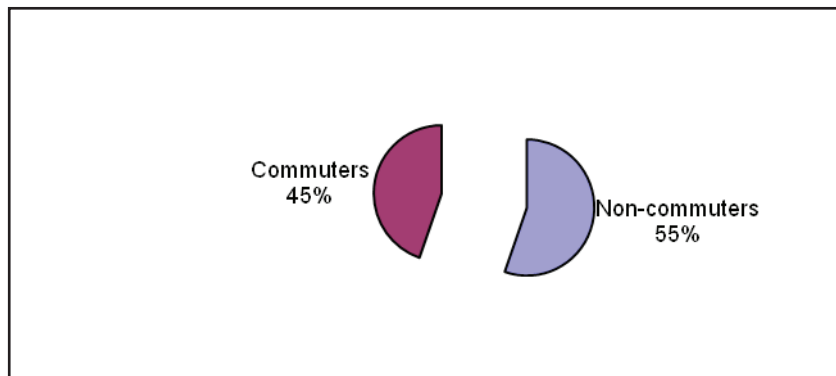
Figure 2: Method of plot acquisition



The place of work of the respondents was established through interviews to determine the extent to which people were commuting from the village to urban centres and vice versa. Some 45% of the sample population commute from Otse to the urban centres of Gaborone and Lobatse.

Figure 3 below presents the ratio of commuters and non-commuters. It is important to mention that although a larger proportion from the sample were non-commuters (55%), this category is composed of the respondents who were ‘non-workers’ and stayed behind in the village to engage in ‘other’ activities that generate income. From the sample, 45% of the respondents were in the ‘commuters’ category, indicating the importance of Otse as a place that provides accommodation to those who work in the urban areas. This also explains why there was pressure to expand residential land and in the process reducing agricultural land.

Figure 3: Proportion of commuters and non-commuters



Nature of Change in Land Use

The nature of change in land use was determined in order to assess how land uses have changed over time in Otse. The assessment took into consideration the village growth as part of land use change. Table 2 indicates the land use change in terms of area hectares. In the 1980s there were six plots that were earmarked for commercial activities. However, in the 2000s there was an increase of 50% in the number of commercial plots in Otse. Table 3 shows that there has been a change in land use over time as demonstrated by the figures for the period from the 1980s to the 2000s.

Table 2: Matrix of land use change in area (ha)

Land use category	Area (ha) 1986	Area in (ha) 2002	Difference in area (ha)	% change
Built up area	157	299	142	52.5
Fields in & around the Village	918	337	-581	-272
Dam	4.4	4.4	0	0
Football Pitches	0	3	3	3
Homesteads surrounded by fields	141	24	-117	-83
Proposed future development	0	55	55	55

Table 3: Matrix of land use change for 1980s and 2000s

Land use category	Previous Land Use (Prior 1980's)*	Est. No. Of plots (1980's)	Est. No of plots (2000's)
Commercial	Arable	6	14
Civic and Community	Arable	4	12
Infrastructure Corridor	Woodland & Arable	2	3
Industrial	Woodland & Arable	0	5
Residential	Woodland & Arable	-	Over 1200
Arable	Arable	22	12

*Estimates could not be established due to poor land management methods in the past

There were no industrial plots in the past (1980s). However, in the 2000s there were five plots designated for industrial activities. The number of plots allocated for civic and community activities in the 1980s was four, and increased to seven in the 2000s. The estimates of arable and residential plots in the village in the past and present could not be established because there was no database on land management in the past. Therefore, information on this was derived through observation by the author. Essentially, the favourable location of Otse, as compared to Gaborone and Lobatse, has escalated the demand for land for residential and commercial purposes.

Future Change in Land Use as Expressed by Residents

Table 3 below shows the ratio of respondents who expressed a desire to change the future land use of their current plot at the time of the interviews. An overwhelming majority of them, 82%, have considered changing the use of their plots (both residential and agricultural) in future. This is attributed to the fact that the community appreciates the importance of the strategic location of Otse between two urban centres (Gaborone and Lobatse), hence the economic potential that the village possesses.

The envisaged future change is attributed to commercial opportunities, such as small-scale businesses, in the form of accommodation/rental, among others, and generally improved transport system, as well as infrastructure developments. The Police College is a government institution and the government has the right to repossess any land for public use as per the TLA section 32, and the constitution, section 8, even though the land was allocated by the BaMaletle Land Board. Tourism facilities remain minimal, with one operational lodge which does provide accommodation to football fans in route to Lobatse.

Table 3: Future change in plot use

Sex of head of household	Change	No Change	TOTAL (%)
Male	45	6	51
Female	37	12	49
TOTAL	82	18	100

Perception of Respondents on Land Use Change

Table 4 below gives the results analysed from the Likert-type scores on the perceptions of the sample population. Column 1 (to the left) is a classification of the sample population into groups by their various characteristics (levels of education, place of work, source of income, and age). It was considered that if the respondents cared about land use change there might be significant differences in these perceptions based on these groups.

The H-Statistic was calculated for each variable (e.g. education) to find out if the various groups of people in the population sample (e.g. people with no formal education, those with primary education, among others) have significant different perceptions recognising land use change as significant, advantageous or disadvantageous to their well-being. The sub-column showing the standard deviation indicates how much agreement or disagreement there was on the mean Likert-type score. The level of significance tested was at 0.05 critical values. The H-Statistics calculated did not show any statistically different perceptions between groups, which make the results difficult to interpret. The guiding result then is mainly in the differences of the means of the Likert scores and their standard deviations.

Respondents across the group characteristics generally developed a trend where they agreed that they recognise significant land use change, even though respondents in the 'primary' education category, those who earn income through the 'rental' sector, and those who had less than five years staying in Otse, remained neutral on the matter. All the respondents across the group characteristics also generally agreed that land use change would be advantageous. The respondents in the 'non' education category remained non-committal on whether land use change was positive, but still agreed that land use change was negative.

In the various age categories, respondents remained non-committal on whether land use change was negative, except the '30-39' age group who agreed that land use change was negative. However, all the age groups generally agreed that land use change was positive and recognise significant changes in land use. Whereas the respondents in the agricultural sector recognised that there was a significant change, they agreed that change was positive and remained non-committal on whether land use change was negative or not. Although it is common knowledge that in the peri-urban areas agriculture is being neglected, the situation differs from one place to another.

That the perception of both the youth and elders with regard to land use change in Otse shows that they do support it is similar to the response in other peri-urban areas, especially those near the cities (Gaborone and Francistown). In this case, we notice that the need to have extra income, apart from that from agriculture, has become one of the survival strategies for the people in these areas. It is for this reason that the current land policy, which was adopted by the National Assembly in July 2015, prohibits the change of land use from arable to residential because the government has noted that trend, especially in the peri-urban areas (Republic of Botswana 2015).

Table 4: Perception of respondents by group characteristics

Groups Characteristics	Recognition of Significant Change		Changes advantage (positive)		Changes disadvantageous (negative)	
	Mean	(sd)	Mean	(sd)	Mean	(sd)
Education						
None	2.4	0.8944	3	1.581	2.2	1.0954
Primary	3.06	0.863	3.12	0.857	2.7	1.074
Secondary	2.77	1.03	2.63	1.21	2.97	1.20
Tertiary	2.69	0.97	2.62	0.75	2.12	0.95
Place of Work						
Commuters	2.73	0.99	2.40	1.15	2.86	0.95

Non-commuters	2.87	0.92	2.91	1.05	2.62	1.12
Source of income (2000)						
Formal employment	2.98	0.84	2.57	1.07	2.83	0.93
Agriculture	2.5	5.89	2.37	0.51	3	0
Rental	3.16	1.19	2.58	1.44	3.25	1.21
Other	2.29	0.91	2.58	1.37	2.82	1.38
Length of stay						
Less than 5 years	3.05	0.91	2.37	1.16	2.84	0.76
5-10 years	2.62	1.07	2.67	1.31	3.19	0.87
Over 10 years	2.73	0.94	2.54	1.04	2.86	1.11
Age						
20-29	2.57	0.79	2.57	0.98	3	0.82
30-39	2.7	0.86	2.55	1.57	2.45	1.15
40-49	2.90	0.94	2.35	1.01	3	0.93
50 and above	2.84	0.99	2.69	1.01		0.93

The mean for respondents by their educational status is 1.01, so it has no influence on how they perceive land use change. The significance of the respondents' perception based on the source of income in 2002 was that the respondents in the formal employment, agriculture and other sectors did recognise that there was significant land use change except those in the rental sector, probably because they have not stayed long enough in the village to notice the change. The respondents in the agricultural sector deviated from the mean more than those from the other sectors in determining that land use change was positive. This group was dominated by the elderly who were farmers and had arable land. They suggested that the change of use from arable to other uses would be positive to them if they had secure property rights over the land. Again, the cultural value of land for elders will always be sentimental, especially with regards to its use for burial and ritual practices. One cannot say the same with the youth, and it is not only in Otse as this applies to the youth in general in the society. In fact, the government and the elderly are equally concerned about the loss of interest by the youth in their culture. It is for this reason that the government and communities are reviving cultural activities.

Again, the H-Statistic on the perception of respondents based on their source of income in 2002 indicates that their perception is not significant at a value of 3.44, tested at 0.1, 0.05 and 0.01 critical values of H-Statistic of Kruskal-Wallis. The H-Statistic revealed that both commuters and non-commuters were aware of the land use change and that it was both positive and negative. The commuters recognise that peri-rural areas provide often cheaper alternative accommodation than urban 'rent'. On the other hand, commuters also noted that the local people in Otse sold plots to citizens and non-citizens, which leads to permanent loss of land. Non-commuters stated that they would rather hold on to their plots as they are seen as a source of security for family welfare.

In order for people to survive in difficult situations, they devise other life coping strategies. In this case, the boom in the land market has provided an alternative. However, some desperate people resort to the illegal selling of tribal land. It is well-known that Botswana is semi desert and drought has been a critical factor which undermines crop production. Due to the increasingly unfavourable climatic conditions, amongst other factors, the status quo has driven the majority of people out of the agriculture sector. That is why, as argued above, renting out houses has become a coping strategy in Otse.

Botswana's long term national Vision 2016 devotes much attention to equitable resource use in order to achieve intergenerational and general equity (Republic of Botswana 1997). Access to land by all plays a significant role in assisting the country to achieve its vision 2016 pillars, especially those of a United and Proud and Prosperous Nation. Therefore, the findings of this paper should assist the government as it guides

the nation towards achieving the goals of Vision 2036. As Botswana celebrates 50 years of independence, there is a need to re-evaluate certain policies, especially those related to land as stipulated in the Tribal Land Act of 1968.

Conclusion

The results of the study show that land use change has occurred over time in Otse. The trend of the land use change has been from agricultural use (pastoral and arable) becoming built-up areas between the 1980s and the 2000s. The analysis has shown that the causes of land use change go beyond urbanisation. Environmental and socio-economic factors are woven in the process of land use change.

Otse has experienced a paradigm shift from an agro-based traditional economy to a more diverse and commercial community. Changes in the livelihoods of the respondents have affected households as they face a different environment within which they have to eke out a living. The impact of land use change has been both detrimental and beneficial to the residents of Otse from the economic, social and environmental perspectives.

The great variations in the responses to questions on land use change and its impact in Otse, and the perception by the local people are variable and were insignificant in line with the H Statistic. This may denote a culture of not 'caring' about the land resource or simply taking the issue of land for granted. This becomes a major obstacle in land management, land use planning, as well as in determining compensation for the land earmarked for repossession. Unlike in the peri-urban areas, where people are informed about land issues and often bargain hard for adequate compensation for losing their land, some people in peri-rural areas such as Otse are not so well informed. For instance, the study undertaken by Nkambwe (2003) in Tlokweng revealed that the local people demanded compensation in line with the principle of land 'rent' in urban areas. Ideally, people preferred to maintain ownership of the land (Nkambwe 2003), whereas in this study, the peri-rural people could not define the (economic) value of their land and usually settled for the compensation offered by the government and private developers.

The changes in land use at Otse were not directed. That is why it led to poor management of land over time. For example, the Balete Land Board has compounded this problem by further allocating residential plots in open spaces within the village, thereby making service provision difficult and expensive. This poor management of the land resource has negative impacts on the livelihoods of the people of Otse as well as on the resource itself.

Despite the fact that the Balete Land Board had indicated that there was no waiting list for plot application and allocation, it was evident that there was demand for land for residential purposes, as shown by the rental sector which has grown between 1986 and 2002 leading to more residential land being designated. Compared to places such as Tlokweng, Boatle, Modipane and Mogoditshane, for instance, Otse has not, at this point, experienced a large number of land sales. However, it is likely that in the near future, the same trend could obtain in this village.

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