



## Participatory Land Use Planning Policy Implementation in Ulanga District, Tanzania: Assessment of Zones Sufficiency

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### Authors' contributions

*This work was carried out in collaboration among all authors. Authors MNN and EFN conceptualized the study. Author MNN collected data, performed data analysis and wrote first draft of paper. Authors EFN and JJK reviewed paper drafts to publishable tone. All three authors approved the final version of the manuscript.*

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### ABSTRACT

Land use plans have been considered as a solution to land use problems and hence enhance ecological, economic and social sustainability of land use. Appropriateness of land use plans and hence its potential for adherence may rely on sufficiency of zones allocated for different land uses. This study was designed to empirically identify land use implementation problems and suggest solutions relevant to the land users, the government, planners and other stakeholders. Specifically, the study assesses: (1) The extent to which the land use zones cover all zones needed by the stakeholders and; (2) Reasons for levels of sufficiency of the allocated land use zones. Data were collected through household survey of 120 respondents from two villages, key informants, focus group discussions and field observation survey while secondary data were collected through review of guidelines for land use planning, village land use plans, district land use framework, books and

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journals. Information used to assess sufficiency of land use zones used in Village Land Use Plans (VLUP) from household survey and village records were descriptively analysed. The implementation of village land use plans was not done as expected. Land use zones were insufficient in terms of the allocated size and needs within the zones for current and future situation. Overall the insufficiency of the land use zones was reported by 90% of the respondents. For individual land use zones the insufficiency was reported by the following percentages of the respondents: 95.0% for residential zone, 89.2% for agriculture zone, 96.7 for grazing zone, 25.2 for forest zone, 0% for wildlife management area, 0% for wildlife corridor and 0% for wetland. The reasons for insufficiency of the land use zones were increasing population, overstocking, and lack of infrastructure necessary within specific zones. Other factors included inadequate consideration for uncertainties in population projection standard, unclear zoning regulation and discrepancy in population data. Based on the findings and conclusions, this study makes the following recommendations. First, the National Land Use Planning Commission should devise mechanisms to ensure that all the six steps of land use planning are completed towards implementable land use plans. Secondly, the national land use planning commission should review zoning standards to sufficiently allocate the land use zones. The population projections used for future allocation of land had influence on the sufficiency of the zones where the rate of population increase is assumed to be fixed throughout the ten years implementation period without consideration of uncertainties. It is worth incorporating GIS to establish trend of land use and forecast future land use to sufficiently allocate land during the 10 years lifespan of the VLUP. Thirdly, the national land use planning commission need to validate spatial data and population data at village level to avoid discrepancies which affect implementation of the village land use plans.

*Keywords: Land use conflict; land use planning; policy implementation; conservation and development; governance.*

## 1. INTRODUCTION

Land is a primary asset for human survival and development in Tanzania and elsewhere in the world [1]. It is a major source of income and livelihoods for most rural and urban populations [2-7]. Contribution to improved livelihoods depends on how land is sustainably managed. Land is not only a source of livelihoods; it also carries social, spiritual, cultural and ecological values [8-11]. As a definite property, land resources have economic as well as physical definitions varying from geological resources to bio-diversity [1]. Essentially, land has a spatial dimension which offers point of departure in development planning resultant to regional and urban planning [1]. Given its importance, access to and availability of land resources are critical to ensuring real and long-lasting improvement in social, economic and political well-being [11,12]. One way through which access to and availability of land is mediated is land use planning.

In Tanzania, land use planning has undergone five phases which are land use schemes in 1920s, village settlement schemes in 1960s, layout plans in 1970s, conventional land use plans in 1970s-1990s and participatory land use plans which is currently the approach used in land use planning [13,14]. Participatory land use

plans were adopted across sectors with the recognition of its problem solving ability through grassroots involvement in planning and decision making [9]. Since land use plans are currently developed in a participatory manner, it is expected that land will be sufficiently allocated according to land user's needs, the plan will be flexible to accommodate influential factors to adherence and the strategies enforced will regulate land users to adhere to the land use plans.

According to National Land Use Planning Commission (NLUPC) (2013), the National Bureau of Statistics (NBS) (2013) reports the government prepared over 900 Village Land Use Plans (VLUPs) between 1998 and 2010 while that 604 VLUPs were prepared between 2008 and 2013. Ulanga District (UDC) had 91 villages out of which 46 had VLUPs [15]. Land use conflict incidences between different categories of land users have been reported in various districts in the country [9]. In spite of initiation of VLUPs to mitigate land use conflicts, the incidences of land use conflicts still exist in some districts including Ulanga District [16-18].

Village land use planning process is highly recommended towards addressing land management problems. The output of the

process, however, depends on how the plan is adapted to local situation and this is reflected during the implementation of land use plans [1,19]. Existing studies on land use implementation have mostly focused on assessing urban land use plans [1,20-24]. Thus investigation of implementation of land use plans at village level has largely been ignored [19,21,25-29]. One of the important aspects that may influence effectiveness of land use plans in solving land use problems is sufficiency of land use zones for land users with different livelihood interests in land.

A zone is a piece of land designated uniformly to maximise use of one particular use though this is sometimes not exclusive to a single use [30-32]. Zones are established in land use plans in order to institute governmental planning policies as well as to enable land users such as land owners and stakeholders to acquire specific rights and interests [33]. Sufficiency of allocated land should consider the current land use needs of the society without jeopardising the future land use needs [14,34]. Hence, VLUPs should comply with sustainable development concept of including liveable community values [35]. The experience from Orumiyeh area in Iran shows that, inadequate consideration for land use sufficiency has been an obstacle to adherence to land use zones [36].

Sufficient allocation of land use zones in the land use plan is considered vital to its implementation. Sufficiency of land use zones, according to [37,38], is determined to a large extent by how the needs of land users are adequately met by the VLUP. Therefore, sufficiency of the zones may vary primarily with the size of the allocated zones although other factors such as inclusion of water sources within a zone may be important as well. Appraisal of land sufficiency based on land use zones according to VLUPs has not been conducted in Tanzania in general and in Ulunga District in particular. Thus the aim of the present study was to fill this information gap. Specifically, the study assessed: (1) the extent to which the land use zones cover all zones needed by the stakeholders, and (2) reasons for insufficiency of the allocated land use zones.

## 2. METHODOLOGY

### 2.1 Description of Study Area

Ulunga District is located to the South West of Morogoro Municipality between longitudes 35.4° and 38.0°E and latitudes 8.0° to 10.0°S (Fig. 1).

It is the largest district in Morogoro region. To the east, it borders Nachingwea District, Liwale District to the south, Namtumbo District to the south-west and Kilombero District to the north. The district area covers some 10,688.89 km<sup>2</sup>. It comprises 21 wards' and 59 villages [15,39]. About 75% of the total area is covered by protected areas (namely: Nyerere National Park (previously known as Selous Game Reserve), Kilombero Game Controlled Area, Wildlife Management Area and forest reserve). About 25% of the total land is accessible for human economic activities including agriculture.

### 2.2 Assessment of Sufficiency of Land Use Zones in the Village Land Use Plans

This study employed cross-sectional design whereby data collection was undertaken once. The study contains information which was collected between January and June 2016. Ulunga District was purposively selected due to persistent incidence of land-based conflicts despite initiation of VLUPs. Two villages were purposively selected from a list of villages with operational VLUP that was obtained from the district land office. The selection of these villages was also based on the major socioeconomic production system (farming and pastoralism) and VLUPs implemented for over three years of time when the community will have adjusted to the changes in planned land use. Other criteria for selection included a village adjacent to a communally managed wildlife conservation area while another not adjacent and accessibility of the villages by the research team.

At the village level, independent groups of female and male farmers as well as female and male pastoralists were drawn randomly from the updated village registers. Each group comprised at least eight individuals since this is a manageable size of group recommended for FGD [40]. Other groups for FGDs included Village Land Use Management Committee (VLUMC) while Participatory Land Use Management team (PLUM) were involved at district level. Key informants were purposively selected from the district and village levels. At village level, the key informants comprised Ward Executive Officer, Village Councillor, Village Executive Officer, Village Chairman and Extension Officer.

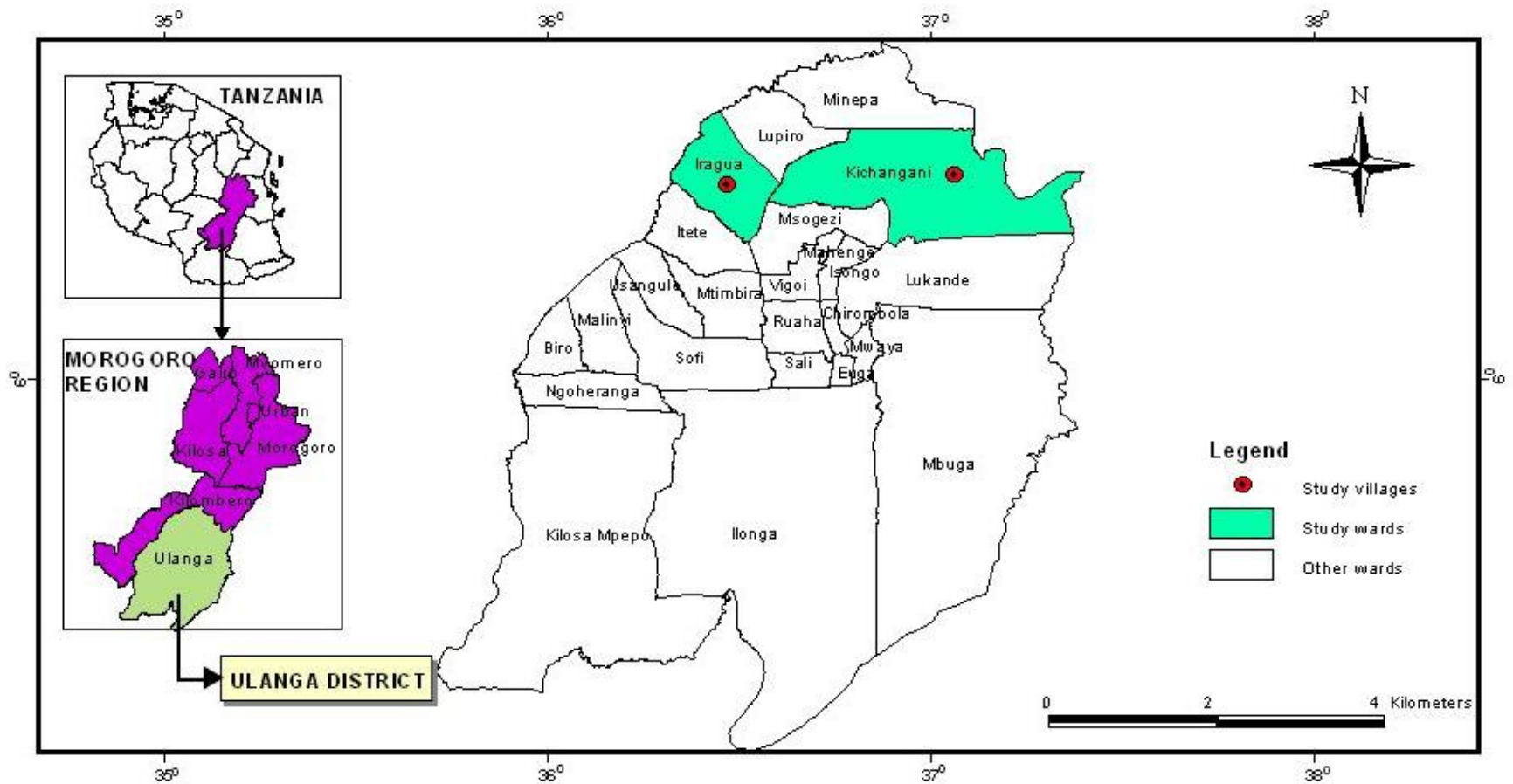


Fig. 1. Map of Ulanga District showing study villages

A total of 120 households (60 from each village) as recommended for socio-economic studies constituted a representative sample for the study [41]. Farmers, pastoralists, male and female headed households were randomly obtained from updated household register of each village with facilitation from the Village Executive Officer.

The District Land Officer was first interviewed in order to facilitate in providing the list of villages with VLUPs which were sorted according to levels of completion and time of implementation and then two villages were selected randomly from among villages with completed village land use plan. The District Land Officer organised the Participatory Land Use Management (PLUM) team for focus group discussion (FGD). Key informants' interview was first conducted with individuals from each village who were knowledgeable and had experience on the issue being discussed. The interview was used to get first-hand information, which assisted in selecting FGDs participants, writing interview guides, moderating FGDs effectively and maximizing the effectiveness of full set of interviews. A checklist of questions was used to direct the interview.

At household level, respondents were asked to give their views on the land use needs and future plans to expand land size to cater for their needs. The information collected using a semi-structured questionnaire included socioeconomic information, age and sex of household members, size of land occupied, main economic activity, duration of stay, access to land, land ownership, income, land sufficiency, land use types, land use needs, factors influencing adherence to land use plans and strategies to enforce adherence. In order to solicit community opinions and probe for more information in an open and participatory approach, it was important to apply participatory rural appraisal approach in this study. Five focus group discussions (FGD) in each village were conducted and one at the district.

Shape files for Iragua and Kichangani village land maps were obtained from the District Land officer and were used to spatially determine the size of the allocated land use zones which were further compared to the documented size of the land use zones. Documents from village and district including VLUPs, maps, records and reports were reviewed to get information on population data, rate of population increase, livestock units versus size of zone allocated, the number and size of zones and strategies for enforcement. Other sources of information were from literature reviewed from journals which

provided approaches for comparison and backing up results obtained on sufficient allocation of land use in VLUPs.

### 3. RESULTS AND DISCUSSION

#### 3.1 The Extent to Which the Land Use Zones Cover All Zones Needed by the Stakeholders

The study observed that the land use zones were allocated according to the needs of the people during land use planning. The zones were residential, grazing and agricultural, village forest, wildlife management area, wildlife corridor and wetland (Table 1,2). Discussion with different land use groups revealed that despite the allocated land use zones, the zones were insufficiently allocated with specific needs to enable adherence to VLUP. During FGD, pastoralists mentioned that they missed areas for residence within the grazing zone since for security they could not reside far from their livestock. On the other hand, agro pastoralists (Wasukuma tribe) voiced that the established zones for grazing and agriculture were also insufficient.

Insufficiency of the mentioned zones were due to the fact that they immigrated into the villages after VLUPs were established and their customary communal way of life was not in adherence to the formal zoned land use. The customary communal way of life of agro pastoralists considered settlement within the same area to allow for communal tilling of land and grazing thereby saving time and energy. Other areas mentioned were livestock paths, water points and cattle dip. Discussion with farmers who occupied the residential zone identified missing areas for expansion of village hospital, markets, construction of new schools, brick making for construction of houses and expansion of farms. Zoning based management scheme would be implementable only if a more detailed grass-root level land use zoning approach was applied [2].

The perceived sufficiency of land use zones allocated in VLUP during the study is as presented in Table 3. The study established that currently, the grazing zones for both villages were insufficient for current and future land use (Table 4). The sufficiency of the grazing zone was assessed by the number of livestock units' verses the area allocated during planning. A livestock unit is the total number of different

types of livestock (cows, goats, sheep and donkey) in relation to feed requirement used to maximise land use potential by determining the carrying capacity or stocking rate [14,42]. The zoned grazing land for Iragua village (633.34 acres) was insufficient since planning; this is because there were 975 livestock units (LU) demanding 4,290.00 acres of grazing zone. At present, there are 8,453 livestock units requiring 16,906.00 acres of land, which exceeds the forecasted livestock units (316.5) and size of zoned area (633.34 acres). This shows insufficiency of the allocated land which is beyond the carrying capacity of the allocated zone. While at Kichangani, currently there are 406 livestock units demanding 1,015.00 acres of land while the forecasted livestock units were 2,305 with 5,764 size of zoned grazing land documented in the village land use plan [43]. In

this regard, there is more than enough land zoned for grazing at Kichangani village.

The current household data (Table 6) for both villages have exceeded the forecasted number of household [43,44]. This study found that in Iragua village, the numbers of households were projected to be 1,267 by 2021 UDC (2011), but currently the number of household stands at 1,350, exceeding the forecasted number of households. Similarly at Kichangani village, currently there are 2,500 households though the projected number of households was 1,035 used to project the size of residential zone and agriculture zone. Based on these findings, the residential and agriculture zones were insufficiently allocated, therefore, a major cause of non-adherence to VLUPs and land use conflicts in the near future.

**Table 1. Definition of land use zones used in the study area**

Land use zone	Definition
Residential	Area set aside for residence. This includes buildings and their surroundings such as home gardens.
Agriculture	Area set aside for cultivation of crops.
Grazing	Area set aside for grazing of livestock. This is also where livestock should spend the night and all their life.
Village forest	Area set aside as a village forest. This may be formalized as a Village Land Forest Reserve.
Reserved forest	This is forest reserve belonging either to the Local Authority (District Government) or the Central Government (National Government) or Private Company
Wetland	An area that is either permanently or seasonally inundated in water but is not a dam or lake.
Wildlife Management	Area set aside to be used by wildlife. The area may be managed by community or central government
Wildlife corridor	An area set aside to allow passage of wildlife from one area to another across the village.

**Table 2. Assessment of inclusion of zones included in the Village Land Use Plans**

Land use zone	Land use zone included in land use plan?	
	Iragua Village	Kichangani Village
Residential	Yes	Yes
Agriculture	Yes	Yes
Grazing	Yes	Yes
Village forest	Yes	Yes
Reserved forest	Yes	Yes
Wetland	Yes	No
Wildlife Management	No	Yes
Wildlife corridor	No	Yes

**Table 3. Perception of sufficiency of land use zones considered under Village Land Use Plans**

Are the zones sufficient for land use needs	Iragua Village		Kichangani Village		Mean percentage
	Frequency	Percentage	Frequency	Percentage	
<b>Overall</b>					
Yes	2	3.30	10	16.70	10.00
No	58	96.70	50	83.30	90.00
Total	60	100.00	60	100.00	
<b>Residential and social services land use zone</b>					
Sufficient	0	0	6	10.00	5.00
Insufficient	60	100.00	54	90.00	95.00
Total	60	100.00	60	100.00	
<b>Agriculture land use zone</b>					
Sufficient	1	1.70	12	20.00	10.85
Insufficient	59	98.30	48	80.00	89.15
Total	60	100.00	60	100.00	
<b>Grazing land use zone</b>					
Sufficient	1	1.70	3	5.00	3.35
Insufficient	59	98.30	57	95.00	96.65
Total	60	100.00	60	100.00	
<b>Forest zone</b>					
Sufficient	42	70	49	81.60	75.80
Insufficient	18	30	11	15.40	25.20
Total	60	100.0	60	100.00	
<b>WMA</b>					
Sufficient	N/A	N/A	60	100.00	100.00
Insufficient	N/A	N/A	0	0.00	
<b>Wildlife Corridor</b>					
Sufficient	N/A	N/A	60	100.00	100.00
Insufficient	N/A	N/A	0	0.00	
Total			60	100.0	
<b>Wetland</b>					
Sufficient	60	100.00	N/A	N/A	N/A
Insufficient	0	0.00	N/A	N/A	N/A
Total	60	100.0			

**Table 4. Number of livestock units versus size of grazing zone. Source: UDC (2008; 2011) and Iragua and Kichangani Extension Officer**

Year	Livestock units	Size of land (acres)
<b>Iragua village (1LU=2.5 acres)</b>		
2008	975.00	4,230.00
2016	8,453.00	16,906.00
2018	316.50	633.34
<b>Kichangani village (1LU=2.5 acres)</b>		
2011	39.00	78.00
2016	406.00	1,015.00
2021	2,305.00	5,764.00

Influence on donor supporting development of land use plans may contradict government policies and guidelines during planning, where inadequate coordination between sectoral authorities and land users perpetuate non-

adherence incidence during implementation (Kauzeni et al., 1993). Such a scenario is observed in this study where the proportion of allocated land for conservation influenced sufficiency of other zones to land users

increasing incidences of non-conformance. The total proportion of conserved areas for Iragua (39.07, 10.08 and 1.68) was 50.83% while Kichangani (56.10, 3.14 and 7.64) was 66.88% where the rest of land were allocated for other uses. Similarly the proportion of conserved area in the district is more than 75% which is covered by the Nyerere National Park and Kilombero Game Controlled Area with exception of forests and Wildlife management areas, wildlife corridors, wetland which lie within the village land, whereas less than 25% of the rest of land used for human activities (UDC, 2013). In order for land use plans to be implementable the zones have to be established with an integrated approach of all sectors and land users.

Further review of the land use plan document for Kichangani village revealed that there is discrepancy in census population figures applied in the population projection formula used for land use zoning. The village government proposed amendment of household figures in the document but the necessary changes were not taken into consideration (UDC, 2011). This may have affected the size of land use zones allocated especially for farming and residence

which depend on the projection of population figures. Discrepancies were also noted in the applied population projection formula whereby 2.6% district annual population increment was applied for Kichangani village, while 2.4% for Iragua based on 2002 census data. The other inconsistency existed in the size of land for residential and agriculture uses whereby the average land size for both villages differed.

Majority of the respondents (90.00%) said that they were willing to expand their land size to cater for their needs (Table 8). When asked further on the land use zones which they considered to cater for their land needs, most of the respondents (50%) considered the WMA while (38.30%) opted for reserved forest. In Kichangani village (58.00%), respondents mentioned the wildlife management area zone followed by village forest (27.5%) and reserved forest (14.50%). The alternative areas like Kilombero game controlled area (KGCA) (33.30%), buffer zone (27.50%), neighbouring villages (25.50%) and KVTC (13.7%) were pointed out by respondents from Iragua village. This is a threat to conserved zones which have arable virgin land.

**Table 5. Number of households and size of residential and agriculture zones. Source: UDC (2008; 2011) and Iragua and Kichangani Village Government**

Year	Number of households	size of residence zone	size of agriculture zone
Iragua village			
2011	925	1,652.90	201.37
2016	2,500	8,485.17	10,646.79
2021	1,035	3,512.86	4,407.77
Kichangani Village			
2008	980	688.78	2,961.28
2016	1,350	1,379.34	4,793.23
2018	1,267	1,294.54	4,498.54

**Table 6. Size of planned zones documented in Iragua Village Land Use Plan versus size of calculated zones mapped and proportion of each zone**

Land use zones	Size of land by 2018 Documented (acres)	Size of land Calculated in 2016 (acres)	Proportion (%) of land use zone
Village Forest	6,800.80	6,706.20	39.07
Agriculture	4,407.77	4,469.50	25.33
Residential	3,512.86	3,510.33	20.18
Nambinga Forest Reserve	1,755.08	1,752.06	10.08
Grazing	633.34	646.35	3.64
Wetland	294.73	302.56	1.69
Total	17,404.58	17,377.00	100.00



**Table 7. Size of land use zone documented in Kichangani Village Land Use Plan versus size of calculated zones mapped and proportion of each zone**

Land use zone	Size of land documented in 2011 (acres)	Size of land calculated in 2016 (acres)	Proportion (in %) of planned land use zone
Wildlife Management Area (WMA)	20,057.62	24,700.00	56.10
Agriculture	4,498.54	4,384.12	12.58
Residential	1,294.55	683.77	3.56
Village forest	1,123.83	1,096.75	3.14
Grazing	5,764	1,271.37	16.12
Wildlife corridor	2,740.92	2,738.69	7.67
Kilombero Valley Teak Company (KVTC)	270.03	265.79	0.74
Total	35,754.75	34,874.70	100.00

**Table 8. Views of respondents on plans to expand land size to cater for their needs**

Plans in future to expand land size	Frequency	Percentage
Plans in future to expand land size		
Yes	108	90.00
No	12	10.00
Total	120	100.00
Reasons for expanding land size in future		
Increase agriculture production	39	36.10
Inheritance for family members	28	25.90
Improve livelihood	19	17.60
Increase income	22	20.40
Total	108	100.00
Land size currently needed to cater for needs		
1 to 10 acres	83	76.90
11 to 30 acres	18	16.70
31 to 60 acres	4	3.70
61 to 100 acres	3	2.80
Total	108	100.00
Land use zones to cater for extra land needs		
Reserved forest	10	14.50
Wildlife Management Area (WMA)	40	58.00
Village forest	19	27.50
Total	69	100.00
Alternative area considered to cater for needs		
Buffer zone	14	27.50
Kilombero Game Controlled Area (KGCA)	17	33.30
Kilombero Valley Teak Company (KVTC)	7	13.70
Neighbouring villages	13	25.50
Total	51	100.00

### 3.2 Reasons for Insufficiency of the Allocated Land Use Zones

The reasons given by the respondents on why they thought the allocated zones were not sufficient to cater for their needs are summarized in Table 9. The majority (66.7% and 54.1%) of the respondents in the district said the main reason for insufficiency of residential and agriculture allocated zones were due to increased human population relative to the

available zones respectively. Moreover, poor land acquisition procedure (16.7%) was the second main factor that caused land insufficiency for residential zone. In addition to increased population, the agriculture zone was affected by limited agriculture potential areas specifically for paddy production and mixed uses within the same zone.

The main reason for insufficiency of grazing zone (Table 9) was said to be due to mixed uses in

allocated zone for grazing (55.0%), invasion by immigrants (18.4%), overstocking of livestock (15.0%) and insufficient land allocated for grazing (6.2%). The insufficiency of the area allocated during planning increased level of encroachment and deforestation (75.0%), population increase (15.0%) and poor agricultural practices (10.0%). The forest zone was considered insufficient mainly due to deforestation (48.3) and missed woodlot (46.7%).

In different socio-economic settings to those of the study area in Nepal, it was reported that fast growing population, internal migration, unmanaged and rapid urbanization were associated with encroachment over arable lands, forests, government and public lands as a repercussion of gaps in land use planning [1]. Land reforms that promote conservation have been suggested as a way to increase sufficiency of forests in Indonesia [7]. Conservation could help maintain forests and hence prevent insufficiency of the forest zone reported in the current study. Insufficiency in land use is a common problem in Tanzania when there are more livestock than what the explicitly or implicitly zoned grazing land can support and the livestock use croplands for grazing [45].

A single use zoning procedure is applied in the country without consideration of the land users' social and cultural values that may influence

adherence to the plan. In order to save time and labour force, the agro-pastoralists groups expressed their cultural and communal behaviour of residing, tilling land and looking after livestock together, which led to insufficiency of specific allocated land use. Native farmers groups (pure farmers) accused illegal immigrants (agro-pastoralists) of invading the allocated zones without following the required land acquisition procedures.

During FGD with land use groups, the village authority was accused of corruption in allocation of land whereby some agro-pastoralists were accused of bribing the leaders to acquire land without following the required procedures. Interview with the District Land Office further revealed that zoning criteria were sector guided and in certain circumstances donor initiated VLUP had influenced allocation of zones. The District Land Officer gave an example of the WMA zones which were established prior to the actual zoning process during land use planning. Lack of clear zoning regulation that would harmonise socio-economic and ecological uses within each zone rendered insufficiency of some land use zones as observed in this study. Review of the land use plan does not show the size of village land leased to investors such as the Kilombero Valley Teak Company (KVTC) even though it was within the same mapped village boundary.

**Table 9. Reasons for insufficiency of the allocated land use zones**

Category label	Frequency	Percentage (%)
<b>Residential zone</b>		
Increased population	55	66.70
Illegal land acquisition procedures	39	26.30
Poor land use implementation	26	7.00
Total	120	100.00
<b>Agriculture zone</b>		
Increased population	65	54.2
Limited agriculture potential areas	40	33.3
Mixed uses	15	12.5
Total	120	100.00
<b>Grazing zone</b>		
Mixed uses in allocated zone	66	55.00
Invasion by immigrants	22	18.40
Overstocking of livestock	18	15.00
Insufficient land allocated for grazing	14	11.60
Total	120	100.00
<b>Forest zone</b>		
Increased deforestation	58	48.30
Missed woodlot	56	46.70
Increased population	4	3.40
Poor agricultural practices	2	1.60
Total	120	100.00

Based on the same argument, increased population increases land use demand which in turn leads to insufficiency of the allocated zones; thereby, calling for revision of allocated zones to ensure that VLUPs are adhered [30]. In another study, the illegal land use and transfer rights led to insufficiency of the allocated zones in some of the study villages while the agriculture zones were affected by shifting cultivation practices [46]. Insufficiency of the livestock zone was mainly attributed to lack of infrastructure and inadequately allocated livestock zone to cater for the number of stock [47]. Corruption was a key factor identified to influence sufficiency in allocation of land to different users [48].

Additionally, village officials and residents misallocate zoned land uses to other users through selling [49]. Lack of security of tenure rendered communally owned zones such as livestock keeping zone, to be vulnerable to change in uses by village council [49]. Sufficiency of allocated grazing zone is limited by mobility and flexible behaviour of pastoralists as an adaptation to climate change and resources [48].

#### **4. CONCLUSION AND RECOMMENDATION**

Based on the findings of this study, it is apparent that the implementation of village land use plans in both Iragua and Kichangani villages in Ulanga District was not done as expected. Further, the study assessed sufficiency of the allocated zones and found that land use zones were insufficient in terms of the allocated size and needs within the zones. The study observed that the allocated land use zones were insufficient for current and future situation because of increasing population, overstocking, and lack of infrastructure necessary within specific zones. Other factors included inadequate consideration for uncertainties in population projection standard, unclear zoning regulation and discrepancy in population data.

Based on the findings and conclusions, this study makes the following recommendations. First, this study established that sufficiency of the land use zones was affected by insufficient needs within land use zones due to incomplete planning process. The study, therefore, recommends that the National Land Use Planning Commission should devise mechanisms to ensure that all the six steps of land use planning are completed towards implementable land use plans. Secondly, the national land use planning commission should review zoning standards to sufficiently

allocate the land use zones. The population projections used for future allocation of land had influence on the sufficiency of the zones where the rate of population increase is assumed to be fixed throughout the ten years implementation period without consideration of uncertainties. It is worth incorporating GIS to establish trend of land use and forecast future land use to sufficiently allocate land during the 10 years lifespan of the VLUP. Thirdly, the national land use planning commission need to validate spatial data and population data at village level to avoid discrepancies which affect implementation of the village land use plans.

#### **DISCLAIMER**

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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#### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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