

## **Integrating Resilience in the Urban Planning Process in Mlandizi Town: An Approach Towards Promoting Comprehensive Over Piecemeal Planning**

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### **Abstract**

Urban resilience is one of the prominent themes in urban development discourse. Its importance resonates with the quest to balance rapid urbanization and adaptation to climate change and variability, which raises the need for building adaptive capacities within urban system. Despite the rapid urbanization in Mlandizi, Tanzania, the town is planned on a piecemeal basis that lacks a holistic view of the urban system. While the integration of urban resilience into the urban development planning process is effective for building adaptive capacities, piecemeal planning raises questions about its effectiveness to integrate the tenets of resilience for addressing a wider range of climate risks, shocks and stresses. This paper ascertained the extent to which piecemeal planning integrated urban resilience into the planning process in Mlandizi small-town. Mixed-research methods were used involving geospatial mapping, in-depth interviews and field observation. Land use/cover change analysis and mapping of urban development were conducted in piecemeal planned areas. Susceptibility to flooding was assessed in the Ruvu river floodplain through an overlay of houses on the Digital Elevation Model. In-depth interviews and field observations were conducted to ascertain the urban resilience outcomes of piecemeal planning. Results suggest that informal urbanization constitutes 90% of the housing development in Mlandizi. There is also rapid land use change and conversion of the natural landscape to man-made land uses, which results in diminishing green spaces. The results further indicate that the piecemeal planning process ignored consultation of stakeholders and strategic environmental assessment. As a result, it failed to provide an appropriate policy for integrating urban resilience with spatial planning. This paper argues for the adoption of comprehensive planning that integrates resilience in urban planning processes, and builds capacity for addressing a wide range of shocks, including the impacts of climate change.

**Keywords:** *resilience, urban planning, piecemeal planning, vulnerability,*

### **1. Introduction**

Urban resilience is among the prominent themes in urban planning and development discourse (Collier et al., 2013; Meerow et. al., 2016; Glaeser, 2021). The intention is to address the impacts of climate change and variability on the livelihood assets of urban populations. Urban resilience has been defined differently by various scholars (Collier et al., 2013; Meerow & Stults, 2016;

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Shamsuddin, 2020). This paper draws insights from Collier et al. (2013), whose definition of urban resilience focuses on building adaptive capacities within an urban system. The adaptive capacities of an urban system depend on the planning for climate change in urban areas, which requires integrating climate change into urban development planning (Eum et al., 2013; Wamsler et al., 2013; Dowling et al., 2019; Glaeser, 2021). According to Fleischhauer (2008), urban planning has the potential of integrating environmental, socioeconomic and institutional structures for promoting adaptation to climate change risks. Such structures are likely to enhance the capabilities of cities and local authorities to build resilience capacities of their residents and infrastructures to cope with climate-related risks.

This paper adopts a policy process approach (Birkland, 2015) to ascertain the potential of integrating climate change into the urban planning process. Collier et al. (2013) consider local land-use planning policies to be an integral part of the dimensions of urban change. Additionally, Eum et al. (2013) counselled on the potential for integrating climate information into the master planning process. Such practices help to map existing urban green spaces, landforms, land-use practices, as well as urban temperature and heat variations. The analysis of spatially distributed climate and resilience attributes provides vulnerability information that can be integrated into urban land-use plans (Eum et al., 2013; Wamsler et al., 2013; Cariolet, 2019).

Integrating climate and vulnerability information in the master planning process, for example, has the potential of producing land-use policies that will, among other things, regulate urban micro-climate and air quality (Satterthwaite et al., 2007; Wong et al., 2011). Certainly, comprehensive planning has the potential for integrating climate and urban resilience because it considers all spheres of life in an urban setting. Drawing from Fleischhauer (2008), a comprehensive urban planning process has the potential for integrating environmental, socio-economic and institutional structures. Thus, it is likely to promote resilience and sustainability in urban areas. However, the current urban resilience literature has focused on cities, while small towns have not been covered (Strzelecka, 2018; Lazzeroni, 2019).

Mlandizi town is among the rapidly urbanizing centres in Tanzania (Yamungu, 2019). According to the 2012 census, the town's population stood at 38,832 (URT, 2013). Mlandizi maintained an average annual urbanization rate of 6.5% for 34 years, from 1978 to 2012 (Yamungu, 2019). The rapid urbanization rate in Mlandizi is influenced by its location along Morogoro road, which is the main transport corridor in Tanzania; as well as being located 65km west of Dar es Salaam city. The growing population is evidenced by the town's spatial development. For example, from 1995 to 2016 the land used for urban functions

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increased by 401%, from 219ha in 1995 to 1099ha in 2016, which is an indication of the rapid urbanization in the small town (ibid.). Despite the rapid urbanization, the small town has been planned on a piecemeal basis.

Small towns do not adequately feature in the urban resilience discourse (Strzelecka, 2018; Lazzeroni, 2019). However, considering the potential growth of small towns, it is worth including them in the urban resilience discourse because a considerable proportion of urban populations live in them (Pelser et al., 2012; Satterthwaite, 2016). Again, small towns have growth potentials and can play an important role in their regional and countries' economic growths (Bryceson, 2011; Berdegúe & Soloaga, 2018; Emran & Shilpi, 2018). Lazzeroni (2019) has argued that the resilience of small towns depends on their ability to understand change, the role of actors in defining development vision, and the ability for self-organisation. These criteria correspond to those of Fleischhauer (2008), who summarized it all into environmental, socio-economic and institutional structures. Such factors are key issues considered by comprehensive planning, which provides the potential for achieving resilience and sustainability. This paper ascertained the extent to which piecemeal planning in Mlandizi small-town has contributed to urban resilience and sustainability.

#### ***1.1 Conceptualization of Piecemeal Planning Approach***

Piecemeal planning means ad-hoc, step-by-step, or doing in small stages: all of which are characterized by being unsystematic (Tewdwr-Jones, 2002; Chigara et al., 2013). In this paper, piecemeal planning means the process of preparing urban layout plans in the absence of a master plan for guiding detailed land-use planning (Yamungu, 2019). As a form of planning approach, piecemeal planning has been used by different professions and academic disciplines: spatial planning (Yamungu, 2019; Chigara et al., 2013; Ünlü, 2011), economics (Witt, 2003; Kocherlakota, 2010); information system planning (Peffer et al, 2003; Gauld, 2007); and environmental planning (Berke & Conroy, 2000; Jabareen, 2006). All the literature in these professions and disciplines indicates many shortfalls of piecemeal planning. The weaknesses lie in its short-term focus, which breaches sustainability (Blackorby et al., 1991; Yamungu, 2019).

Piecemeal planning creates a favourable environment for urban sprawl, incompatible land uses, uncoordinated spatial development, and unfriendly environmental practices (Chigara et al., 2013; Sawyer, 2014). According to Dowling et al. (2019), piecemeal planning fails to promote transformation because it fails to make a comprehensive situational analysis. The shortcomings of piecemeal planning have many profound implications for the socio-economic and spatial development of residents in urban areas. While socio-economic implications take a long time to manifest, spatial implications take short time to be felt. It has been advanced that the weaknesses of piecemeal urban planning can be addressed by integrating it with comprehensive planning (Yamungu, 2019; Soltani, 2022).

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Despite the weaknesses of piecemeal planning, the approach has been adopted in some cities and rapidly urbanizing small towns in sub-Saharan Africa (Chigara et al., 2013; Sawyer, 2014; Yamungu, 2019). For example, the ongoing informal settlement regularisation in Tanzania is being implemented piecemeal across cities and small towns. The adoption of piecemeal initiatives for urban development planning is mainly influenced by constraints of human, technological, and financial resources (Dowling et al., 2019; Yamungu, 2019). Considering its planning outcomes and their implications, piecemeal planning is regarded as inappropriate for achieving transformation, resilience, and sustainable urban development.

### ***1.2 Theoretical Perspective on Urban Planning in Developing Countries***

The planning theory in developing countries is currently oriented toward southern urbanism (Miraftab, 2009; Watson, 2009a, 2014; Comaroff & Comaroff, 2012; Oldfield & Parnell, 2014; Roy, 2014). This theoretical orientation resonates with Michael Dear's (2000: 36) assertion on the "... revolt against the too-rigid conventions of existing methods and practices." Proponents of southern urbanism challenge the dominance of planning ideas from the global north. Their argument is based on the differences between the planning realities of the global north and those of the south. Southern urbanism advocates for developing theories and subsequent practices based on the realities of the cities of the global south. Thus, they challenge the universality of northern-driven ideas because they cannot be effectively applied in contexts other than from which they emanate. Watson (2009) argues for learning from planning practice as a strategy for developing a theory for the global south.

The realities of cities of the global south are many and diverse. They include the proliferation of informal settlements, where in some countries the proportion of households living in such areas ranges between 16–75%. Certainly, informal settlements increase with the rate of urbanization, as well as associated risks (Huchzermeyer & Karam, 2006; Zweig, 2016). Other challenges include low capacities of local governments, land tenure management, poor infrastructure, and access to urban services. These urbanization challenges in the global south have rendered non-preparation of master plans. The adoption of other approaches like piecemeal planning makes plans ineffective for managing urban development (Sharifi & Yamagata, 2014; Kasala, 2015; Yamungu, 2019). The abandonment of master plans and the adoption of piecemeal plans explain the revolt against the rigid master planning approaches in small towns. The adoption of piecemeal planning in small towns is a manifestation of the influence of local realities on planning practices in the global south.

Urban planning in developing countries has been associated with cities, while ignoring small and emerging urban settlements (Knox & Mayer, 2013). Consequently, small towns have been side-lined by urban planning authorities. Many such towns remain without formal planning even after they have been

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declared for urban planning (Yamungu, 2019). As aforementioned, small towns have contributed enormously to socioeconomic development of countries and regions (Cottyn, 2018; Donaldson, 2018; Emran & Shilpi, 2018). However, their categorization as rural areas in some developing countries has rendered them ineligible for urban planning financing (ibid.). This situation has influenced town planners to adopt planning practices that correspond to the capacities of their institutions, even though such practices cannot enhance resilience to climate change-related risks and vulnerabilities.

Urban resilience as a concept for guiding urban development has focused on cities (Setyono et. al., 2018; Strzelecka, 2018; Lazzeroni, 2019). Thus, the non-existence of urban planning policies for small towns is likely to weaken their resilience capacities, as well as the socio-economic development of their residents. As a result, this lack of policies for guiding comprehensive planning for small towns has affected their ability to adapt to climate change, whose impacts are constantly increasing. So, the need to develop theory and planning practices based on southern realities should also consider the integration of urban resilience in the spatial development plans of small towns. The integration of environmental, socioeconomic and institutional structure fits well in the tenets of comprehensive planning approaches that consider the city as a system.

Master plans, as a form of comprehensive planning, draw theoretical insights from the system theory developed by Ludwig von Bertalanffy in 1956. The theory draws on ecological relationships and social systems to acknowledge the interactions that exist between various components of a system. The system theory is informed by modernist rationalities on the reliance on science and comprehensive analysis. It has always been a key analytical framework in the urban planning profession (McLoughlin, 1969; Forrester, 1971; March, 2010). The theory emphasizes the ordering of components as a system by taking cities and towns as sets of connected parts (Taylor, 1998). This requires considering all components of an urban system in the planning process because their functionality depends on their interconnections. As a system, an urban area's resilience and sustainability depend on the interrelationships and interconnectedness of environmental, social, economic, and spatial components in its system.

Master plans are prepared based on a comprehensive analysis of human activities with available natural resources, biodiversity, and ecology. Analysis helps to plan for various land uses; including recreation, commercial, residential, industrial, and the associated infrastructure. Master plans have played a great role in managing urban environments and landscapes (Namangaya, 2013; Mabaso et al., 2015; Soltani, 2022). Such plans have always provided holistic and comprehensive consideration of social, economic, and environmental domains of urban development. Moreover, the merits of urban master plans rely on their ability to provide a development vision for ecological elements, infrastructure and future land-use

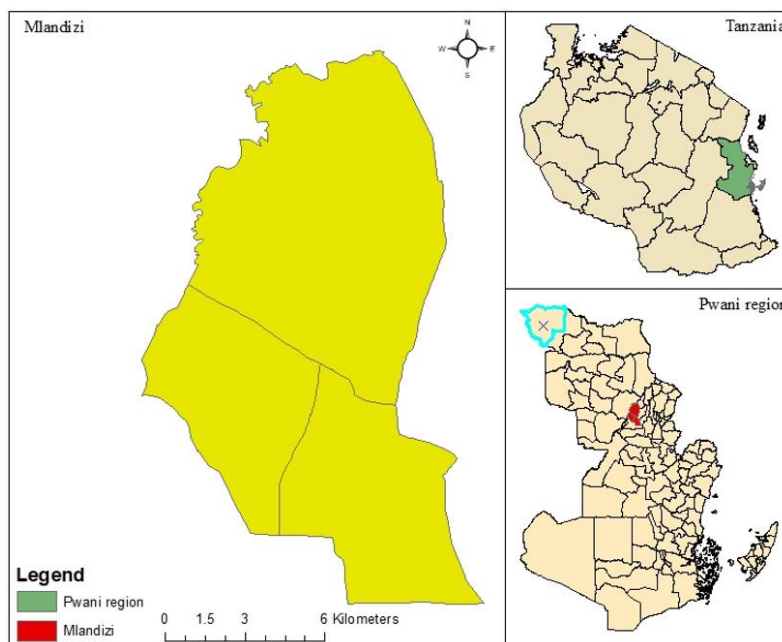
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organization (Namangaya, 2013). Thus, master plans stand a better chance of promoting an integrated and systematic incremental urban development for promoting resilience and sustainability (Berke & Conroy, 2000; Ünlü, 2011).

## **2. Methods and Materials**

### **2.1 Description of the Study Area**

Mlandizi, a rapidly urbanizing small town, is located 65km west of Dar es Salaam city (Figure 1). The town is in the Kibaha district, Tanzania, between 6°42'.00"S and 38°43'59.99" E (Kibaha District Council, 2007).



**Figure 1: Location of the Study Area**

Source: URT, 2012

Mlandizi is the second largest urban centre in the district after Kibaha town. It covers 16,271ha; and is divided into three administrative wards: Mlandizi, Kilangalanga and Janga. Mlandizi town grew from a rural settlement, whose concentration of population was triggered by the construction of the tarmac road that links Dar es Salaam port with the larger interior parts of the country.

### **2.2 Data Collection Methods**

A mixed-methods research design was employed for this study. Both quantitative and qualitative methods were used to collect data for the research. Purposive sampling was used to obtain informants. Quantitative data included spatial

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analyses of 109 layout plans using a Geographical Information System software (ArcGIS 10.5), land-use mapping, classification, and analysis of Landsat and Sentinel satellite images. Land-use mapping and analyses helped to establish the extent and direction of land-use and land-cover change in the small town, as well as the spatial development patterns. Qualitative data were collected through in-depth interviews, focus group discussions, and field observations.

Spatial analyses involved various spatial data and techniques to establish spatial implications of piecemeal planning practices. First, was the determination of the extent of land-use/land-cover changes over the past 20 years. This process was based on 10-meter resolution satellite images for 1995 and 2016 obtained from Landsat and Sentinel 2, respectively. An unsupervised classification method was used to generate land-cover types that were used to establish land-use change. The second stage involved obtaining layout plans from the Ministry of Lands, Housing, and Human Settlement Development. A total of 109—out of 120 (91%) urban planning layouts—were collected for analysis. These layout plans were digitized, then combined to create a mosaic which was used to analyse land-use compatibility, the proposed location of various services, and the connectivity of proposed linear infrastructure networks.

The third stage involved the digitization of existing buildings based on Google Earth images. This involved an overlay of the town's boundaries over the Google image, followed by the digitization of all buildings within the boundaries. Thereafter, the section of the Ruvu river crossing through Mlandizi was digitized and buffered by 250 meters. The buffer of 250 meters was used because this area's altitude is below 5 meters above sea level. This was arrived at after making several iterations, which established the buffer of 250 meters as a suitable lower-level cut-off line in which vulnerability to human activities is high. In addition, a digital elevation model (DEM) was obtained from the Earth Explorer for raster reclassification. This helped to obtain different elevation classes for detecting susceptibility to flooding. Next, the building layer was overlaid on the elevation classes to determine the proximity of buildings to flood-prone areas.

In-depth interviews were also conducted involving a town planner, one economic planning officer, a principal urban planning officer in the Ministry of Lands, Housing and Human Settlements Development (MLHSD), a senior urban planning officer in the Ministry of Local Government, and a ward councillor. In addition, two representatives of private sector planning firms involved in planning and land delivery were also interviewed. These informants were selected on the grounds of their roles and experiences in planning and approval processes. Interviews lasted for an average of an hour. One FGD was conducted with local leaders to gain an understanding of their perceptions of the role of town planners and the adoption of piecemeal planning practices. Lastly, field observation was conducted to familiarise

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with existing social, economic, spatial, and environmental conditions resulting from piecemeal planning. Also, field observation was combined with ground truthing to verify data obtained through spatial and non-spatial data collection methods.

### **3. Results and Discussion**

#### **3.1 Rapid Urbanization and Piecemeal Planning**

Rapid urbanization is evident in Mlandizi while its population increases at an average annual rate of 6.5% (Yamungu, 2019). Rapid urbanization influences the development of informal settlements, where 90% of the residents live. The urbanization rate in Mlandizi has surpassed formal land and housing delivery, which has influenced the development of informal settlements and activities. Thus, piecemeal planning is regarded as an alternative approach to controlling the development of informal settlements in Mlandizi (ibid: 2019). During an interview with the Mlandizi town planner in February 2017, he pointed out:

*“The Council supported the preparation of layout plans in a piecemeal manner as a strategy for controlling the development of unplanned settlements.”*

The town planner claimed that, where layouts plans had been prepared and implemented, they have helped to administratively control the development of informal settlements, as in the Kisabi, Vikuruti, Kilangalanga, and Misufini areas.

However, this claim is contrary to the urban planning procedure in Tanzania that requires the preparation of master plans (general planning schemes) that are spatially implemented through a series of layout plans (detailed planning schemes). Section 9 of the Urban Planning Act No. 7 of 2007 requires the preparation of master plans for guiding detailed planning to achieve sustainable development. Again, a Principal town planner in the Ministry of Lands, Housing and Human Settlement Development said during an interview that: “... piecemeal planning has no theoretical basis, but has a practical basis.” This assertion explains why town planners practise planning contrary to section 9 of the Urban Planning Act. Considering the realities that confront town planners, piecemeal planning was regarded as a practical strategy for providing planning solutions in Mlandizi small-town.

Local realities that influence urban planning in Mlandizi include low institutional capacities for both human and financial resources. The town is also characterised by informal urbanisation, customary land tenure, and associated informal land market that require planning attention. Again, political influences affect the allocation of available meagre resources; while the role of the private sector in planning and land delivery refocus urban governance on commercial motives. The interplay among these factors created a complex situation that influenced town planners in the local government to adopt piecemeal planning.

Since its declaration as an urban planning area in 2001 (URT, 2001), Mlandizi remained without any formal urban plan until 2009 when the first layout plan was



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prepared (ibid.). By 2017, a total of 120 layout plans were in place (of which, only 109 were obtained for this study). The layout plans cover 323 plots with 5,135ha, which is equivalent to 32% of the township area (16,271ha) as indicated in Table 1.

**Table 1: Layouts Plans Prepared in Mlandizi, 2009-2017**

Year	Layout Plans	Total Number of Plots	The average Number of Plots per plan	Total area (ha) of Plans	Average Area (ha) of Plans
2009	2	1236	618	176	88.0
2010	7	2506	358	428	85.6
2011	24	7378	321	819	68.3
2012	13	5363	413	514	54.1
2013	13	4269	388	348	43.5
2014	13	6168	474	924	71.1
2015	10	3138	314	392	43.6
2016	24	4485	236	1303	76.6
2017	3	671	224	231	77.0
<b>Total</b>	<b>109</b>	<b>35 214</b>	<b>323</b>	<b>5135</b>	<b>47.0</b>

Source: Field data, 2017

A summary of the layout analysis results indicates that the number of layout plans prepared per year have not been constant. The number of layout plans prepared per year increased for the first three years up to 2011, then dropped. The number of layout plans increased again in 2016 and dropped in 2017. In 2017 only three layout plans were obtained. This low number of layout plans was probably attributed to the timing of the data collection conducted in March, which could have increased if the layout plans for that year (2017) were collected towards the end of the year. This demonstrates that layout plans prepared in a piecemeal manner are characterised by poor coordination, and also by not being integrated with government plans for infrastructure and utility services. Thus, over 80% of the piecemeal planned neighbourhoods in the town remained un-serviced and lacked critical infrastructure services such as water supply, access roads and stormwater drainage.

It is clear, in this case, that piecemeal planning approach focused on housing delivery by increasing the number of surveyed plots. The lack of basic infrastructures and utility services in the planned areas attests to the weaknesses of piecemeal planning in promoting resilience and sustainability. The planned area in Mlandizi has 35,214 plots, and assuming each plot is inhabited by one household, it will mean that the area will house 211,284 people. Accommodating such a big number of people in the context of poor infrastructures and delivery of utility services has the potential of exposing residents to disaster risks.

### **3.2 Diminishing Urban Green Spaces**

Rapid urbanization and piecemeal planning practices have contributed to the shrinking of urban green spaces in Mlandizi. Pieces of evidence from land-use/land-

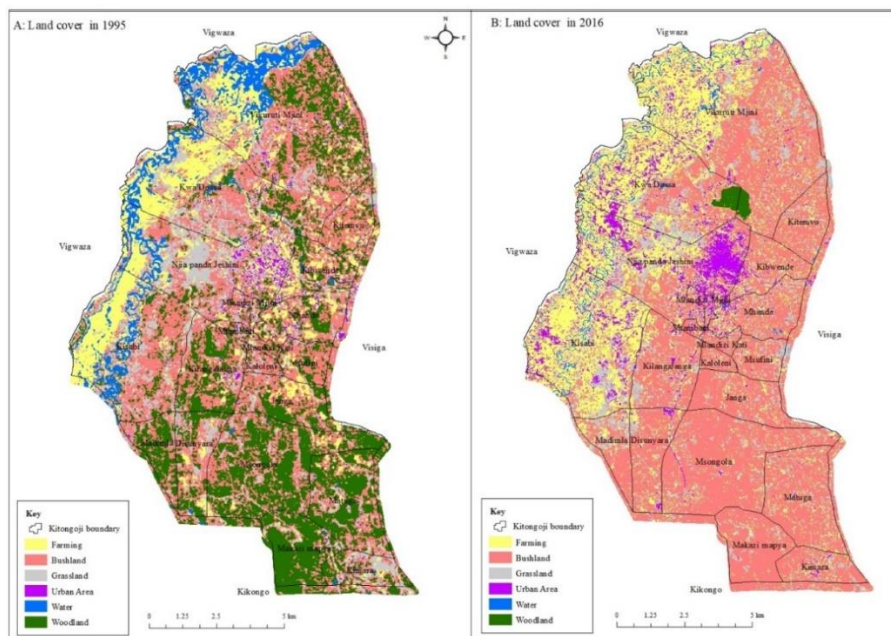
cover change analysis of satellite images for 1995 and 2016 established the extent of the spatial expansion of Mlandizi small-towns, as well as the diminishing of green spaces. During the period under analysis, the urban area increased in size from 219ha in 1995 to 1099ha in 2016 (Table 2 and Figure 3). This means that the urban area increased by 401.8% in the two decades. Other forms of land cover and their respective percentage increases (decreases) are farming (93%), bushland (44%), grassland (-20%), water resources (-77%), and woodland (-98%).

**Table 2: Land Use and Cover Change in Mlandizi**

Year/use	Agriculture	Bushland	Grassland	Urban area	Water	Woodland
1995	2306	5817	2583	219	895	4450
2016	4448	8350	2068	1099	206	100
Change	2142	2533	-515	880	-689	-4350
Percentage	92.9	43.5	-19.9	401.8	-77.0	-97.8

Source: Field data, 2017

Rapid population growth and urbanization influenced the conversion of land initially covered by grassland, waterbodies, and woodland (Figure 2). For instance, in 2016 only small pockets of woodland (100ha) and water resources (206ha) remained in the northern part and along the Ruvu river valley (yellow colour), which is dominated by farming; while the southern part was completely converted to bushland, grassland and settlements (Figures 2 and 3).



**Figure 2: Land Cover Change in Mlandizi Between 1995 (A) and 2016 (B)**  
Source: Landsat, 1995 & Sentinel, 2016

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Population growth rate and associated land-cover conversion raise an alarm for diminishing green spaces. This trend challenges the ecosystem's ability to maintain its natural functionality, as well as the capacity of green vegetation in regulating micro-climate. Such aspects are hardly considered during the preparation of piecemeal plans. The Mlandizi town planner mentioned during an interview that the preparation of layout plans was guided by the planning and space standards that are provided by urban planning regulations. The regulations provide standard requirements for each land-use category, including for the conservation of environmentally sensitive areas and water sources. In addition, there was no evidence that stakeholder participation was conducted. Thus, no stakeholder opinions were included in the piecemeal plans: thus, some sensitive environmental issues of concern were ignored.

A master planning process is an ideal approach for conserving nature and green spaces. The process is well coordinated by an established steering committee responsible for coordinating the planning process. Again, stakeholder consultative meetings ensure that all important city structuring elements—including green spaces, urban parks and environmentally sensitive areas—are considered. The steering committee is responsible for overseeing the planning and implementation of the plan, thus ensuring its effectiveness.

Considering the rate at which Mlandizi is urbanizing, piecemeal planning is likely to hasten the degradation of all-natural vegetation and ecological hotspots. Comprehensive planning has the potential of designating environmentally sensitive areas for conservation. Again, the conservation of green spaces and ecological hotspots has the possibility of adopting nature-based solutions for urban development.

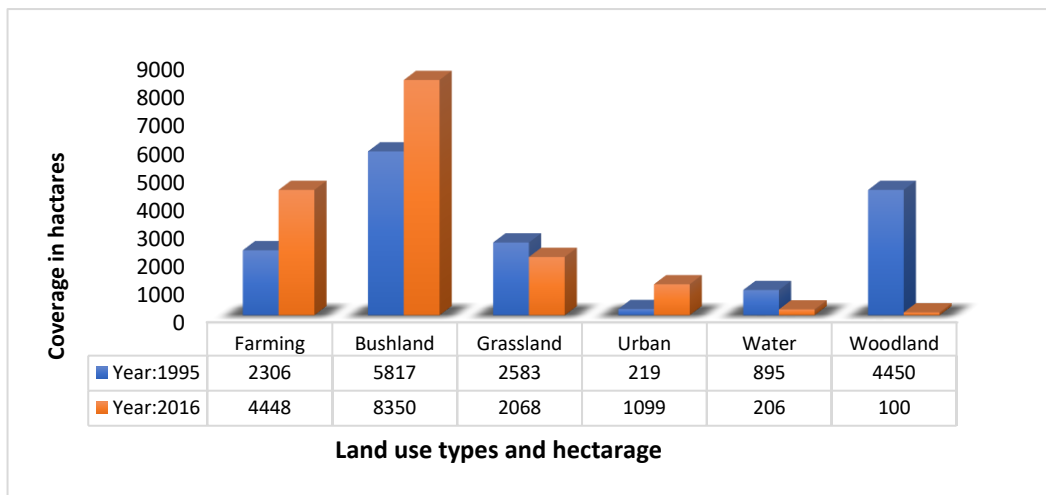
### ***3.3 Rapid Expansion of Settlement Over Other Land Uses***

Mlandizi is dominated by unguided human-induced land-use activities that convert land from its natural state to urban uses. The change involves the conversion of natural landscapes into man-made land uses dominated by settlements and farming expansion. Land-use change analysis for 1995 and 2016 indicates that the area covered by woodland declined by 98% within two decades. Woodland was converted to other increasing land uses, namely: urban area (401%), farming (65%), and bushland (58%). Land uses of which their area coverage declined include grassland and water resources (Figure 3). The decline of some land uses was attributed to the land-use trajectory in the town; where some land uses are main, and others transitional. Bushland and grassland in this case are the emerging transitional land cover from woodland to farming and urban area. This implies that, at some point, woodland and transitional land uses will be converted to urban land use.

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The urban area in Mlandizi is mainly dominated by settlements, and a small proportion by other land uses like infrastructure and social services, open spaces, and public buildings. The development of settlements in Mlandizi is highly (90%) dominated by informality, with only 10% of it being planned. Piecemeal planning has influenced urban sprawl to remote areas like Kimara, Vikuruti, Makazi Mapya, and Kisabi. Such settlements are sporadically scattered, and some are planned even in ecologically sensitive areas like the Ruvu river floodplain.

Land-use change indicates a successive trend from natural to man-made uses (Figure 3). Areas covered by natural vegetation—woodland and grassland—as well as areas covered by water bodies, have significantly decreased; while bushland, farming, and urban areas have increased. Land-use change is inevitable in the context of rapid urbanization. Thus, comprehensive land use planning must be adopted to guide spatial development for sustainable development.



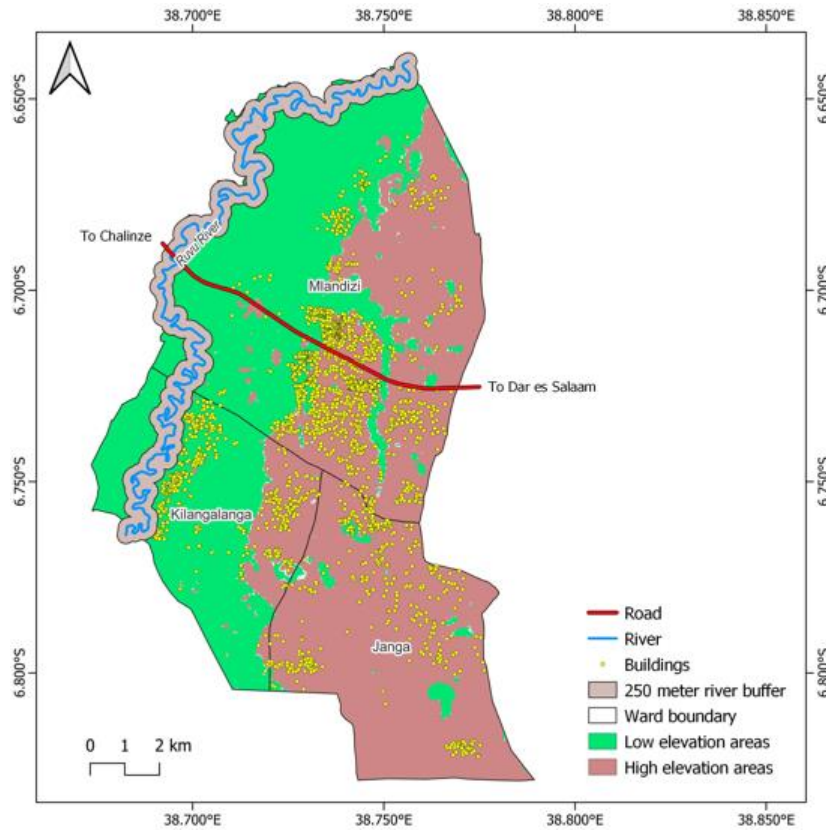
**Figure 3: Land Use Change Between 1995 and 2016**

Source: Field data, 2017

### **3.4 Settlement Development in Flood-prone Areas**

The Ruvu river flood-prone areas have been developed for various uses. Piecemeal planning has influenced settlements and institutional developments in the river valley due to the existence of approved layout plans. The preparation of layout plans in these environmentally sensitive and flood-prone areas has legalized the established settlements. Spatial analysis involving an overlay of elevation classes and existing buildings indicates that about 21% of the buildings in Mlandizi are found in low-elevation areas, which increases susceptibility to flooding (Figure 4).

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**Figure 4: Susceptibility to Flooding**

Source: Field data, 2017

Urban development activities have been on an increase in the Ruvu river floodplain, including the construction of the Kibaha District Council offices, industries and residential units. Such developments are a result of piecemeal planning and informality. Housing development in such areas is likely to increase inhabitants' exposure to flood risks should climate-related disasters occur. Although developments in the Ruvu river floodplain are dominated by informal settlements, the existence of pockets of piecemeal planned areas in the river valley legalizes the area for urban development. Developments in the environmentally sensitive areas are contested by the National Environmental Management Council (NEMC). According to town planners in Mlandizi, the NEMC is concerned about developments in the area, including the recent construction of office buildings by the Kibaha District Council. Again, piecemeal plans were not subjected to strategic environmental assessment as legally required. Thus, the NEMC issued a stop order that no further developments should be undertaken in the areas.

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The presence of planned areas in the river valley attests to the shortfalls of piecemeal planning. If a comprehensive plan had been prepared in the form of a master plan, such areas would have been ideal for conservation as the elevation is below 2-5m. Settlements at this level of elevation in the context of informality, poor housing conditions, and poverty can be susceptible to floods in cases of extreme rainfalls. Comprehensive planning has the potential for addressing many of the weaknesses of piecemeal planning because it views urban areas as a system. Again, stakeholder consultation helps to take on board varied ideas and concerns. If a comprehensive plan was prepared in Mlandizi, the NEMC concerns could have been taken care of during the planning stage.

#### **4. Discussion**

Rapid urbanisation is evident in Mlandizi: the town urbanises at an annual average rate of 6.5%, while informal settlements constitute 90% of the housing developments. This rate of informality is higher than national and regional figures for the population living in informal settlements, which is 70% (UN-Habitat, 2009, 2016; Cockhead & Hemalatha, 2016). This calls for the need to refocus research and planning efforts towards small towns where there are issues that require more attention than in cities. Informal settlements dwellers in small towns experience various challenges—including access to water supply, adequate provision of sanitation, drainage, as well as access to social services—which put them at risk (Satterthwaite et. al., 2020). Challenges confronting informal settlements, as well as the need to build capacities for resilience in the era of climate change, cannot be addressed by piecemeal planning.

Rapid urbanisation, coupled with piecemeal planning and the development of informal settlements, have caused the diminishing of green spaces in Mlandizi town. Urban green spaces are very important for urban landscapes in providing ecosystem services, including biodiversity support, as well as water and temperature regulation (Pezzagno et. al., 2021). Piecemeal planning, as practised in Mlandizi, has failed to establish environmental, socioeconomic and institutional structures for building resilience and sustainability. As a result, urban sprawl, which has increased by 401%, is the main factor for diminishing green spaces and associated ecosystem services. The provision of green infrastructure can be coordinated in an urban system if supported by comprehensive planning since green spaces that are not well-planned cannot produce the intended outcomes. The integration of ecosystem services in informing master planning can be beneficial to enhancing urban resilience (Semeraro et. al., 2021). Again, the lack of stakeholders' engagement during the piecemeal planning process has rendered such plans ineffective for promoting inclusive urban development.

The expansion of settlements is higher than the rest of the land uses. In addition, the Ruvu river floodplain has been developed for settlements, industrial and

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institutional purposes. The area is currently home to more than 21% of the residents. The areas with an altitude of less than 5 metres may be convenient for residential development. However, its resilience to extreme events like floods will depend on many other factors, including housing conditions and the availability of infrastructure services. Since 90% of the Mlandizi residents reside in informal settlements, this means that 23.3% of informal settlement dwellers reside in the flood plains, which increases vulnerability to extreme events.

Concerns by the NEMC could have been addressed during the planning process. The steering committee could have ensured that a strategic environmental assessment is conducted if a comprehensive approach had been adopted. Again, this means that a comprehensive urban land-use planning is ideal for enhancing urban resilience as it analyses city complexities, which is not the case for piecemeal planning (Martino & La Greca, 2020). In turn, this again proves that urban resilience challenges are beyond the capacity of piecemeal planning.

#### **5. Conclusion and Recommendations**

This paper has discussed the contribution of piecemeal planning in enhancing urban resilience in Mlandizi small-town. Due to its short-term focus, piecemeal planning has failed to provide an urban development policy that integrates climate change for enhancing urban resilience. Rapid urbanisation at 6.5% per year has fuelled urban sprawl. Again, land use changes have affected the natural landscape, which has been converted to settlements and agricultural use at the expense of woodland, 98% of which has been lost in two decades. The loss of green spaces and the development of informal settlements in environmentally sensitive areas that are susceptible to floods are among the conditions affecting the resilience of dwellers. Piecemeal planning has proved as non-compliant with regulations governing urban planning. As such, piecemeal planning has made an insignificant contribution to enhancing urban resilience and sustainability in Mlandizi small-town. Therefore, master plans that conceive the city as a system stand a better chance of integrating resilience into the urban planning process and, thus, are likely to achieve sustainability.

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