Administrative Transformation of the Urban Authorities and the Emergence of Un- Ecological Land Use/Cover Dynamics in Urban Authorities: Case of Dodoma National Capital City, Tanzania

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Received: 22, April, 2023 Accepted: 01, May, 2023 Published: 11 May 2023

Abstract

This study explores how the evolutionary changes in Dodoma's urban administrative status from lowest to highest ranks in Tanzania have resulted in the emergence of Un - ecological urban land use and land cover changes, urban land degradation, and un-ecological urban villages in the locality of the newly established Dodoma National Capital City. The empirical evidence for this study has been drawn from interviewing 443 respondents in 17 wards and 56 sub-wards and through analysing Landsat satellite images of 1998, 2008, 2018 and 2022 years by semi-automatic classification plug-in (SCP) in Quantum Geographical information system (QGIS) software (version 3.12.3). The findings of this study revealed that built-up land hectares have increased by 60%, bare land hectares decreased by 23%, vegetation hectares decreased by 13%, and water hectares decreased by 1% between 1998 and 2022.

If Dodoma City persists in the same way up to 2030 withoutgreenbuilding concepts and design, New urbanism and ecological modernization theories interventions it will lose the potential of being a resilient and liveable National Capital City. Sustainable development principles are recommended to be utilized in all the major development projects to be carried out in the city advert the situation.

Keywords: ***Administrative transformation, Land-use Dynamics, and Un- Ecological Land Uses***

1: Introduction

Counting from Colonial rule to independence up to the present (1912 up to 2022), Dodoma City has been undertaking substantial administrative evolutionary changes, from rural villages to Town, Municipal and City. Consequently, to that, the hierarchical administrative position transformation journey has enhanced theemergence of challenges in administrative setup, restructuring, un - ecological quarantined Urbanvillages, un ecological land use/cover changes, land degradation and rural urbanism and unguided urban expansion in Dodoma City localities.

The extent and the impact of such evolutionary administrative transformation in Dodoma City from 1912 – 2022 and the presence of National Capital City administrative in Dodoma City on the urban ecological environment have not yet been assessed/ evaluated andanalysed.

In light of this, the purpose of this study is to assess the extent of the effects and impact of the administrative evolutionand presence of the Capital City in Dodoma on the emergence of un-ecological urban villages, land use land cover changes, urban expansion, rural urbanism, and legal implications. Because of that regard, understanding the present and predicting the future development situation in Dodoma will be useful for planners to develop new urban planning strategies to reshape the capital city of Tanzania

This study is worthy for Dodoma National Capital City as it provides it with useful information on Urban Land degradation, Legal implications, land use/ cover changes and the emergence of un -ecological Urban Villages in its Locality. Corresponding to that, this study recommends green building concepts and design, new urbanism and ecological modernization theories interventions as the means for achieving resilient Dodoma National Capital City.

2.1: Literature Review

Administrative transformation of Urban authority is a habitual process in the evolution of the state of the urban territory from the lowest to the highest rank. It is based on a constant tension in the relations between urban physical, ecological and social and administrative elements. The changes in social and economic processes always involve an almost permanent urban need to

upgrade or modernize or simply transform towns, municipalities and cities which in turn results in land use/cover dynamics.

Similarly, to that, Maria (2007);Zhang et al., 2011) argued that the established urban administrative authorities are not static as they can undergo substantial physical and administratively changes and from lowest (Town) to highest (City) administrative status through splitting, deleting, merging, expansion, and updating the status of the existing administrative authority.

Similarly to the above, (Güneralp et al.,2020a;Güneralp et al., 2020b;Belal and Moghanm, 2011); Hegazy and Kaloop, 2015a;Hegazy and Kaloop, 2015a; Zhang and Zhao, 2011; Worrall et al., 2017; Owoeye and Ibitoye, 2016; Taiwo, Samsudin, and Ayodele, 2019)argued that the impactof the administrative transformation of urban authority and physical expansion of urban areas leads to the impact of declining of agricultural and ecological land uses, Rural urbanism into an urban setting.

In the same way (Jiang et al.,2021;Wang and Zhao, 2016)point out that, Human activity has seriously affected the global ecosystem and various ecological and environmental problems have worsened. The ecological environment is the foundation of human survival and development and refers to the sum of human society and the various natural factors that surround it (Jiang et al., 2021). It is of great significance, therefore, to accurately monitor and evaluate the quality of and changes in the ecological environment (Jiang et al., 2021; Wang and Zhao, 2016).

The studying of the relationship between administrative hierarchical position transformation and land-use dynamics in Tanzania will enable the Government to undertake effective and efficient measures of achieving; resilient and ecological rural urbanism inside urban territory through management of the co-existence of rural and urban land uses inside the urban territory.

Land use dynamics analysis is regarded as one of the most important components of modern natural resource management and environmental monitoring systems (Hegazy and Kaloop 2015b; Forrester, 1969; Barredoet al., 2003; Tacoli et al ., 2013; Barredo et al., 2003: 146; Hegazy and Kaloop,2015b; Ramankutty and Coomes, 2016; Walker,2004) cited in (Bürgi et al., 2017);and Maria (2007).

In the same focus,the natural population increases in Cities, rural-urban migration, Development Policy, Rural Urbanism into urban settings, and economic development have been identified as major Causes, and drivers, of Urban Transition, expansion and city growth in terms of size and status (Sajjad and Iqbal, 2012; Seto et al., 2012; Abebe, 2013).

Taiwo and Liu in their study on the City's administrative evolutionary changes point out that, congestion; sprawl, uncontrolled urban growth, loss of agricultural land, unconditional growth, widespread settlement, informal settlements, rising carbon footprints, and rising crime rates are materialisation effect of administrative transformation of Urban authority.

In the same focus to that, the rising carbon footprints, rising crime rate, robbery groups, and drug abuse overcrowded in city locality is also caused by evolutionary changes inthe administrative state of urban authority (African Urban Dynamics, 2015; Ranpise, 2016; Liu et al., 2012; Taiwo et al., 2014; African Urban Dynamics, 2015; Heider et al., 2016).

Correspondingly to that, Zhang in the study of the development of Urban Villages in China reviles that, Land Value is Highest in Central Business District Areas and declines as you move away from CBD to peri-urban areas and its occurrence is due to the city's evolutionary changes (Zhang and Wu, 2006; Zhang and Lu, 2011; UN-HABITAT, 2015).

Furtherance to the above, the developmentof inexpensive apartment buildings (handshake" buildings), street traders and hawkers, street children, beggars, traditional agriculture in urban settings and prostitution in the urban locality is due to the administrative transformation of urban authorities in (Seto, Güneralp, and Hutyra, 2012; Herold,2018; UPA, 2007; LGUAA, 1982).

Culwick in their studies on land use dynamics in China and Latin America argued that the major causes of land-use dynamics in the regional, global, and local context and Cities are infrastructure development, natural environmental features, uncontrolled urbanization and Urban Sprawl, urban developments, land use planning, urban and planning policies and Land Value (Culwick et al., 2019; Culwick et al., 2019; PO – RALGb, 2021; Zhang et al., 2006; Kironde et al., 2007; Zhang,2011).

Consequently to that, Zhang and Lu, 2011; UNDE, 2000; PO – RALGa, 2003;Zhang and Lu, 2011; Makene et al., 2017; UN_Habitat Agenda, 2016; Aerni, 2016) revealed that congestion; sprawl, uncontrolled urban growth, loss of agricultural land, unconditional growth, widespread settlement, informal settlements, are the materialization impacts and effects of the administrative transformation of Urban Authority and land use dynamics.

2:2 Data and Methods

The case study area (Dodoma City) was founded in the late 18th century and developed first as a traditional and cultural town. It is the most prominent town in the central part of Tanzania. Dodoma is about 439.7 kilometres northwest of Dar es Salaam, the commercial and industrial hub of Tanzania. Dodoma City occupies a total land area of 2608 km2 with a population of 2,083,588 in 2012. The major livelihood activity in Dodoma City is vineyard growth. This is because Dodoma city falls within semi-arid climatic conditions which favour the vineyard growth. The growing vineyards make Dodoma City known all over the world as the major producer and exporter of Dodoma wine. Dodoma City has grown from being a vineyard agricultural settlement in 1890 to a significant Government City in 2019.

Administratively, Dodoma City is found in Dodoma Region, which is not completely centrally located, but it is the major regional Centre whose position has developed as a key intersection of the transport network within mainland Tanzania. This means, most people will have a shorter distance to cover when they want to go to the new capital from their respective regional headquarters. Spatially, Dodoma City is in the Arc_1960_UTM_Zone_36South of equators, WKID: 21036 Authorities: EPSG and between Longitude 700000 to 950000 eastern of the equator, Longitude 9210000 to 9490000 of Greenwich as it is seen in (Figure1).

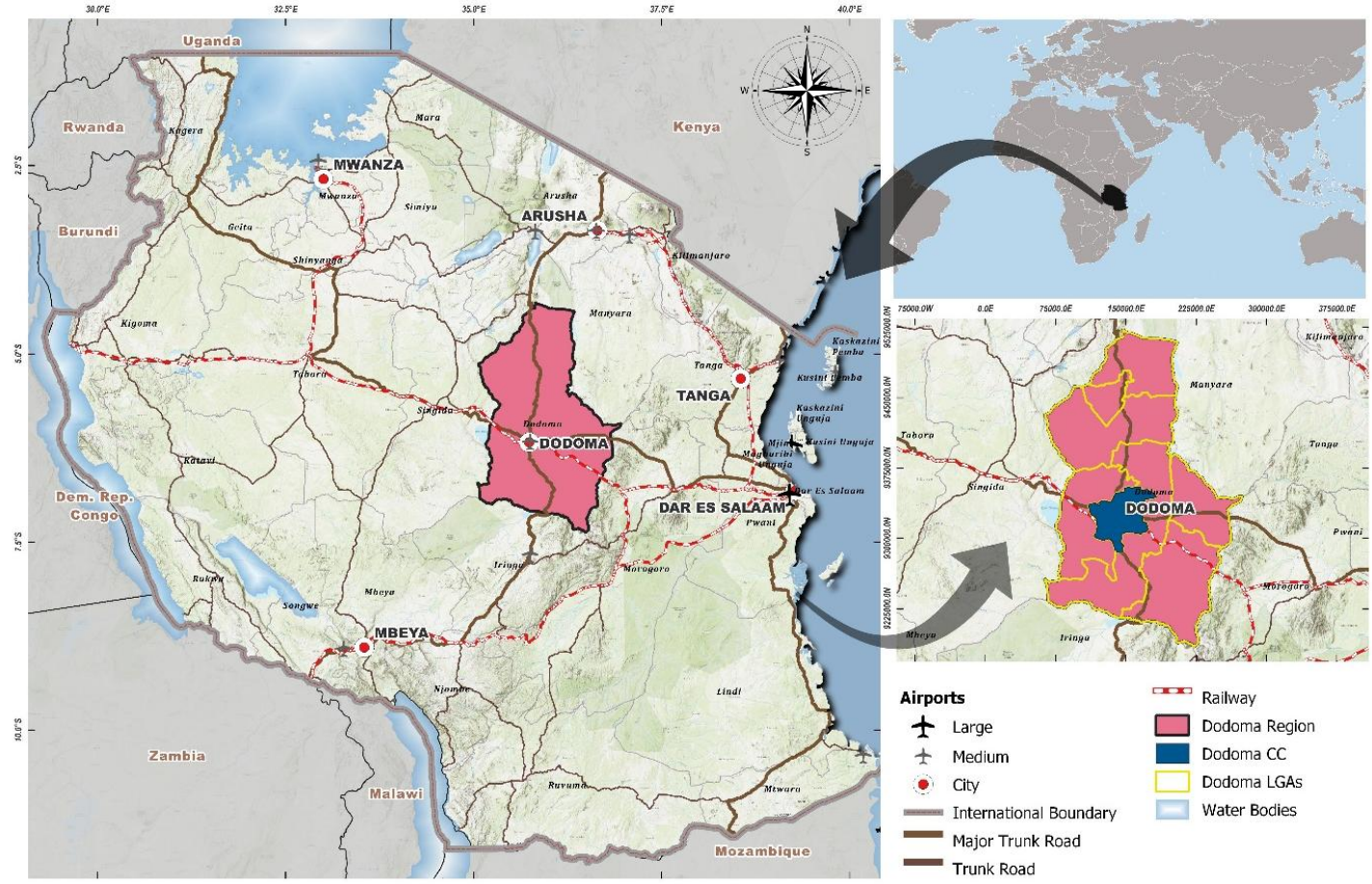


Figure1: Dodoma City Location Map
Source: President Office Regional Administration and Local Government (PO- RALG) GIS-Unit Dodoma, (2022)

Strategically, to quantify, recommend and propose useful interventions on the indicators, empirical evidence and concept variable for the emergence of un - ecological Urban Villages and Land use/cover changes into urban localities in Dodoma National Capital City, questionnaires,observations, interviews, and documentary reviews formed the research data collection techniques.

Both probability and non-probability sampling methods were used to decide where to conduct the study, the sample size, and what kind of information to be collected.Under such focus,non-probability sampling methods such as Purposive and stratified Sampling techniques were used and criteria for data required were set, of which, 17 wards, out of 43 wards in Dodoma City together with their 56 sub-wards were Purposively sampled and selected as the unit of analysis for conducting this study. Quantitativelyat least in each ward, 40 people were interviewed to make a sample size of 446 interviewees out of the 152,095-total population in selected 17 wards. Correspondingly that to decide on how many people to interview in 56 sub-wards, non-probability sampling methods were used in which stratified Sampling techniques were applied to ensure the interviewed populationare selected from all 56 sub-wards.

Based on the 152,095-total population in selected 17 wards the recommended sample size is 384 though in this study 446 people were interviewed this is with the inclusion of official interviews.

The sample size (n) was calculated according to the formula: n = [z2 * p * (1 - p) / e2] / [1 + (z2 * p * (1 - p) / (e2 * N))].

Where: z = 1.96 for a confidence level (α) of 95%, p = proportion (expressed as a decimal), N = population size, e = margin of error.
z = 1.96, p = 0.5, N = 152095, e = 0.05
n = [1.962 * 0.5 * (1 - 0.5) / 0.052] / [1 + (1.962 * 0.5 * (1 - 0.5) / (0.052 * 152095))]
n = 384.16 / 1.0025 = 383.192
n ≈ 384

Under such circumstances, a case study as a research design was adopted in which the decision to select 17 wards out of 43 wards together with their 56 Sub -wards were made based on criteria of being with features such as Livestock, rural urbanism, rural operations, un - ecological Urban Villages and Land use and Land cover changes, and Urban land degradationin the locality of the newly established Dodoma National Capital City. Methodologically, the remotely sensed Data together with 446respondents' answers in the case study wereanalysed andquantified based on Purposive sampling, focus group discussion and observation.

In light of that,56 Sub ward executive Officers,20 Officials from Dodoma City and 25 from the President's Office Regional Administration and Local Government were interviewed to provide both qualitative and quantitative data. Kobo toolbox and excel software were used in collecting and analysing statistical data.

Three cloud-free Landsat images (level 1G) for the years 1998, 2008, 2018 and 2022 were downloaded from USGS earth explorer. IDRISI TerrSet and ArcGIS were used for the processing of the images.Data used in this study includes remotely sensed Satellite images, administrative boundary shapefiles and maps, Land use land cover maps, demographics, livestock, Land use, agriculture,

building and respondent statistical data, Administrative Government Notes and maps of Dodoma.
The classification, analysis, and pre and post-processing of satellite images and LULC in Dodoma City were done by defining the study area by using a semi-automatic classification plug-in (SCP) in Quantum Geographical information system (QGIS) software (version 3.12.3).

The method used for the image Analysis/LULC Cover Classification

The classification and analysisof LULC in Dodoma City were done by defining the study areaby using a semi-automatic classification plug-in (SCP) in Quantum Geographical information system (QGIS) software (version 3.12.3) which offers tools to perform LULCclassification to enhance LULC classes(vegetation, built-up areas, bare soil, and water). In that regard, the Maximum Likelihood (ML) algorithm) was used to calculate the probability distributions for the classes, related to the Bayesian theorem, estimating whether a pixel belongs to a certain land cover class.

Method for Accuracy Assessment

The accuracy of LULC maps was calculated from error matrices.The ground truth data were derived from Google Earth maps and an error matrix was generated for each land cover map. In this study, theaccuracy assessment of LULC in Dodomawas done by comparing directly the classified pixels to known, ground-truthed locations in Dodoma City of which Viwandani Sub - ward was used as known, ground-truthed locations in the Dodoma City.
Semi-automatic classification Plug-in (SCP) in Quantum Geographical information system (QGIS) software (version 3.12.3) was used to compute an error matrix to count the number of pixels correctly classified as bare land, built-up and vegetation that agree with the ground truthing data, and how many were misclassified.

Method for Change Analysis

Dodoma City Land Cover was analysedbased on Semi-Automatic Classification methodologies while healthy vegetation cover and identification of the bare land in Dodoma City was analysed based on the Normalized Difference Vegetation Index (NDVI). When determining vegetation density and monitoring changes in plant health, NDVI is used to measure how green the vegetation is. According to conventional methods, NDVI is determined as a ratio between the red (R) and near-infrared (NIR) values.

Normalized Difference Vegetation Index (NDVI)=((NIR-Red))/((NIR+Red))

In Landsat 4 -7, NDVI = (Band 4 – Band 3) / (Band 4 + Band 3) and In Landsat 8-9, NDVI = (Band 5 – Band 4) / (Band 5 + Band 4). The answers that come from the formula above negative values pixels are detecting water presence, 0 - 0 value is bare soil or built up and 0.1 - 1 are vegetation covers and Water - 0.1 water detection.

Method for Comparing Pre and Post-Designation LULC

The pre and post-processing LULC in Dodoma City was done by defining the study area by using a semi-automatic classification plug-in (SCP) in Quantum Geographical information system (QGIS) software (version 3.12.3) which offers tools for pre-processing and post-processing Comparisons.The LULC for the year 1998 up to 2022 were generated and the results were compared. Pre-processing involved clipping of the satellite image using Dodoma City administrative shapefiles for the study area from the President Office Regional Administration and Local Government of which the clipped band images were then converted from digital numbers to surface reflectance.

3.1:RESULTS AND DISCUSSION

The practical experience shows Dodoma Capital City is Characterised by flooding, deforestation, overutilization of natural resources, temperature rises, underproduction, desertification, air-borne diseases, pollution (air, water and soil) erosion, chronic diseases, Scarcity of natural resources, and loss of biodiversity, increases of the hawkers, unconditional growth, widespread settlement, informal settlements, rising carbon footprints and the rising crime rate. Materially the major reason for such outlined environmental challenges is un ineffective administrative transformation of Dodoma from Town to Capital City rank from 1956 to 2022.
Objectively, the purpose of this study is to explore how the evolutionary changes in urban administrative status from lowest to highest ranks resulted in the disappearance of urban ecological Land Uses and the re-emergence of Un-Ecological Urban Villages into Dodoma City locality in Tanzania.

3.2: The Impact and Effects of Evolutionary changes in the Urban territory (Town to City) and Land Use/Coverin Dodoma Capital City from 1998 to 2022

Historically, from colonial rule to independence up to the present (1912 up to 2022), Dodoma City has been experiencing 5 hierarchical administrative transformation ranks and serving as administrative headquarters. Periodically, counting from 1912 under German rule when Dodoma become the National Provincial administrative headquarters for all eight (8) Provinces in Tanzania to 2022, Dodoma City has lasted 110years old, serving as an administrative headquarters in Tanzania. Hierarchically, under such transition periods, Dodoma has undergone eight (8) hierarchical administrative headquarters namely: Central Province Headquarters; Dodoma Region Headquarters; Dodoma Urban District Headquarter, Town, Municipality and City Council headquarters and, the National Capital City headquarters as shown in (Figure 2).

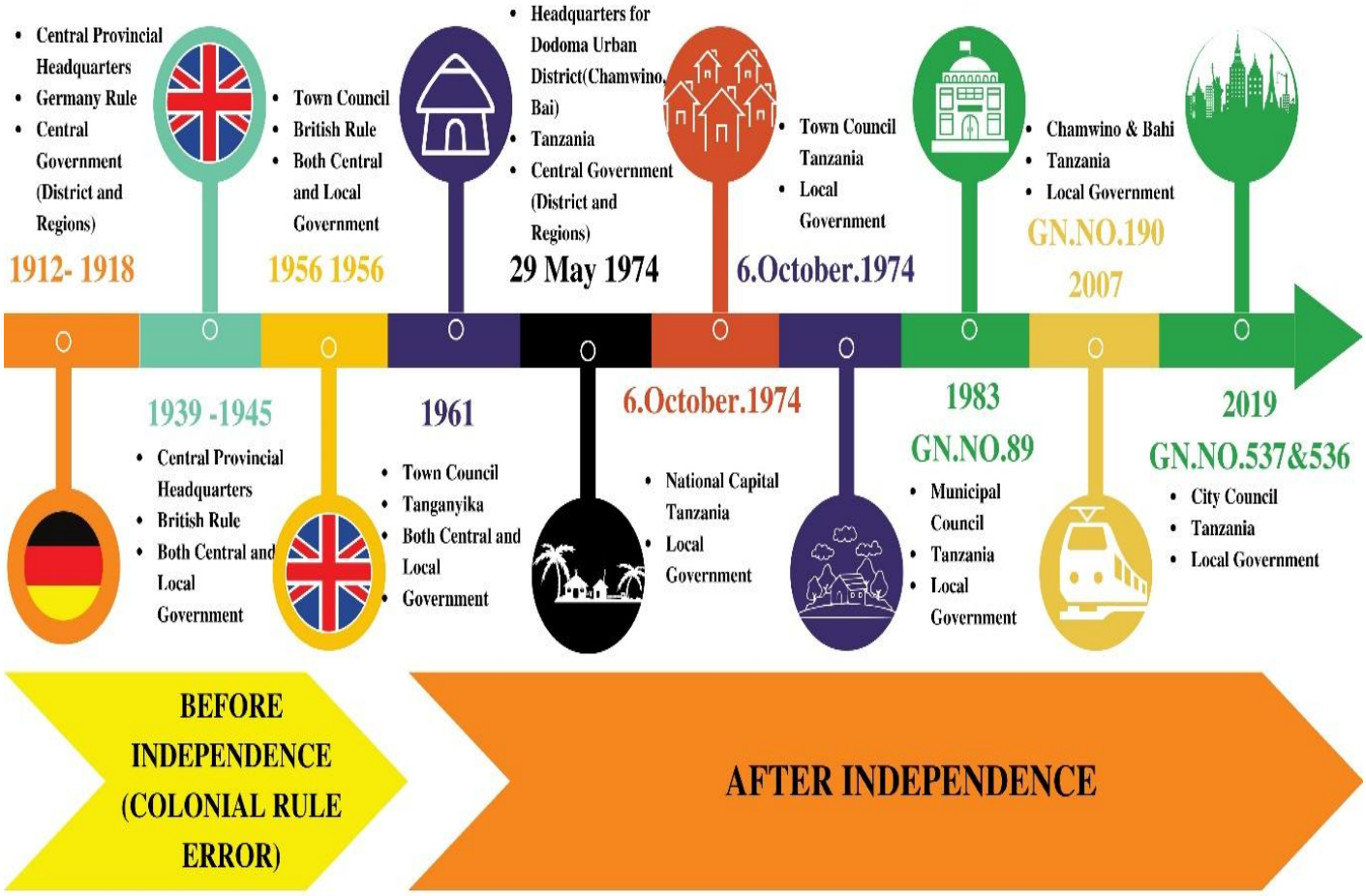


Figure 2: Administrative transformation of Dodoma from 1912 - 2022
Source: The Researcher's Construction based on Wader and Oates (1938) LTR, 2020

In light of that, this paper analyses/ asses and evaluated the extent and the impact of Dodoma City's evolutionary administrative transformation from 1912 – 2022 on the emergence of un ecological Land use Land cover changes, urban ecological environment, un-ecological Urban villages, Urban expansion, Rural urbanism, and Legal implications into City localities.

3.2.1: The emergence of un- ecologicalLand Use and Land Cover Changes in Dodoma City

The land cover pattern in Dodoma City Council between 1998 and 2022 is examined in this study. The study displays alterations in the built-up, vegetated, and wetland land cover every ten years, from 1998 to 2008 to 2018 to the present 2022. Similarly, to that, it offers land cover changes and the average yearly change for each land cover over 10 years, such as 1998–2008, 2008–2018, and 2018–2022. The analysis has been done After acquiring Landsat images by using QGIS which are

Land sat 4-5 LT05_L2SP_168064_19981208_20200908_02_T2 of 1998, Landsat 7 LE07_L2SP_168064_20080906_20200912_02_T1 of 2008, Landsat 8 LC08_L2SP_168064_20180910_20200830_02_T1 of 2018, and Landsat 9 LC09_L2SP_168064_20220508_20220510_02_T1 of 2022

Sn	Satellite images	Spatial resolution	Satellite images ID	Source
1	Landsat TM 4-5	30m x30m	LT05_L2SP_168064_19981208_20200908_02_T2	USGS
2	Landsat 7	30m x30m	LE07_L2SP_168064_20080906_20200912_02_T1	USGS
3	Landsat 8	30m x30m	LC08_L2SP_168064_20180910_20200830_02_T1	USGS
4	Landsat 9	30m x30m	LC09_L2SP_168064_20220508_20220510_02_T1	USGS

Fig 3: Characteristics of satellite image

The satellite images were imported into QGIS for further analysis and the supervised classification of remote sensing images is made possible by the Semi-Automatic Classification Plugin (SCP), which offers tools for image download, pre-processing, and post-processing.

Geographical Information systems and Remote sensing techniques were used to study the ecological land use and land cover change (LULC) status in Dodoma Capital City from the year 1998 to 2022 as shown in Map1.Of which the finding results show that Dodoma Cities built–up land decreased by 73,838 hectares (23%), vegetation decreased by 86,248 hectares (13%), and water decreased by 2,630 hectares (1%) as shown in (Figure 3).

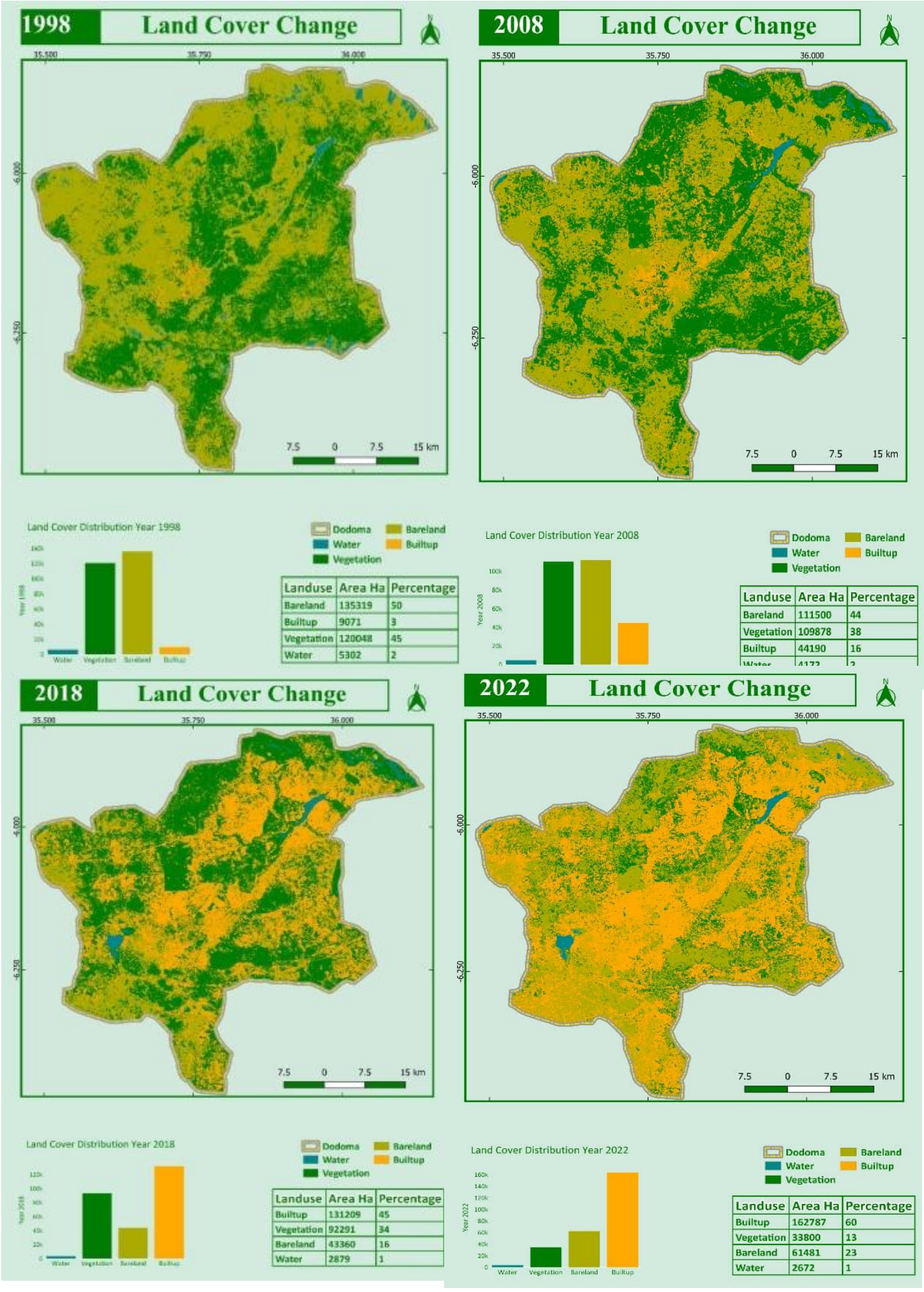

1998 Land Cover Change
35.500
35.750
36.000
-6.000
-6.250
7.5 0 7.5 15 km
Land Cover Distribution Year 1998
Dodoma
Bareland
Water
Builtup
Vegetation
Landuse | Area Ha | Percentage
Bareland | 135319 | 50
Builtup | 9071 | 3
Vegetation | 120048 | 45
Water | 5302 | 2
2008 Land Cover Change
35.500
35.750
36.000
-6.000
-6.250
7.5 0 7.5 15 km
Land Cover Distribution Year 2008
Dodoma
Bareland
Water
Builtup
Vegetation
Landuse | Area Ha | Percentage
Bareland | 111500 | 44
Vegetation | 109878 | 38
Builtup | 44190 | 16
2018 Land Cover Change
35.500
35.750
36.000
-6.000
-6.250
7.5 0 7.5 15 km
Land Cover Distribution Year 2018
Dodoma
Bareland
Water
Builtup
Vegetation
Landuse | Area Ha | Percentage
Builtup | 131209 | 45
Vegetation | 92291 | 34
Bareland | 43360 | 16
Water | 2879 | 1
2022 Land Cover Change
35.500
35.750
36.000
-6.000
-6.250
7.5 0 7.5 15 km
Land Cover Distribution Year 2022
Dodoma
Bareland
Water
Builtup
Vegetation
Landuse | Area Ha | Percentage
Builtup | 162787 | 60
Vegetation | 33800 | 13
Bareland | 61481 | 23
Water | 2672 | 1

Figure 4: Land Use/Cover Dynamics in Dodoma Capital City from 1998 - 2022
Source: Land Cover Changes in Dodoma (1998 – 2022) and PO- RALG,2022

Kabanda (2019) in his study on land use/cover changes in Dodoma from 1968 to 2018 revealed the same result. He explains that there is an inverse relationship between built-up coverage and other Land covers such as bare land and vegetation area of which from 1998 to 2022, the map shows a decrease in vegetation, water, and bare land while the Built-up area increased in Dodoma City. Zhang and Zhao (1998)further define the urban territory and Land-use/Cover changes as the process whereby physical land uses like agriculture are naturally transforming into none agricultural land uses while existing urbanized settlements remain untouched as urban villages in the urban locality.

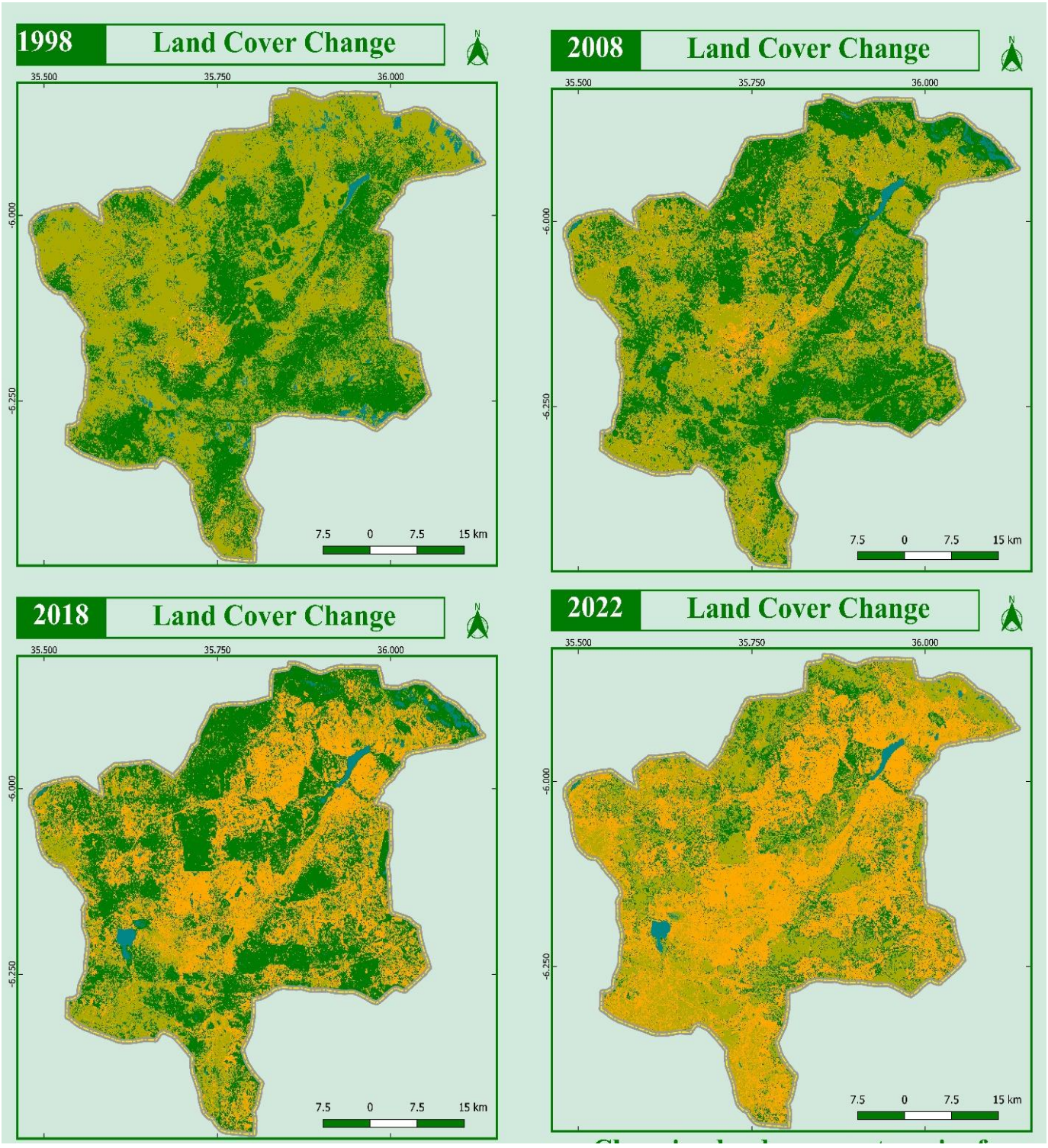
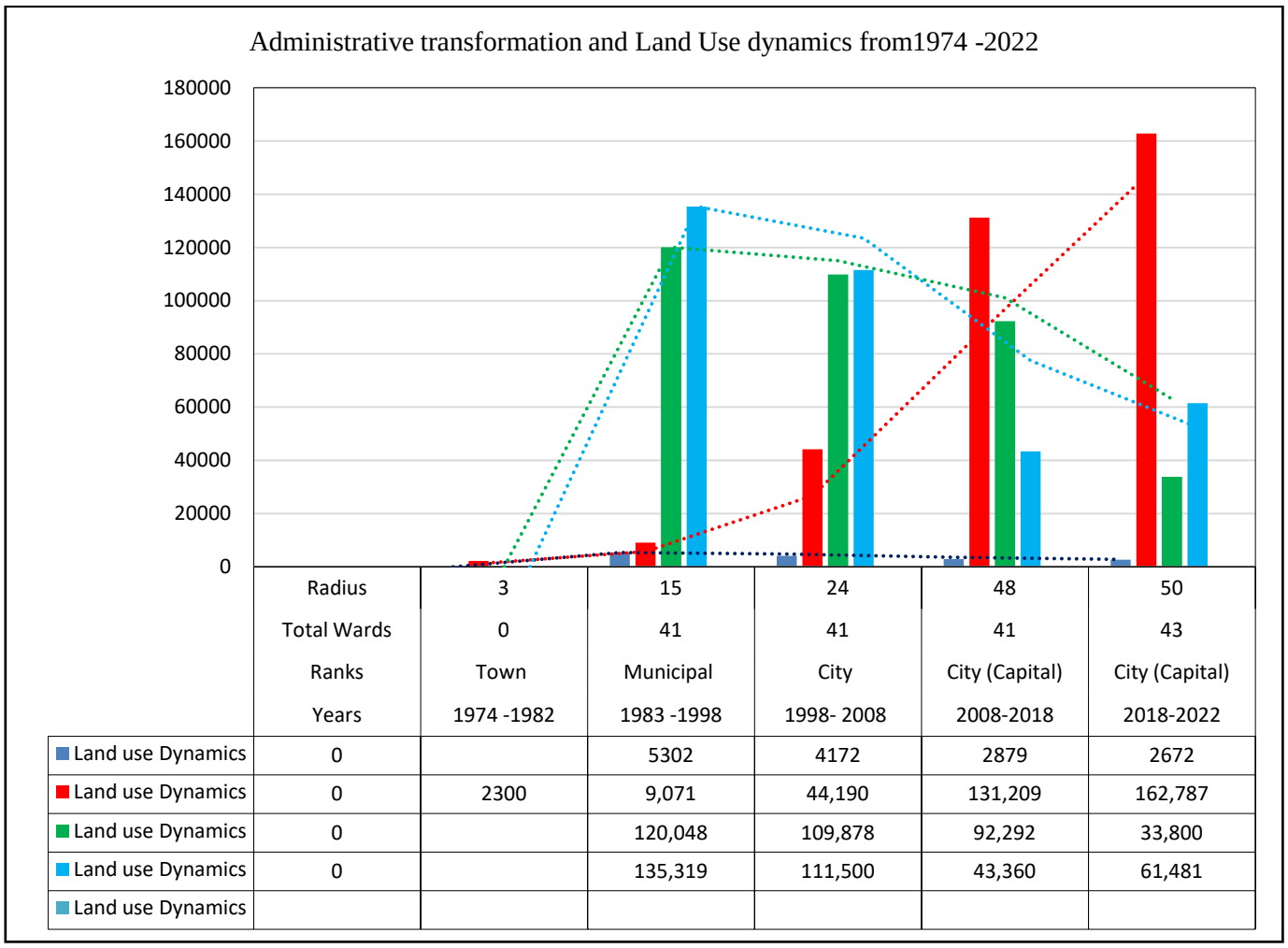


Figure5: Land Use/Cover Dynamics in Dodoma Capital City from 1998 - 2022
Source: Land Cover Changes in Dodoma (1998 – 2022) and PO- RALG,2022

Muttitanon and Tripathi (2005) explain that it is very essential to examine the changes in the urban territory and land use/cover to understand their effect on Local Government Transformations.
Likewise, Sankhala and Singh (2014) point out that, urban territory and Land-use/Cover changes affect the local and/or regional environment which would eventually affect the global environment at large.

The finding results in Figure 5 show that the built-up area in Dodoma City between the period of 48 years from the year 1974 to 2022 has increased from 2, 300 ha to 162,787 ha. Of which the increase has led to a decline in vegetation cover and bare land to enhance the decline of the urban ecological environment in Dodoma City locality.Correspondingly to that, the increases in administrative status from town to city have facilitated the increases in the number of wards from 41 to 43 as well as the built-up area radius from 3 kilometres to 50 kilometres as presented in Figure 6.



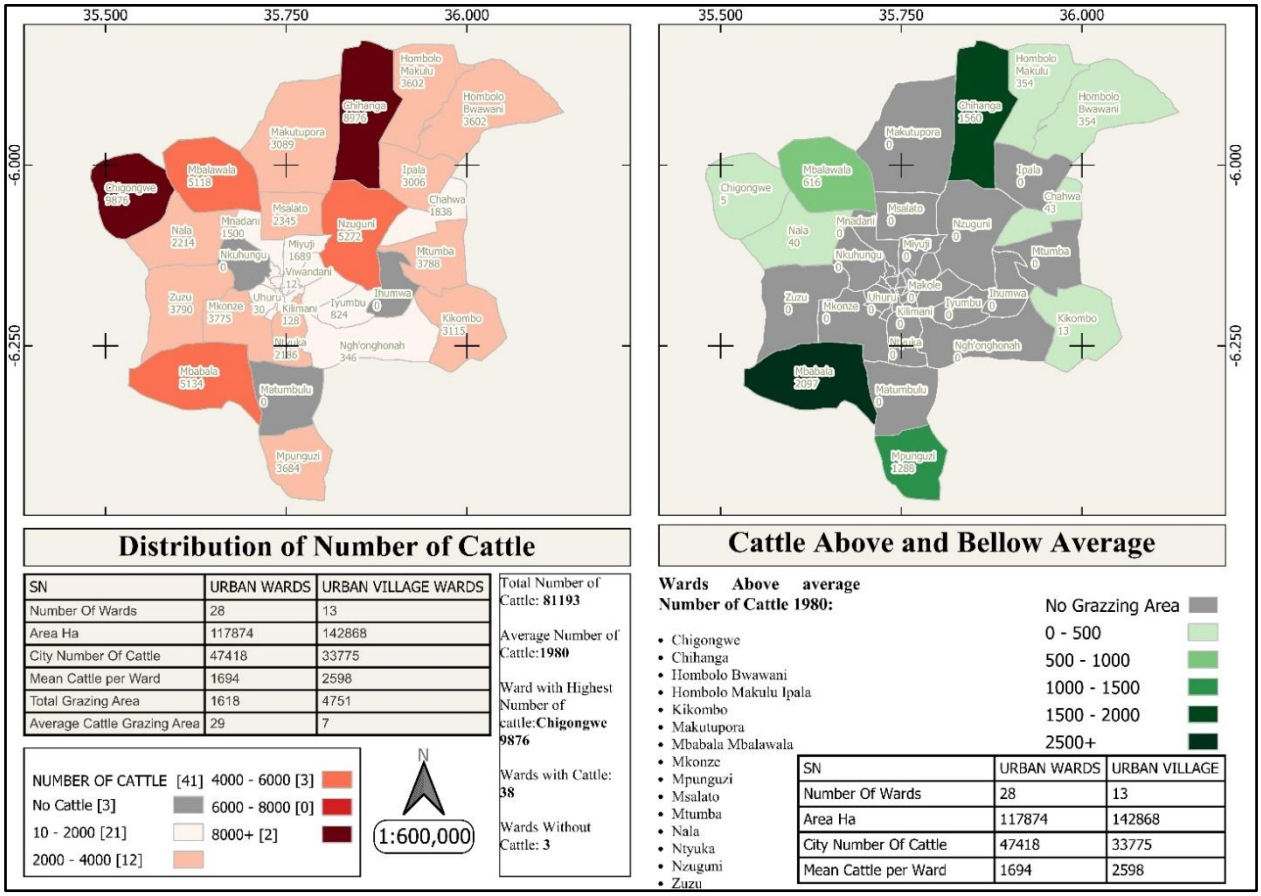
	Radius	3	15	24	48	50
	Total Wards	0	41	41	41	43
	Ranks	Town	Municipal	City	City (Capital)	City (Capital)
	Years	1974 -1982	1983 -1998	1998- 2008	2008-2018	2018-2022
Land use Dynamics	0		5302	4172	2879	2672
Land use Dynamics	0	2300	9,071	44,190	131,209	162,787
Land use Dynamics	0		120,048	109,878	92,292	33,800
Land use Dynamics	0		135,319	111,500	43,360	61,481
Land use Dynamics						

Figure 6: Urban Evolutional Chance and Land Use Dynamics in Dodoma from 1974 -2022
Source: Land Sat analysis (Satellite image) of 1998 – 2022.

Sankhala and Singh (2014) point out that, this kind of change greatly affects the local and/or regional environment,which would eventually affect the global environment. Likewise, Muttitanon and Tripathi (2005) explained that it is very essential to examine the changes in urban territory land use/cover to understand its effect on the terrestrial ecosystem in the cities to ensure sustainable land use planning.

3.2.2: Re-Emergence of Un- Ecological Rural Urbanism into Dodoma Capital City

The finding results show that 28 Wards equal to 65% out of 43 Wards in Dodoma City undertaking rural operations in the city locality. Objectively Chihanga and Chigongwe are marked as the Rural operations leading wards in Dodoma City locality with 800 Cattle and 5,405.46 hectares being planned for grazing land purposes to serve 81,193 cattle which are contained in Dodoma National Capital City(Dodoma Master Plan 2020 – 2050). In the same focus, the decline of rural livelihood operations including agriculture in urban locality enhancing the emergence of uncoordinated street traders and hawkers selling imported goods, street children, children and elderly beggars, agriculture, livestock, traditional livelihood activities, prostitution for younger girls, robbery groups, and drug abusers in urban authorities as shown in Figure 7.



SN	URBAN WARDS	URBAN VILLAGE WARDS
Number Of Wards	28	13
Area Ha	117874	142868
City Number Of Cattle	47418	33775
Mean Cattle per Ward	1694	2598
Total Grazing Area	1618	4751
Average Cattle Grazing Area	29	7

Total Number of Cattle: **81193**

Average Number of Cattle:**1980**

Ward with Highest Number of cattle:**Chigongwe 9876**

Wards with Cattle: **38**

Wards Without Cattle: **3**

- Chigongwe
- Chihanga
- Hombolo Bwawani
- Hombolo Makulu Ipala
- Kikombo
- Makutupora
- Mbabala Mbalawala
- Mkonze
- Mpunguzi
- Msalato
- Mtumba
- Nala
- Ntyuka
- Nzuguni
- Zuzu

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Number Of Wards	28	13
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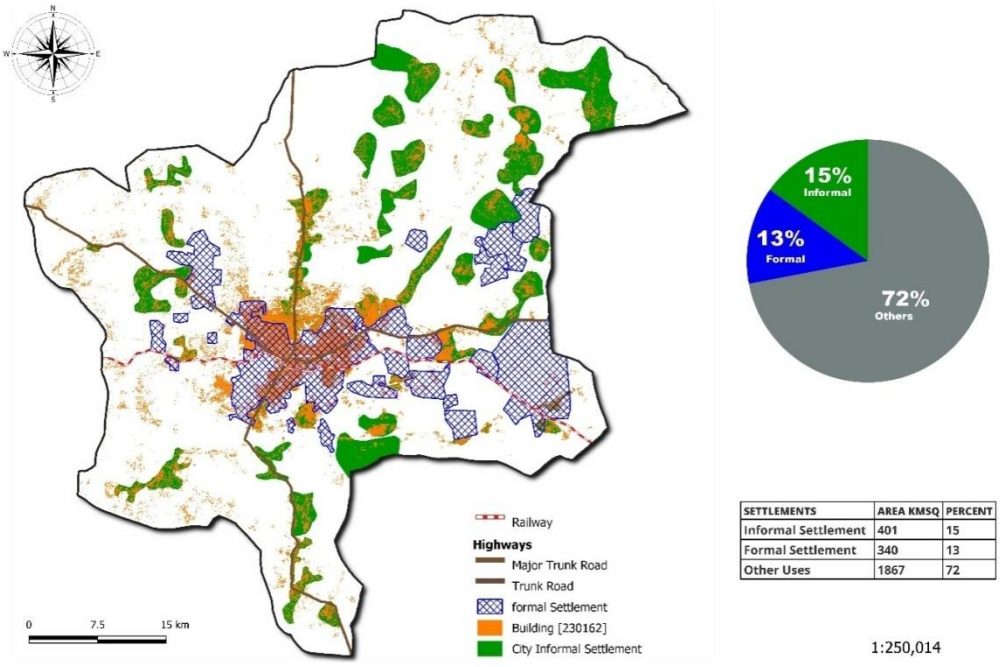
Mean Cattle per Ward	1694	2598

Figure7: Livestock Urbanism in Dodoma City Locality
Source: Data Collection, Dodoma July 2022

Angel (2015), points out that there is a need for comprehensive explorations of how residents become urbanites. Angel (2020), defines urbanism as a situation in how people interact with the built-up environment. Therefore, urbanism is closely associated with the process of becoming urban.

Finding result shows that, the informal settlement in Dodoma City occupies 401 square kilometres equal to 15% of the total City area while planned /formal settlement occupies 340 (13%) while 72% is used for other rural operation activities. Under these circumstances, 87% of the city's total area undertakes rural urbanism and operations which enhances the decline of the urban ecological environment in Dodoma City locality as shown in Map 5.



SETTLEMENTS	AREA KMSQ	PERCENT
Informal Settlement	401	15
Formal Settlement	340	13
Other Uses	1867	72

Figure8:Formal and informal Settlement in Dodoma City
Source: Data Collection, Dodoma July 2022

3.2.3: Emergence of unguided urban expansion and Building Density Dynamicsin Dodoma Capital City

The finding results show that, in the period of 19 years from 1956 - 1976, the settlement development (Built part) in Dodoma City occupies 23 square kilometres equal to 1% of the 2608 total City areas while 99% of the city area formed unbuilt up area. Counting from CBD in those days the radius of the City's edge grew outwards up to 3kilometres.In 2022 the built-up part of the city occupies 1628 square kilometres equal to 60% of 2608 total City areas while 40% of the city area formed an unbuilt area. Counting from CBD the radius of the City's edge grew and sprawled outwards up to 50 kilometres as presented in Figures 1 and 8.

This expansion is contrary to the requirements of the Local Government Act No 7 and 8, 1982 which points out that the maximum size of the City should be 1,000square kilometres which has to be within a radius of 18 square kilometres from the CBD.

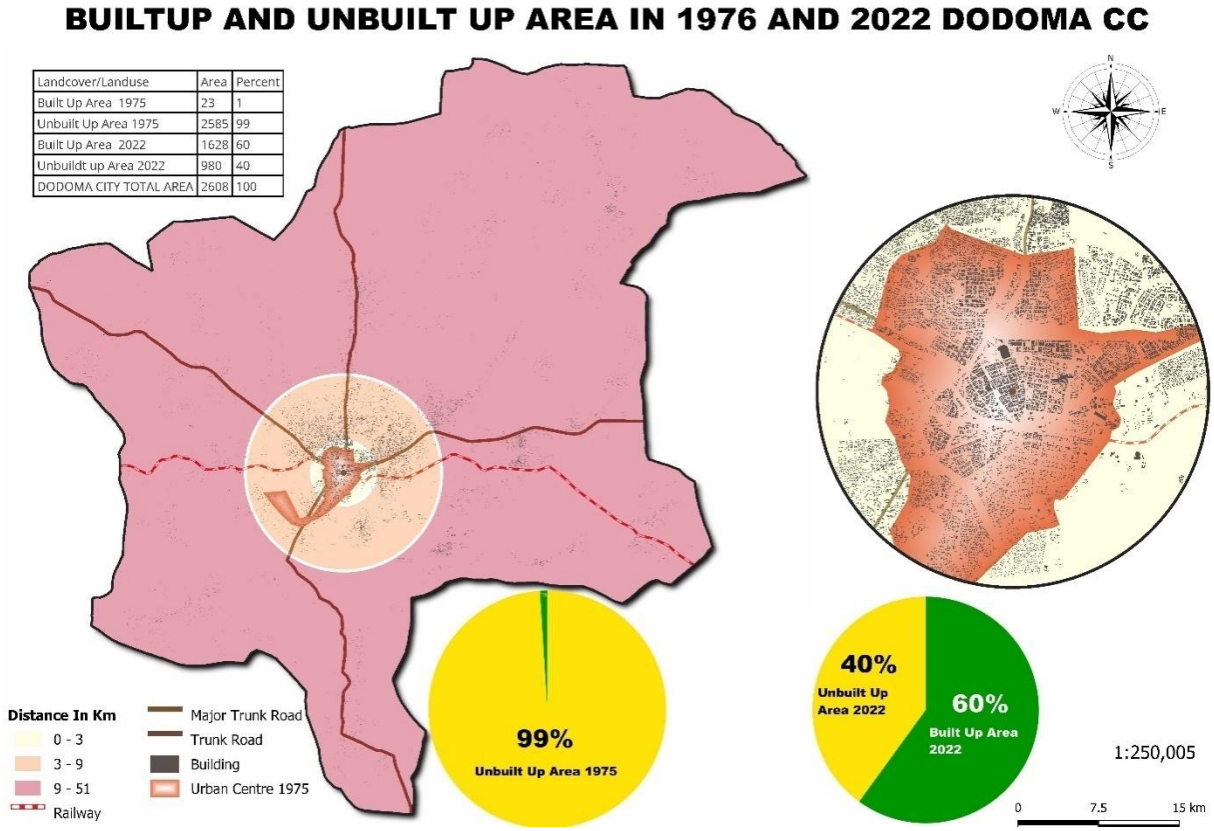


Figure 9: Administrative Transformation of Dodoma City from 1956 to 1975
Source: Researcher's Own Construction Based on LTR, (2020)

The total population of Dodoma is 960,738 people of which the density of four (4) people living in one hectare.The housing density per hectare (Ha) in Dodoma CBD is 30 houses per hectare (Ha). This is three times the density of buildings per hectare (Ha) in an Urban Villagewhich is 10 buildings per hectare (Ha). This means that the houses are scattered unlike to Central Business District Area where the buildings are densely concentrated up to 30 houses per hectare. The Housing Density in Dodoma City is decreasing as you move away from its administrative headquarters which serves as Central Business District Area. The dynamics in building densities, enhancing the urban ecological environment and Land use/Land Cover decline and degrade its quality as you move away from CBD.

Similarly to that, scholars; (Tacoli, McGranahan, and Satterthwaite, 2015; Hegazy and Kaloop, 2015a; Nguyen, van Western, and Zoomers, 2017)in their study on the growth structure of China and Vietnam Cities revealed that China's Urban Villages are located proximal to their administrative headquarters and CBD unlikely to urban villages in Africa which are remotely located from their administrative headquarters.

In the light of their study, they notice that urban villages which are distantly located from the administrative headquarters experience feature such; as a rise in transport and infrastructure construction costs, poor provisions of public utilities, poor land use Planning and ineffective development control which enhancing un-ecological land use land cover changes footprints and Land Degradation in Dodoma Capital City.

Likewise (Culwick et al.,2019; Tacoli,2012; Hegazy and Kaloop, 2015a; Tacoli, McGranahan, and Satterthwaite, 2015; Zhang et al ., 2011; Sankhala and Singh, 2014) point out that unguided urban expansion as the major cause of congestion, unsustainable infrastructure finance, Poor infrastructure development, development of unconditional growth, widespread settlement, and informal settlements, rising carbon footprints, rising crime rate, losses of agricultural land and water bodies, land use and land cover changes and Urban land degradation in Urban localities.

Angel (2015), points out it is very expensive to finance and facilitate the development of social infrastructure in sprawling cities which in turn results in the development of unconditional growth, widespread settlement, and informal settlements, rising

carbon footprints, rising crime rate, developing inexpensive apartment buildings (handshake buildings), overcrowded, informal dwellings in the vicinity of well-developed urban districts.

Based on the President Office Regional Administration and Local Government Official interview Hante explained that the administrative boundary of Dodoma National Capital City has been extended outward to swallow three (3) wards from Chamwino District Council into its Locality. The such administrative transformation will enhance the increases in infrastructure construction Costs, the emergence of un-serviced and hard-to-reach wards, failure of implementation in detail of the Master Plan, widespread settlement development, emergence of Un – Ecological Land Use and Land Cover Changes and Urban Land Degradation in Dodoma Capital City Locality.

3.2.4: The Emergence of Un – Ecological Urban Villages into Dodoma City Locality

In the period of 46 years from 1974 - 2022, the status growth of Dodoma Urban elevated up to 5 administrative ranks crossing from Urban District to Town, Municipality, Capital Development Authority, and City to National Capital City. Notably, the growth of Dodoma urban in terms of size and administrative status has resulted in the formation of new agglomeration allowing both rural and urban settings to co-exist within a jurisdictional area of the City as shown in (Figure 9).

The finding results show that in 1983 when the Dodoma Municipality was established under Government Notice (GN) No. 1983/CDA73 there were 18 Rural villagescontained in the city locality occupying 944 square kilometres while urban Sub - wards occupied 563 square kilometres and Urban Villages 1,101 square kilometres out of the 2608 square Kilometers which is the total City area.

In 2019 the administrative status of Dodoma Municipality was upgraded from Municipal Council to National Capital City Council. The Administrative boundaries of the city have affected the administrative status of 18 villages and transformed them from rural villages to urban villages which occupied 2044 (78%) of Dodoma City's total area as shown in (Figure9).

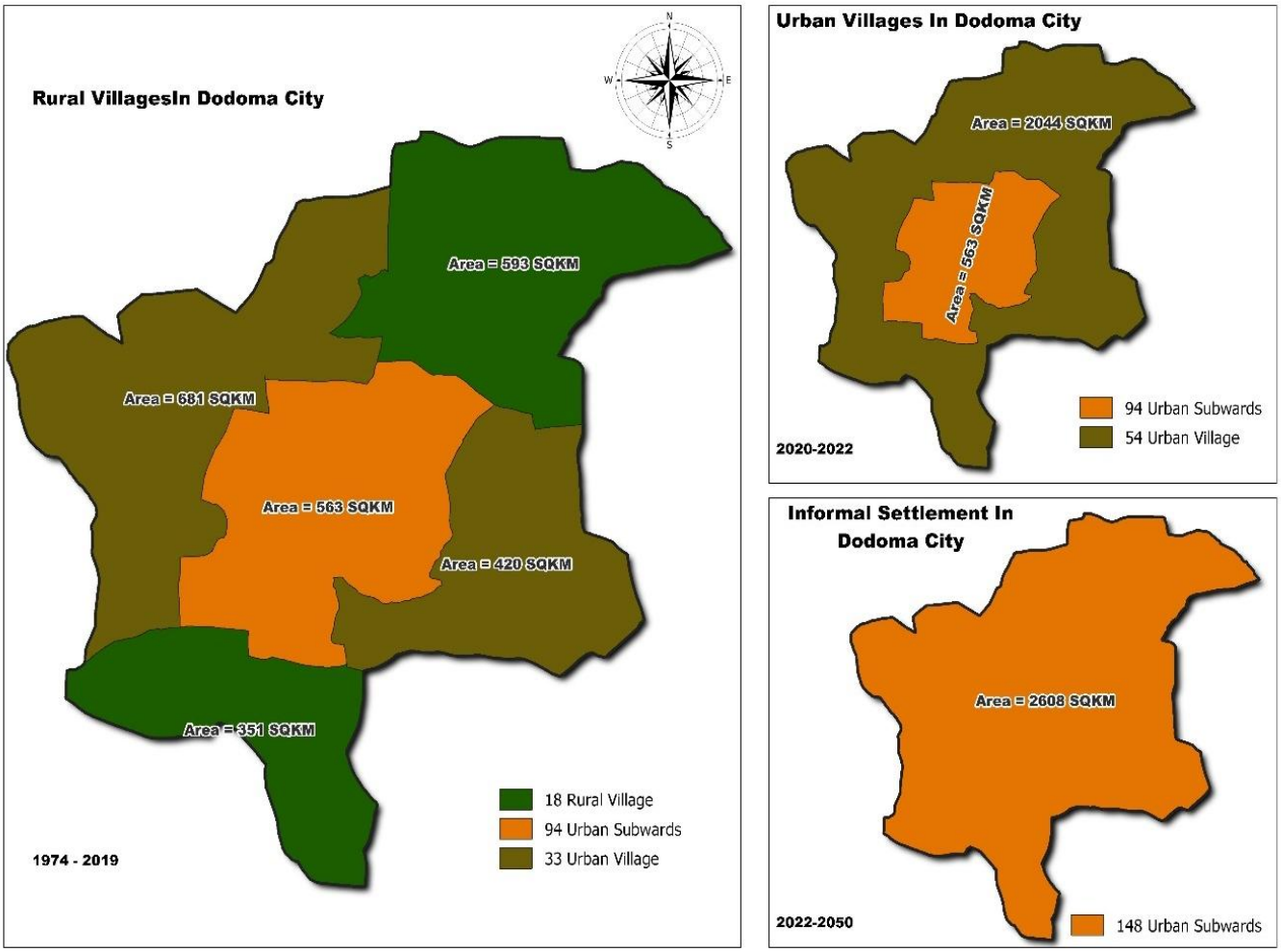


Figure10:Administrative Transformation of Dodoma City 1974 – 2022
Source: The Researcher's Construction is based on GN. NO.17&536/537 (2019,1983/CDA73), LTR, 2021.

Under such regard, 78% of the total area of Dodoma City is occupied by urban Villages while 32% of the City's area occupies Urban Sub - Wards. Materially, the presence of rural urbanism and informal settlement in Dodoma Urban Locality is the materialization effects of the Urban Villages into the City locality.

The funding results reviled that 82% of the informal settlement are falling in 333 Urban Villages while 18% of informal settlements fall in 71 Urban sub - wards. Consequently, this means that Urban Villages are Habitations of informal settlements in Dodoma National Capital City as shown in Map 11.

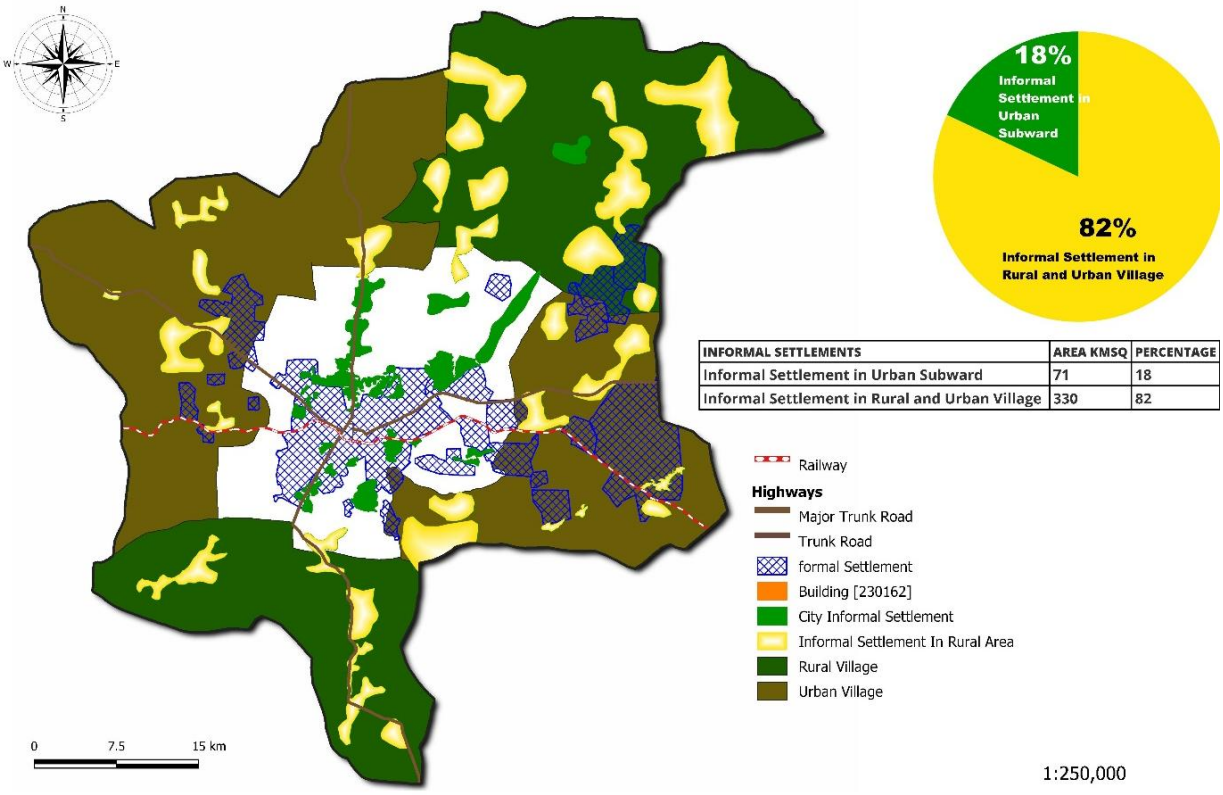


Figure 11: Informal settlement status in Dodoma City
Source: Researcher's Construction based on Dodoma Master Plan

Urban villages in the Dodoma City locality are characterized by having features like traditionally constructed buildings, road networks that are dominated by many footpaths and unclassified road networks, low-density housing, and declined agricultural land which enhanced the un - ecological environment, un - ecological land use /cover changes and the emergence of urban land degradation features such as; flooding, deforestation, overutilization of natural resources, the temperature rises, Under production, desertification, airborne diseases, pollution (air, water and soil) erosion, chronic diseases, Scarcity of natural resources, and loss of biodiversity in urban settings.

Comparatively to China, Latin America and Vietnam in which Vancouver (2011) explains that villages are characterized by having surrounded by skyscrapers, major transportation infrastructures, and other modern urban constructions rather than farms, High settlement density, dark claustrophobic alleys jammed with dripping air-conditioning units, hanging clothes, caged balconies, and bundles of buzzing electrical wires – crowned with a small strip of daylight, called by locals "thin line sky. "At times, buildings stand so close to one another that they are dubbed "kissing buildings" or "handshake houses"– you can reach out from one building to reach over and shake hands with your neighbour, originate from the outward growth and expansion of the cities to swallow neighbouring villages into city territory.

3.2.5: Planning and LegalIssues on the Changes of Urban territory (Town to City) and Land Use/Cover in Dodoma Capital City

Despite the legal and administrative interventions for the separate establishment of urban and rural authorities, to incorporate urban planning concepts for effective and efficient management of urban authorities in Tanzania, experience has shown that dramatically re-emergence growth of rural urbanism and the disappearance of urban ecological land use into the urban locality in Tanzania has maintained the status quo, resulting in the proliferation of unconditional cities growth.

Legally, the Written Laws (Miscellaneous Amendments) (No.2) Act, 2009 of the Local Government (Urban Authorities) Act of,1982 Re,2000 in the addition of Section 87A: Sub-Sections (3), (4) and (5), it recognizes the presence of Urban Villages (Uvs) in an urban setting but restricts rural operations into the urban locality. Comparatively to Urban Planning Act No. 8, Section 7 (1), 2007 which allows the transformation of Rural Villages into Urban Villages through declare them as Planning areas as well as allowing them to be part of the urban once declared planning areas but restricts rural operation into the urban locality.

The finding of this study has shown that the Dodoma City profile has features such as Urban Land degradation, un - ecological land use and land cover changes in Urban Villages, Rural urbanism and Sprawling growth. Objectively, all laws (Urban Planning Act No.8 of 2007 and Local Government Act No. 7 and 8,1982) allow the coexistence of rural and urban interfaces in the same urban territory but all laws restrict all rural operations (Rural Urbanism and Planning) in the urban territory. This fact is contrary to what happens in Dodoma City in which the finding revealed that out of 43 Wards in Dodoma 28 wards are undergoing rural urbanism and Rural operations, this means 65% of ourtotal wards are undergoing rural operations which is contrary to the requirements of the Laws. Consequently, to that, under such circumstances, there are difficulties in implementing Urban Planning and Local Government Acts in the management of Urban development of

Dodoma Capital City which in turn ensures informaldevelopment of the city and pre-planning which is Costly.

In the practical case of Egypt and China, experience has shown that doing pre-planning in existing conventionally constrained structures in the urban village was difficult and costly. Under such circumstances, the built-up component of the engulfed village remains untouched to avoid costly compensation and relocation programmes. Eventually in the future, it becomes a traditional planned settlement inside the urban authority this case appeared similarly in the National Capital City of Dodoma.

3.2.6: Theory and Concepts of the Evolutionary Changes of Urban territory (Town to City) and Land Use/Cover in Dodoma Capital City

This paper uses new urbanism, alternative Stable state and Ecological modernization theories as a framework to examine and recommend where shall the local people go and which ways they should urbanize into the City territory during evolutionary changes of Dodoma's Urban territory from Town to City in the period of 1998 to 2022.

Holling (1973) in Alternative Stable State theory explains that after a small disturbance /change of anything which is in a stable state, it will pass into a transition period and after a certain period, it shall find another alternative stable state and in the alternative state the ecosystem would return to its stable state, but after a large disturbance, a different or alternative stable state would develop. This means there is a possibility of the reappearance and disappearance of the declined urban ecological environment and un – ecological Urban Villages in Dodoma City locality. Under such regard, the lack of intervention for the emerged un – ecological quarantined urban villages will ensure them to be more stable in urban localities than they were in rural/district localities.

Holin (1996) in the study of ecological modernization theory points out that, towns and cities have been transformed into urban settings while excluding ecological modernization concepts. Leaving behind ecological modernization concepts is the major reason why urban areas in developing countries are possibly urbanizing at quarantined urban villages capacities. Strictly, ecological modernization theories are directly interfacing with the planning concepts and theories such as; Concentric Zone, Sector theory, Multi Nucleus, Radial and Radiant Cities.

To ensure resilient planning in rural-urban interface areas, modernization theory should be implemented in the swallowed quarantined urban villages by taking into consideration of philosophical ideas of entitlement, community participation and utopian theories to ensure the sustainability of the urban quality.

Significantly to that, to rise Tanzanian cities resilient and liveable,Local Government Authorities are advised to integrate and implement the concepts of new urbanism which emphasize the development of villages' idea of planning and encompass Ten (10) basic principles which include; traditional neighbourhoods design (TND) and Transit- Oriented Development (ToD). These ideas can all be circled back to two concepts in building a sense of community and the development of ecological practices in Dodoma City and the rest.

Furtherance to that, other interventions to bring Dodoma National Capital City resiliently and ecological are such as; promoting energy efficiency codes in buildings (ee) standards & certificates, environmentally friendly design use of climate-adapted and sustainable building materials, building orientation, building form /shape, space allocation and opening, daylight and solar protection, natural ventilation and passive cooling;the use of passive heating and building envelop, the use of external finishers and renewable energy, water efficiency and drainage, stormwater management; sanitation and solid waste management, landscaping and energy efficiency, mixed social structure and adequate density and compact planningand promoting of walkability and active mobility in local government authorities.

4. Conclusions

The study concludes that the urban ecological land uses and cover in Dodoma City have declined and degraded leading to occurrences of floods, temperature rise, desertification, loss of biodiversity and air pollution. The built-up land hectares have increased by 60%, bare land hectares decreased by 23%, vegetation hectares decreased by 13%, and water hectares decreased by 1% between 1998 and 2022.

To enhance resilience in the National Capital the study recommends the application of environmentally friendly waste management systems, green building concepts and design, Energy-efficient appliances, enhanced integration of the new urbanism, alternative stable state and ecological modernization theories in managing and planning Urban Villages into Dodoma City Locality. Furthermore, the study recommends amendment of Urban Planning Act No.8 of 2007 and Local Government Act No. 7 and 8,1982 to comply with Rural Urbanism and Operations in the locality of the City.

5. Data Availability

The data, mostly secondary data, was collected based on the sources have been cited and presented in the study and references. Oral data and Archival sources that formed the basis of this study have been deposited at the Tanzania National Brew of Statistics and Present Office Regional Administration and Local Government archives at Dodoma Tanzania.

6. Conflicts of Interest

We -the authors declare that there is no conflict of interests Regarding the publication of this paper.

7. Funding Statement

The research and publication of our article was funded by ourselves.

8. Acknowledgments

My greatest credits go to my supervisors Professor Marco Burra and Doctor Nelly John Babere and Dr Hante Mukuki, who have been a source of intellectual inspiration and guidance. Their constructive comments, criticism and support made this study possible. Special thanks go to my lovely Mother Rebecca Joseph, My wife Winnie Mwaipopo My Family from Gibeni, for their understanding and endurance during my absence.

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