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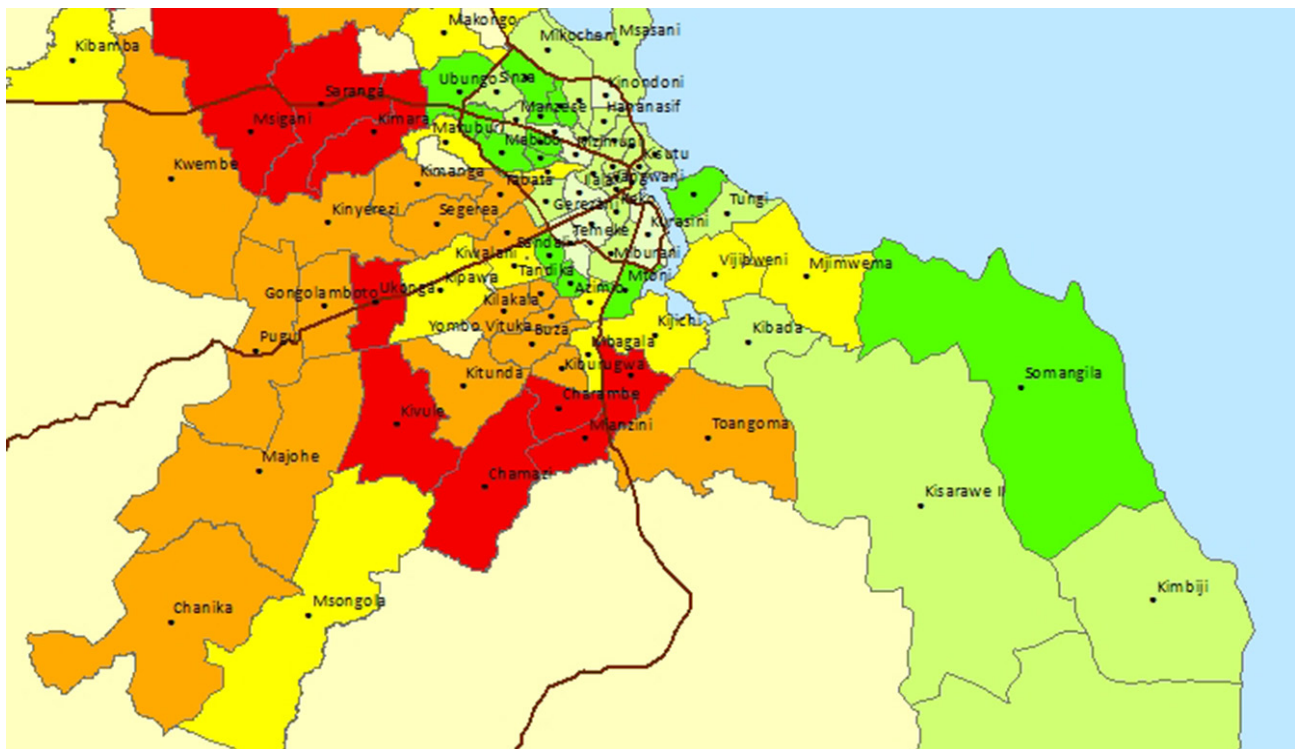
## African Rural-City Connections

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### Working paper 1

## Population Growth and Spatial Expansion of Dar es Salaam

An analysis of the rate and spatial distribution of recent population growth in Dar es Salaam





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# Population Growth and Spatial Expansion of Dar es Salaam

*An analysis of the rate and spatial distribution of recent population growth in Dar es Salaam*

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# 1. Introduction

Dar es Salaam is a prime example of a rapidly growing city in sub-Saharan Africa. In the most recent inter-census period from 2002-2012 population growth has been as rapid as ever. Dar es Salaam has experienced an absolute population increase of 1.9 million people, almost doubling its population from 2.5 million inhabitants in 2002 to 4.4 million in 2012. This translates into an average growth rate of 5.8 per cent per year, which is significantly higher than in the two previous inter-census periods. It is also much faster than national population growth, which suggests that in-migration has been an important source of population growth<sup>1</sup> (National Bureau of Statistics Tanzania 2006a, National Bureau of Statistics Tanzania 2013).

It is well-documented that population growth in Dar es Salaam historically has translated into spatial expansion and residential sprawl, rendering the current transport system unable to cope with the spatial expansion of the city. The bulk of urban spatial expansion has happened in the form of informal settlements, often with little infrastructure in place (Olvera et al. 2003, Kombe 2005, Sawio 2008, UN-Habitat et al. 2010).

This working paper will present a GIS- based analysis of recent population growth and spatial expansion in Dar es Salaam, focusing primarily on the most recent inter-census period from 2002-2012. The paper attempts to locate where the city has grown by combining and comparing different indicators. Inter-census population changes are assessed through analysis of the spatial distribution of average annual population growth rates and absolute population increases, as well as the absolute and relative changes in population densities. The resulting changes in the overall spatial distribution of the population are analysed through comparison of population counts and population densities for 2002 and 2012. Held together these indicators help form a whole-some picture of where the city is growing, and where this growth is most significant.

The paper is based on spatially disaggregated population data for Dar es Salaam from the two most recent censuses of Tanzania held in 2002 and 2012. Data from the 2012 census have only recently been made available to the public, making the analysis as up-to-date and relevant as possible. Analysis of spatially disaggregated data enables a closer scrutiny of where urban growth is really happening. This gives a more nuanced understanding of urban growth, which is increasingly needed by policymakers (Montgomery 2008). This knowledge also forms a solid foundation for further inquiries into how the city might be growing differently in different places – and why.

The working paper is part of the research project African Rural-City Connections, popularly named ‘Rurban Africa’, with the overall objective of exploring connections between rural transformations, mobility and urbanization processes<sup>2</sup>. The paper has been developed as part of initial research for my PhD project exploring how rapid population growth is transforming Dar es Salaam and what forces are shaping these transformations. It is my hope that this paper will form a solid base for further enquiries into the growth and transformation of Dar es Salaam and perhaps also be of interest for other researchers as well as policymakers and practitioners in the field of urban planning in Dar es Salaam.

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<sup>1</sup> The difference between the national and the urban population growth rates is the main indicator of how much in-migration is contributing to urban growth (Van Dijk et al. 2001, Potts 2005). The assumption behind this indicator is that natural population increase in urban and rural areas is similar. This assumption is contestable and quite difficult to assess in practice due to lack of systematic, spatially disaggregated data on fertility and mortality in much of sub-Saharan Africa. Classic demographic theory would suggest that urban natural increase is much lower because urban women generally have fewer children, but Potts argue that, at least historically, it is reasonable to assume similar rural and urban natural increase in much of sub-Saharan Africa. In this region urban fertility levels have fallen more slowly than in other parts of the world, although they have generally been lower than rural fertility levels. Urban crude birth rates in sub-Saharan Africa have tended to stay nearly as high as in rural areas because of the concentration of the urban population in the youthful fertile age ranges. Furthermore, infant mortality is generally lower in urban areas, which is also one of the reasons why urban and rural natural increase tends to be similar in sub-Saharan Africa (Potts 2005, Potts 2012).

<sup>2</sup> For more information about Rurban Africa, see: [www.geo.ku.dk/rurbanafrica](http://www.geo.ku.dk/rurbanafrica).

## 2. Data and its limitations

This working paper is based on 2002 and 2012 population headcount data for Dar es Salaam, which are spatially disaggregated down to the administrative unit of wards. This section will discuss the explanatory force and limitations of these data.

The 2012 ward-level data have been published in the 2012 census general report (National Bureau of Statistics Tanzania 2013). These data have only recently been made available to the public, making them as up-to-date as possible. The 2002 ward-level data have been kindly made available on request by the National Bureau of Statistics Tanzania. Together they form a detailed, comprehensive and spatially disaggregated dataset, which enables comparison over time and a closer scrutiny of where population growth is actually happening.

The analysis relies on census data and therefore suffers from some of the same appertaining limitations. As census data follow administrative boundaries, the city of Dar es Salaam is defined by these in this paper. Administratively Dar es Salaam has status of a region. The region consists of three municipalities: Kinondoni, Ilala and Temeke. Each municipality consists of a number of wards, which is the administrative level that data is disaggregated to (see map 1 for an overview of the administrative boundaries). In a more functional view of the city, Dar es Salaam might stretch beyond the administrative boundaries in some places, as is probably the case along the major roads. The administrative boundaries might also include areas that are more rural in character in terms of population densities, as is the case in the southern parts of Temeke along the coast.

Censuses capture a static image of the population. They measure the stock of residents at a given point in time, but they cannot capture flows in between. Censuses are often held with quite long time intervals, e.g. there is 10 years between the two most recent censuses of Tanzania. Therefore the census figures can reveal a general trend in the rate of population growth, but they cannot capture any major fluctuations in the population in between censuses. It is well-known that there is a generally high level of mobility in populations of sub-Saharan Africa, and that circular migration patterns often feature prominently in both rural and urban livelihood strategies. This fluidity is only poorly captured in the census data (Van Dijk et al. 2001, Potts 2010).

This is also important to keep in mind in the analysis of spatially disaggregated ward-level data from the censuses. It is only the change in stock of residents in each ward that one is able to measure with census data. Urban residents are not stationary. They often change their place of residence many times during their life for various reasons. Some areas might have experienced large in- and out-flows of residents in the inter-census period, but if there is no significant increase or decrease in the stock of residents, it will not be possible to detect it in the data. Likewise, the absolute increase in the stock of residents in an area cannot be taken as an indicator of the level of “new residents”, i.e. people who have moved to the area in the recent inter-census period. Even though a ward had a population count of a significant size back in 2002, it is fully possible that all residents of the area in 2012 are new residents. It all depends on the in- and out-flows of residents in between the two censuses.

This point is also important for the discussion of the link between mobility and population growth. At the city-level, it is reasonable to assume that a high growth above the national population growth rate is an indication of a large in-flow of migrants<sup>3</sup>. One needs to be much more careful when interpreting the spatially disaggregated ward-level data, though. High growth rates in a smaller part of the city should not be taken as an indication of a large in-flow of new migrants. Of course, this could be the case, but rapid growth at ward-level could also easily have been fuelled by intra-urban mobility. Likewise, it is fully possible that slow-growing areas have received a large in-flow of new migrants. If the flow of residents moving out of the area is also substantial, it will not show in the data.

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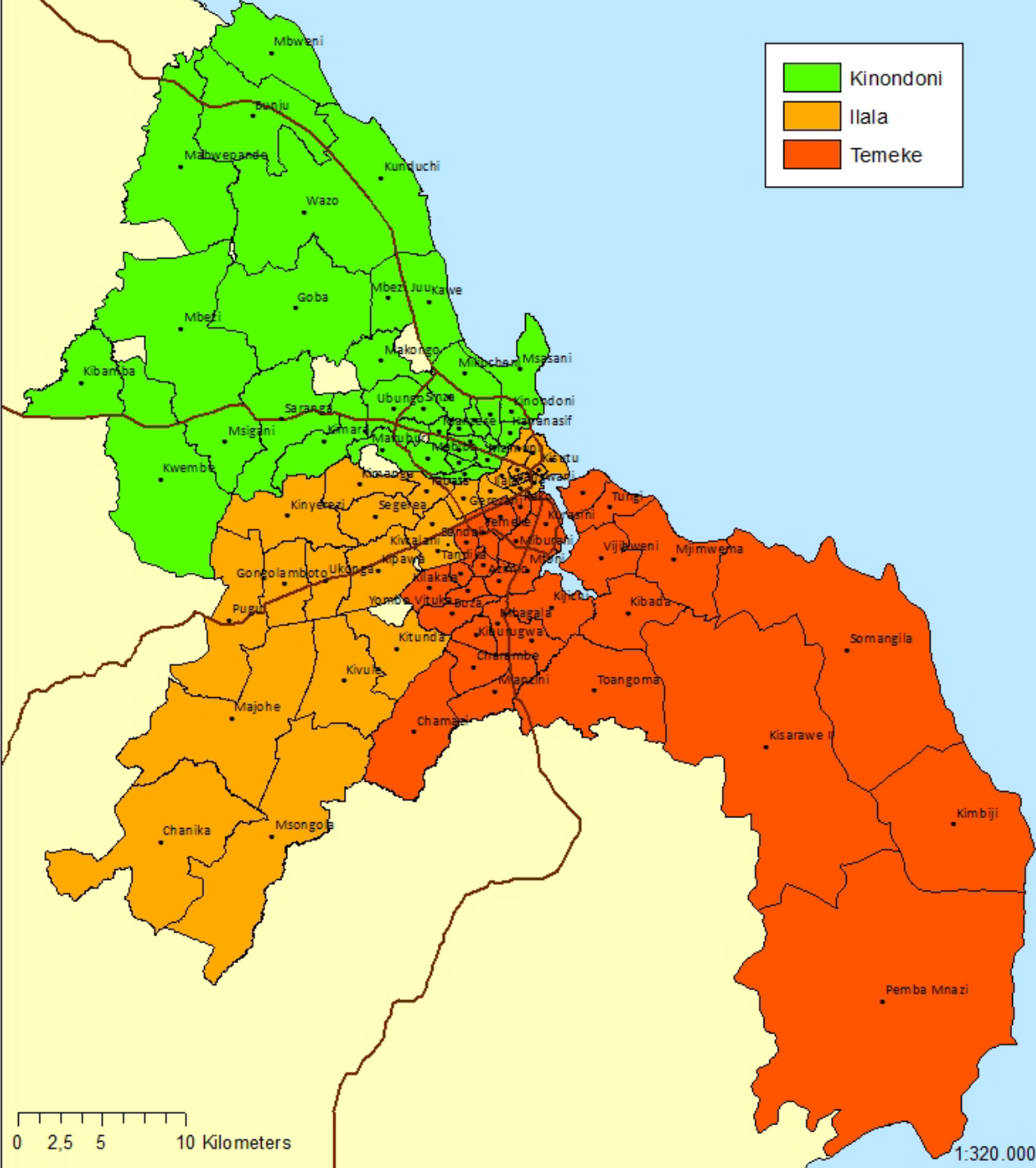
<sup>3</sup> See footnote 1 for an explanation why.

Direct comparison of 2002 and 2012 ward-level data is not possible for all wards because of intermediate boundary changes. Dar es Salaam consisted of 73 administrative wards during the 2002 census. By 2012 there were 90 administrative wards in Dar es Salaam. Re-districting has happened without inclusion of much new territory, so most of the new wards in 2012 are formed by dividing up 2002-wards in two or more new wards. In a few instances a new ward has been created by smaller bits and pieces of several 2002-wards. A total 32 2012-wards are affected by inter-census boundary changes. These have been identified by overlaying GIS-layers of 2002 and 2012 ward boundaries, kindly shared for the purpose of this analysis by the National Bureau of Statistics Tanzania. To make the data comparable, only the 2012 ward boundaries are used in the analysis. For the 2002 data, all the wards affected by inter-census boundary changes have been assigned adjusted 2002 population counts based on a relative share of the 2002 population counts of the ward(s) they formed part of in 2002. The relative shares are based on the area wise size of wards in sq.km. assuming equal population distribution across the zones in 2002.

The assumption of equal distribution of population across the zone is probably not very representative of the actual distribution of the population in 2002, but when one does not know more about the zone, it is most valid to assume equal distribution. This creates a risk of distortion in the analyses, though, especially in the peripheral wards which are generally very large area wise. In many cases new 2012-wards have been created by dividing a 2002-ward in two. The area wise larger 2012-ward has then been assigned a proportionate larger share of the 2002-count, while the area wise smaller wards have been assigned a proportionate smaller share of the 2002-count. In some cases it might be more likely that the area wise smaller 2012-ward was really the most populated part of the territory in 2002, because it is closer to a larger road or closer to the city centre. Possible distortions of this kind will be noted during the analysis. Improving the precision of the analysis and minimizing distortions would require data disaggregated to a smaller unit than ward. At present 2002 population counts do exist for the sub-ward level, but currently not in a geo-coded form. 2012 population counts for the sub-ward level have not been publicised yet, but should become available within the next few years.

## Map 1

## Wards of Dar es Salaam according to municipality





### 3. Analysis methods

This working paper builds on a GIS-based, spatial analysis of where the city has grown in the most recent inter-census period from 2002-2012. In the analysis process several different indicators have been compared and combined to gain a full and whole-some picture of where the city is growing, and where this growth is most significant. This section will elaborate on the analysis methods deployed.

The inter-census population changes are assessed through analysis of the spatial distribution of average annual population growth rates and absolute population increases of wards. An average annual population growth rate is an expression the yearly percentage-wise change in the population of an area. Change is measured relatively to the starting point of the area itself. This means that high growth rates can occur in area with a very small number of residents, which might have doubled or tripled in the inter-census period, but which is still negligible in 2012. Likewise, more moderate growth rates can translate into significant volumes of people, if the starting point in 2002 is a fairly large number of residents. Therefore it is necessary to hold growth rates together with absolute population increases to get a fuller picture of where population growth has been most significant. Absolute population increase is a measure for the absolute difference in number of people living in an area between 2002 and 2012. Analysing the spatial distribution of absolute population increase can help identify areas where the population increases have been of a significant size, both in absolute terms in number of people, and compared to the overall population increase that has happened in Dar es Salaam.

As the wards of Dar es Salaam are quite different in size, it is not straightforward to compare the absolute population increases between wards. The population increases should also be held in relation to the size of the territories they are distributed across. Therefore the analysis of inter-census population changes are further nuanced by an analysis of the changes in population densities of the wards. Population density is a measure for the average number of people living per sq.km. in an area. Analysing the changes in population densities is a way of assessing where the population changes might have had the most significant impacts. An area might have experienced rapid growth and a large absolute population increase, but if it is distributed across a very large territory, the change in population density might not be that dramatic. Likewise an area with a relatively lower growth rate and a smaller absolute population increase might feel these changes more dramatically, because people are distributed over a much smaller area.

The resulting changes in the overall spatial distribution of the population are analysed through comparison of ward-level population counts and population densities for 2002 and 2012. Comparing population counts for 2002 and 2012 can help assess if the spatial distribution of the recent population growth has affected the overall spatial distribution of the population in any significant way. It is also necessary to hold this together with a comparison of overall population densities in 2002 and 2012 as the wards of Dar es Salaam are very different in size area wise (cf. above paragraph).

Thematic maps are a recurrent tool in the analysis process. The thematic maps help identify and visualise patterns in data. Thematic maps should be read with great care, though. Readability of thematic maps rely on simplification by grouping data into a few categories. This means that the selected thresholds between categories matter quite a lot for the visualization of data. In this paper most maps have been created with data grouped into 5-7 categories. Thresholds between categories are sought determined by natural groupings inherent in the data. This means that chosen thresholds are those that best group similar values and maximize the difference between categories. Where maps of 2002 and 2012 distributions are compared, thresholds are determined by the natural groupings in the 2002-data and used on both 2002 and 2012 maps to facilitate comparison. If thresholds are chosen for other reasons, it will be explained in the analysis. Thematic maps also rely on zones and data are mapped according to zones. This makes it appear as if the data being mapped is equally distributed across the zones, which is probably not very representative of the underlying geography of the data. In reality there might be parts of a ward which are

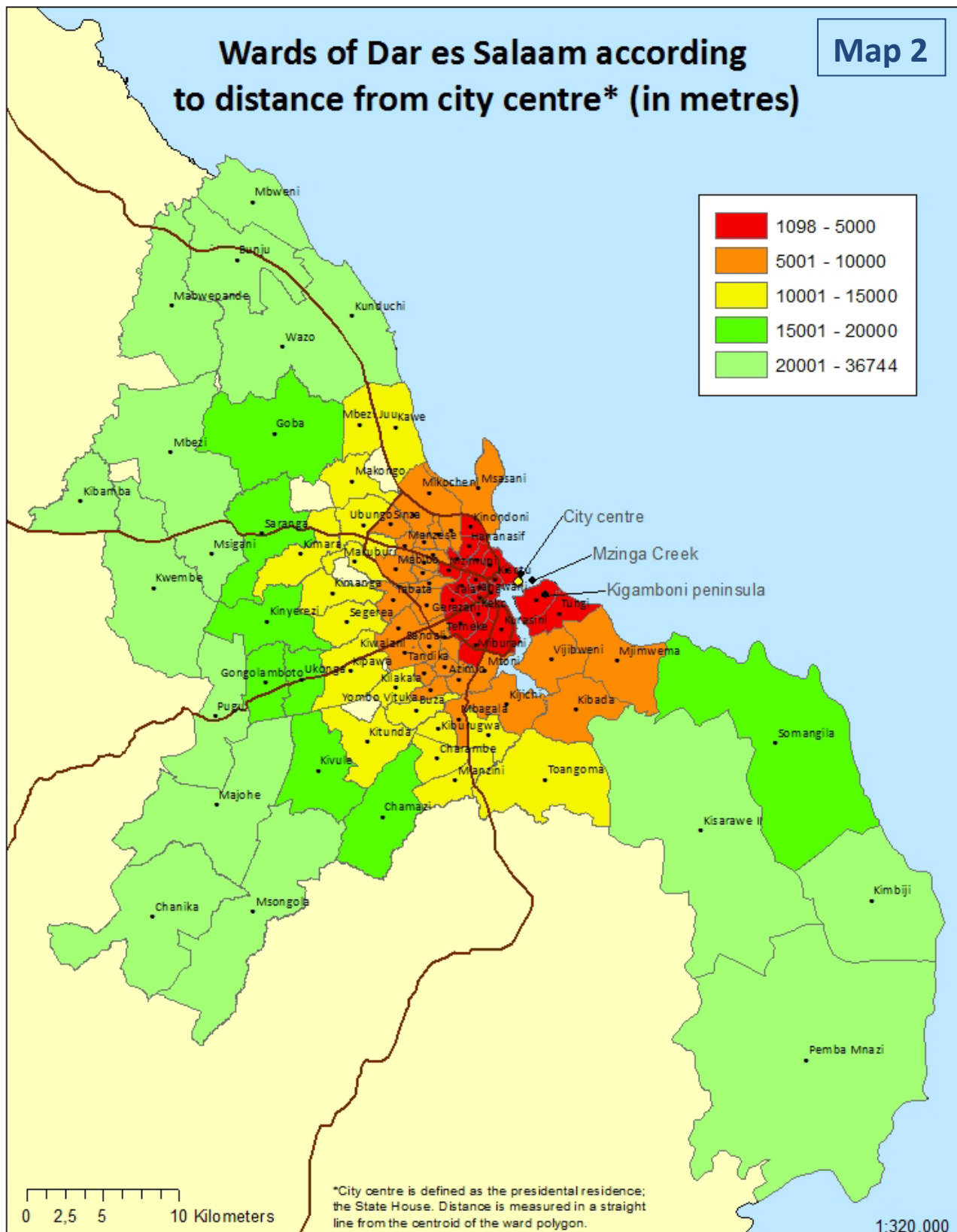
much more populated than other parts. This is especially pronounced when working with very large and odd-sized zones, as is the case with many of the peripheral wards of Dar es Salaam.

Tables and cross-tables are also a recurrent tool in the analysis process. The tables help summarize and present the data visualised in the thematic maps. Tables and maps should often be read together. In some of the tables data are crossed with the variables municipality or distance from the city centre. Municipality is an important variable because much urban planning effort is organised according to municipality. Therefore it is interesting to see if patterns in data might be different in the different municipalities. Distance from the city centre is an important variable, because it is interesting to summarize data according to central vs. peripheral locations and see how patterns in data relate to this. It is important to read the distance variable with great care, though, and in comparison with analysis of the maps, as this variable is an expression of straight line distance.

The distance variable has been created by measuring straight line distance from the city centre to the centroid of the ward polygon. The city centre is defined as the presidential residence, the State House, located in the central ward of Kivukoni (see map 2 for a location of the city centre). Because of the geography of Dar es Salaam region, straight line distance is not an equally useful proxy for distance in all directions. It is a fairly useful proxy in northern, western and south-western directions, which are serviced by major roads. In the southern direction, straight line distance is much less useful proxy. In the southern areas along the Kilwa Road the regional border of Dar es Salaam is much closer to the city centre than in all other directions, which means that the more peripheral locations in this direction are really outside Dar es Salaam region. In the southern areas along the coast, which are not serviced by any major roads, the periphery is much closer to the city centre than in all other directions. In this direction the estuary of Mzinga Creek separates Kigamboni peninsula from the city centre (see map 2 for a location of these features). On the Kigamboni peninsula and beyond a 10 km radius covers quite a lot of urban land that could be considered quite peripheral compared to the 10 km radius in other directions. These areas might be close to the city centre measured in a straight line, but in reality they are much less populated than other central areas and much harder to reach because of Mzinga Creek. Distance measured in transport-time would be a much more meaningful indicator of actual distance. This would require more complex and sophisticated analysis methods, which are outside the scope of this working paper. Instead, possible distortions related to straight line distance will be noted during the analysis

## Wards of Dar es Salaam according to distance from city centre\* (in metres)

Map 2



## 4. Growth and spatial expansion before 2002

This section will present data on the rate of population growth for Dar es Salaam before 2002 and account for the historical experiences of spatial expansion documented by other scholars.

Dar es Salaam grew from a population of app. 433.000 people in 1967 to 2.5 million people in 2002 (cf. table 1). The average annual growth rate of Dar es Salaam's population decreased considerably from 7.8 per cent in the 1967-1978 inter-census period to 4.8 per cent in 1978-1988 and 4.3 per cent in the period 1988-2002 (cf. table 2). In all inter-census periods the growth rates of Dar es Salaam were considerably higher than growth rates of the total population, though (cf. table 2). The growth rate of Dar es Salaam in the whole 1967-2002 period was 5.1 per cent per year on average, compared to a national population growth rate of 3 per cent per year on average for the same period. Assuming that natural population increase in Dar es Salaam is similar to natural increase in the rest of the country, this suggests that in-migration has contributed significantly to the growth of Dar es Salaam<sup>4</sup>.

Historically, population growth in Dar es Salaam has translated into widespread spatial expansion and urban sprawl. Kombe describes the growth of Dar es Salaam as *"complex organic urban structures which expand horizontally"* (Kombe 2005). The surface area of the city has increased dramatically. In 1969 the maximum distance from the centre to edge was 6-10 km. In the late 1990s it was up to 30 km (Olvera et al. 2003). Sawio argues that geographical expansion is even up to 50 km from the centre in some directions if you take a more functional view of the city (Sawio 2008). Spatial expansion of Dar es Salaam in the 1970s and 1980s followed a star-shaped pattern along major roads, which reflected the transport crisis of the time. Spatial expansion was initially driven by residents' need to produce their own food in times of growing economic crisis (Briggs and Mwamfupe 2000, Owens 2010).

In the 1990s new conditions emerged that made the peri-urban zone a place of investment in housing and commercial agriculture. An emerging business and political elite began to see the peri-urban areas as a place to invest its newfound wealth in land, houses and farms (Briggs and Mwamfupe 2000, Briggs and Yeboah 2001, Olvera et al. 2003, Owens 2010). Briggs and Yeboah explain how the structural adjustment programs enabled spatial expansion in the 1990s. With liberalisation of trade and foreign currencies, finance became available through trading gains and remittances from overseas migrants. The bulk of it has been invested in housing and real estate. The deregulation of public transport of the late 1980s was also a significant driver of urban expansion, as the many new privately operated minibuses made the peripheral areas more accessible (Briggs and Yeboah 2001). By the 1990s most of the spatial expansion happened by infill and densification rather than further along the major roads (Briggs and Mwamfupe 2000, Olvera et al. 2003).

The bulk of urban spatial expansion has happened in the form of informal settlements. A recent UN-Habitat report estimates that there were around 7000 housing units in unplanned areas in Dar es Salaam in 1963. By 1972 the number of units in unplanned areas had grown to 28,000 (UN-Habitat 2010). Recent calculations by the Ministry of Land, Housing and Human Settlements Development suggest that at least 80 per cent of the population of Dar es Salaam is living in informal settlements, instead of the often cited 70 per cent. In an analysis of satellite images the Ministry found app. 500,000 buildings in the city, out of which 400,000 were in informal areas. Considering the high occupancy rate of informal areas, they feel it is safe to conclude that over 80 per cent of the city's residents live in informal areas (UN-Habitat et al. 2010). Expansion in informal areas has often happened without any basic infrastructure in place, contrary to the common belief among policymakers that the absence of infrastructure will restrain growth (Kombe 2005). Despite the term "informal", people who build in informal settlements often have a perceived security of

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<sup>4</sup> See footnote 1 for an explanation why.

tenure and many build houses with permanent and modern building materials. A unique feature in Tanzania is the phenomenon that mixed socio-economic groups often live side by side in informal settlements (Fagerlund 2010, UN-Habitat 2010).

| <b>1. Population counts of Dar es Salaam and Tanzania, 1967-2012</b>  |                      |                 |
|---|----------------------|-----------------|
|   | <b>Dar es Salaam</b> | <b>Tanzania</b> |
| <b>1967<sup>1</sup></b>   | 433,145              | 12,313,469      |
| <b>1978<sup>1</sup></b>   | 851,534              | 17,512,610      |
| <b>1988<sup>1</sup></b>   | 1,360,865            | 23,095,882      |
| <b>2002<sup>1</sup></b>   | 2,487,288            | 34,443,603      |
| <b>2012<sup>2</sup></b>   | 4,364,541            | 44,928,923      |
| <sup>1</sup> Source: 2002 census (National Bureau of Statistics Tanzania 2006a). The counts for Dar es Salaam in 1967 and 1978 are own extrapolations from 1988 count and the inter-census average annual growth rates (see table 2). |                      |                 |
| <sup>2</sup> Source: 2012 census (National Bureau of Statistics Tanzania et al. 2013)   |                      |                 |

| <b>2. Average annual population growth rates of Dar es Salaam and Tanzania, 1967-2012</b>         |                      |                 |
|---|----------------------|-----------------|
|   | <b>Dar es Salaam</b> | <b>Tanzania</b> |
| <b>1967-1978<sup>1</sup></b>  | 7.8 %                | 3.2 %           |
| <b>1978-1988<sup>1</sup></b>  | 4.8 %                | 2.8 %           |
| <b>1988-2002<sup>1</sup></b>  | 4.3 %                | 2.9 %           |
| <b>2002-2012<sup>2</sup></b>  | 5.8 %                | 2.7 %           |
| <sup>1</sup> Source: 2002 census (National Bureau of Statistics Tanzania 2006a).                  |                      |                 |
| <sup>2</sup> Source: Own calculations based on population counts for 2002 and 2012 (see table 1). |                      |                 |

## 5. Recent population growth 2002-2012

This section will present and analyse the recent rate of population growth for Dar es Salaam.

Dar es Salaam has grown very rapidly in the most recent inter-census period from 2002-2012. The city has experienced an absolute population increase of 1.9 million people, growing from 2.5 million inhabitants in 2002 to 4.4 million in 2012. This translates into a quite high average annual growth rate of 5.8 per cent (cf. table 3). This growth rate is actually higher than in the two previous inter-census periods (cf. table 2), which is impressive considering that it has happened in a much larger city. For comparison, anything growing at an annual growth rate of 5.8 per cent will double its number within 12.3 years. It is also much faster than the total population growth rate of 2.7 per cent for the same period (National Bureau of Statistics Tanzania 2006a, National Bureau of Statistics Tanzania 2013). This suggests that net migration has also been an important factor in the recent population growth of Dar es Salaam<sup>5</sup>.

The regional projections of the 2002 census foresaw that that Dar es Salaam would have only 3.3 million inhabitants in 2012 – a huge underestimate in the area of 1.1 million people. The growth of Dar es Salaam was projected to stagnate after 2002 and grow at a rate of only 2.8 per cent per year from 2002-2012 - very close to the projected total population growth rate of 2.9 per cent. This huge underestimation of Dar es Salaam's growth might have been caused by the assumption on internal migration that were built into the projections; that the situation found during the 2002 census would prevail for the entire projection period (National Bureau of Statistics Tanzania 2006b). In reality Dar es Salaam must have received a growing volume of migrants, as keeping up a high annual growth rate in a rapidly growing city, would require a growing number of net migrants.

The recent population growth has been fairly evenly distributed across the three municipalities of Dar es Salaam region. All three municipalities have experienced an absolute population increase of app. 6-700,000 people and average annual growth rates around 5-7 per cent (cf. table 3). Kinondoni municipality was more populated than the other two in 2002 and has also experienced a slightly higher share of the absolute increase, though it translates into a slightly lower average annual growth rate. Ilala municipality received the smallest share of absolute increase, though it translates into a slightly higher average annual growth rate, as Ilala was and still is the least populated municipality. Kindondoni remains the most populous municipality, in both absolute figures and in relative terms, although it has experienced a small decrease in its share of the population. Ilala has increased its relative share slightly, while Temeke's share has remained the same.

### 3. Central population figures for Dar es Salaam region and its three municipalities, 2002-2012

|                      | 2002 count <sup>1</sup> | 2012 count <sup>2</sup> | 2002 share <sup>3</sup> | 2012 share <sup>3</sup> | Absolute increase <sup>3</sup> | Share of absolute increase <sup>3</sup> | Average annual growth rate <sup>3</sup> |
|----------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------------|---|---|
| Kinondoni            | 1,083,913               | 1,775,049               | 44%                     | 41%                     | 691,136                        | 37%                                     | 5%                                      |
| Ilala                | 634,924                 | 1,220,611               | 26%                     | 28%                     | 571,359                        | 30%                                     | 6.8%                                    |
| Temeke               | 768,451                 | 1,368,881               | 31%                     | 31%                     | 614,758                        | 33%                                     | 5.9%                                    |
| <b>Dar es Salaam</b> | <b>2,487,288</b>        | <b>4,364,541</b>        | <b>100%</b>             | <b>100%</b>             | <b>1,877,253</b>               | <b>100%</b>                             | <b>5.8%</b>                             |

<sup>1</sup>Source: 2002 ward level data acquired from the National Bureau of Statistics.

<sup>2</sup>Source: 2012 census (National Bureau of Statistics Tanzania et al. 2013).

<sup>3</sup>Source: Own calculations based on the above.

<sup>5</sup> See footnote 1 for an explanation why.

## 6. Spatial distribution of relative growth rates

Dar es Salaam's population has grown at an average rate of 5.8 per cent per year from 2002-2012. Almost all wards have experienced population growth, but the city-level average covers quite a lot of variation. Ward-level average annual growth rates range from -2.7 per cent in the central ward of Kurasini to 23.7 per cent in the western peripheral ward of Msigani. In this section the inter-census population changes are assessed through analysis of the average annual growth rates of the wards of Dar es Salaam and the spatial patterns of relative growth rates across the territory of the city.

The wards with growth rates on or above the city average of 5.8 per cent will be considered rapidly growing in this paper. A total of 39 wards fit this category (cf. table 4). 13 of them have growth rates between 5.8-10 per cent, while 26 of them have very high annual growth rates above 10 per cent. The rapidly growing wards have, perhaps unsurprisingly, also been the areas where most of the recent population increase has happened. The rapidly growing wards account for 73 per cent of the total population increase. 53 per cent of the total increase happened in wards that grew at an annual rate above 10 per cent, whereas 20 per cent happened in wards with growth rates from 5.8-10 per cent. Many of the rapidly growing areas are likely new and developing areas that were able to uphold these very high growth rates because they started from a fairly undeveloped state in 2002. This is confirmed by the 2002 census classification of wards, where many of the rapidly growing wards were classified as rural or mixed in the 2002 census.

The wards with growth rates above the national population growth rate of 2.7 per cent, but below the city average of 5.8 per cent, will be considered moderately growing wards. Growth rates above the national population growth rate suggests that mobility is a driver of population growth in these areas, whether it is intra-urban mobility or new migrants. 22 wards fit into this category, and 20 per cent of total population increase has happened in these areas (cf. table 4). The wards in this group were already quite developed in 2002, as the majority of them were classified as urban in the 2002 census.

The wards with growth rates on or above the national population growth rate of 2.7 per cent are considered slow-growing wards. 29 wards fit into this category, 7 of which have experienced negative growth rates. Only 7 per cent of total population increase happened in these wards (cf. table 4).

### 4. Wards of Dar es Salaam grouped by 2002-2012 average annual growth rates according to 2002-2012 absolute increase and 2002 census classifications

| Average annual growth rates 2002-2012 | Absolute increase 2002-2012 | Share of absolute increase 2002-2012 | 2002 census classification*<br>(no. of wards) |           |           | Total no. of wards |
|---------------------------------------|-----------------------------|--------------------------------------|---|-----------|-----------|--------------------|
|                                       |                             |                                      | Rural   | Mixed     | Urban     |                    |
| > 10 %                                | 1,002,455                   | 53%                                  | 7   | 11        | 8         | 26                 |
| 5.8-10 %                              | 366,709                     | 20%                                  | 4   | 3         | 6         | 13                 |
| 2.8-5.7 %                             | 371,715                     | 20%                                  |   | 4         | 18        | 22                 |
| 0.1-2.7 %                             | 152,139                     | 8%                                   |   |           | 22        | 22                 |
| < 0 %                                 | -15,764                     | -1%                                  |   |           | 7         | 7                  |
| <b>Dar es Salaam</b>                  | <b>1,877,253</b>            | <b>100%</b>                          | <b>11</b>                                     | <b>18</b> | <b>61</b> | <b>90</b>          |

Source: Own calculations based on comparison of 2002 and 2012 ward level data. See chapter 2 for a more elaborate explanation of data sources.

\*In the 2002-census, there were only 73 wards, whereas in the 2012-census there were 90 wards. The 17 new wards have been categorised for the purpose of this exercise according to the classification of the 2002-ward(s) they formed part of. In the few cases where new wards have been formed by parts of more than one 2002-ward with different 2002 census classifications, they have been categorised as 'mixed'.

Rapid growth has generally happened in the more peripheral parts of the city (cf. table 5 and map 3). Almost all the peripheral wards located beyond 15 km of the city centre have experienced growth rates above city average, and the majority of them have growth rates above 10 per cent<sup>6</sup>. The rapidly growing peripheral wards have received 42 per cent of the total population increase between 2002-2012. Some of the medium distance wards a 10-15 km from the city centre have also experienced rapid growth. 24 per cent of total increase has happened in rapidly growing wards at medium distance of 10-15 km from the city centre. These rapidly growing medium-distance wards are only found west, south-west and south of the city centre. In the northern direction rapid growth is only found more than 15 km away from the centre. In the southern direction rapid growth is also found closer to the centre within 10 km from the centre in some the areas along Kilwa Road and on the Kigamboni peninsula. In table 5 it shows that 8 per cent of total population increase has happened in rapidly growing wards within a 10 km radius from the centre – all of the wards in this category are located south of the city centre. The southern peripheral areas beyond 15 km are growing less rapidly than peripheral areas in other directions.

The modestly and slow-growing wards are generally located closer to the city (cf. table 5 and map 4). Almost all of the central wards have annual growth rates below the city average<sup>7</sup>. Moderately growing wards, with growth rates between 2.8-5.7 per cent, are primarily found in the 5-15 km zone, almost forming a “belt” around the more central areas, except on and beyond Kigamboni peninsula, where growth rates in the 5-15 km zones are above city average. 17 per cent of total increase has happened in the modestly growing wards located within 5-15 km from the centre. Interestingly modestly growing wards are also found in the old city centre, although these areas account for only 1 per cent of total population increase.

Slow-growing wards, with growth rates below 2.7 per cent, are all found in the central parts of the city, in between the city centre and the belt of moderate growth. The small handful of wards, which have experienced negative growth rates, are also located in the central parts of the city.

| <b>5. Share of absolute population increase 2002-2012 for Dar es Salaam grouped according to ward-level average annual growth rates 2002-2012 and distance to city centre</b> |               |                |                 |                 |                   |                            |
|---|---------------|----------------|-----------------|-----------------|-------------------|----------------------------|
| <b>Average annual growth rates 2002-2012</b>  | <b>0-5 km</b> | <b>5-10 km</b> | <b>10-15 km</b> | <b>15-20 km</b> | <b>&gt; 20 km</b> | <b>Total Dar es Salaam</b> |
| +10%  | 0%            | 7%             | 13%             | 15%             | 19%               | <b>53%</b>                 |
| 5.8-10%   | 1%            | 0%             | 11%             | 4%              | 4%                | <b>20%</b>                 |
| 2.8-5.7%  | 1%            | 10%            | 7%              | 0%              | 2%                | <b>20%</b>                 |
| 0-2.7%  | 1%            | 6%             | 1%              | 0%              | 0%                | <b>8%</b>                  |
| <0%   | -1%           | 0%             | 0%              | 0%              | 0%                | <b>-1%</b>                 |
| <b>Dar es Salaam</b>  | <b>2%</b>     | <b>22%</b>     | <b>32%</b>      | <b>19%</b>      | <b>24%</b>        | <b>100%</b>                |

Source: Own calculations based on comparison of 2002 and 2012 ward level data. See chapter 2 for a more elaborate explanation of data sources.

<sup>6</sup> Only one peripheral ward has a growth rate below city average; Majohe ward with an average annual growth rate of 5 per cent. Majohe is a new ward in 2012 created by the northern part of 2002-Chanika and the southern part of 2002-Ukonga. The 2002 adjusted count for Majohe is likely higher than it should be, because Majohe is quite large area wise. Therefore the actual average annual growth rate for Majohe might be higher (see section 2 for an elaborate explanation of data comparison).

<sup>7</sup> Only one central ward has a growth rate above city average; Kigamboni ward with a growth rate of 6.7 per cent. Kigamboni and the neighbouring Tungi ward formed one ward in 2002. The actual 2002 count for Kigamboni might be lower than the adjusted count, because the 2002 count has been divided between the two new wards according to their area wise size. If the average annual growth rate is calculated together for Kigamboni and Tungi, according to the 2002-ward boundary, it is 3.9 per cent, which is below city average (see section 2 for an elaborate explanation of data comparison).

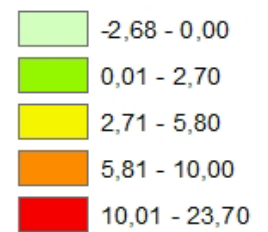


### Map 3



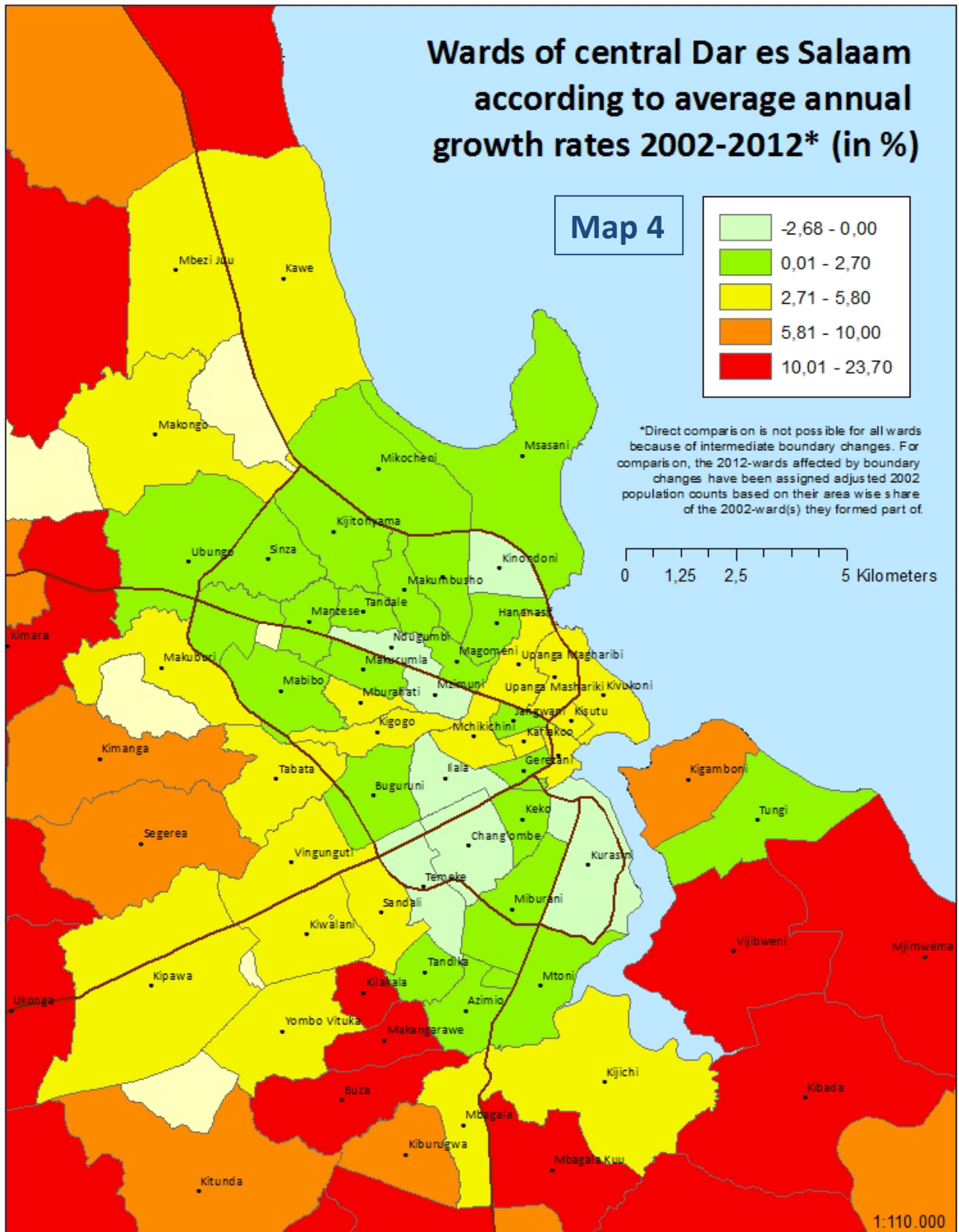
# Wards of central Dar es Salaam according to average annual growth rates 2002-2012\* (in %)

Map 4



\*Direct comparison is not possible for all wards because of intermediate boundary changes. For comparison, the 2012-wards affected by boundary changes have been assigned adjusted 2002 population counts based on their area wise share of the 2002-ward(s) they formed part of.

0 1,25 2,5 5 Kilometers



## 7. Spatial distribution of absolute population increase

Dar es Salaam has experienced an absolute population increase of app. 1.9 million people from 2002-2012. In this section the analysis of the inter-census population changes are nuanced through analysis of the spatial distribution of the absolute population increase across the territory of the city.

The more peripheral areas of the city have generally experienced quite large population increases. 75 per cent of total increase actually happened in the wards that are located beyond a 10 km distance of the city centre. 32 per cent of the absolute increase happened in the wards at medium distance of 10-15 km from the centre, while 43 per cent happened in the most peripheral wards more than 15 km from the city centre (cf. table 6). Mapping the wards of Dar es Salaam according to the absolute population increase from 2002-2012 illustrates these patterns (cf. map 5). Here it is clear that many of the wards that received the largest “chunks” of the absolute population increase, more than 28,000 people per ward, are all located in the peripheral and medium-distance areas. This is consistent with the findings from the previous section, that urban growth is most rapid in these areas, and it certainly indicates that recent population growth has resulted in widespread spatial expansion. One should also keep in mind, though, that these wards are also the largest wards area wise so the population increase is spread over a much larger territory. For comparison, the wards located more than 10 km from the centre actually make up 88 per cent of the total area of Dar es Salaam region, and the wards located more than 15 km away from the centre make up 76 per cent of the total area.

The central urban areas have also received a fair share of the recent population increase. Most of the central wards have experienced an absolute population increase of less than 15,000 people (cf. map 5), but the central area consist of many small wards, so it adds up to significant numbers. 24 per cent of the absolute increase happened in the more central wards that are within a 10 km radius of the city centre (cf. table 6). On the Kigamboni peninsula a 10 km radius covers a lot of urban land that could be considered quite peripheral, but even if these are taken out of the equation, 20.5 per cent of the absolute increase has still happened in truly central areas. Despite the finding from the previous section that most central areas have growth rates below city average, it has still translated into significant volumes of people as these areas were already quite populated in 2002. This suggests that the central wards must have experienced intense densification. Most of the absolute increase in central areas has not happened in the city centre itself, but in the wards that are located in 5-10 km distance from the city centre. Only 2 per cent of total population increase has happened in wards located within a 5 km radius of the city centre.

| 6. Absolute population increase in Dar es Salaam 2002-2012, according to distance from city centre   |  |                            |              |
|--|--|----------------------------|--------------|
| Distance from city centre  | Absolute increase ( <i>no. of people</i> ) | Share of absolute increase | No. of wards |
| 0-5 km   | 46,200                                     | 2%                         | 20           |
| 5-10 km  | 422,074                                    | 22%                        | 29           |
| 10-15 km   | 598,619                                    | 32%                        | 17           |
| 15-20 km   | 352,030                                    | 19%                        | 8            |
| > 20 km  | 458,331                                    | 24%                        | 16           |
| <b>Total Dar es Salaam</b>   | <b>1,877,253</b>                           | <b>100%</b>                | <b>90</b>    |
| Source: Own calculations based on comparison of 2002 and 2012 ward level data. See chapter 2 for a more elaborate explanation of data sources. |  |                            |              |

The identified patterns in the spatial distribution of recent population increase are not uniform across the territory of the city. In map 5 it is clear that it is primarily the peripheral areas to the north, west and south-west of the city centre that has received large absolute population increases. There are also southern wards which have received more than 28,000 people in absolute increase, but these areas are all located at medium distance of 10-15 km from the city centre along Kilwa Road. The peripheral southern wards along the coast have all received less than 15,000 people per ward. Despite high growth rates in these peripheral southern areas, the areas started from such a low level in 2002 that it has not translated into a significant volume of people.

In the north-western municipality of Kinondoni most of the population increase has happened in peripheral wards 15 km or further away from the city centre (cf. table 7). These peripheral wards of Kinondoni account for 23 per cent of the total population increase. This might be because Kinondoni was more populated than the other two municipalities in 2002. Furthermore, parts of Kinondoni, especially to the north along Bagamoyo Road, have a reputation for being the preferred choice of more wealthy segments of the urban population, which would imply relatively larger plot sizes and more spacious development of urban land. Kinondoni municipality has also accommodated a significant share of the population increase in areas closer to the city centre, though. 14 per cent of total increase happened in Kinondoni wards located at medium distance of 5-15 km from the centre. None of the increase in Kinondoni happened within 5 km of the city centre.

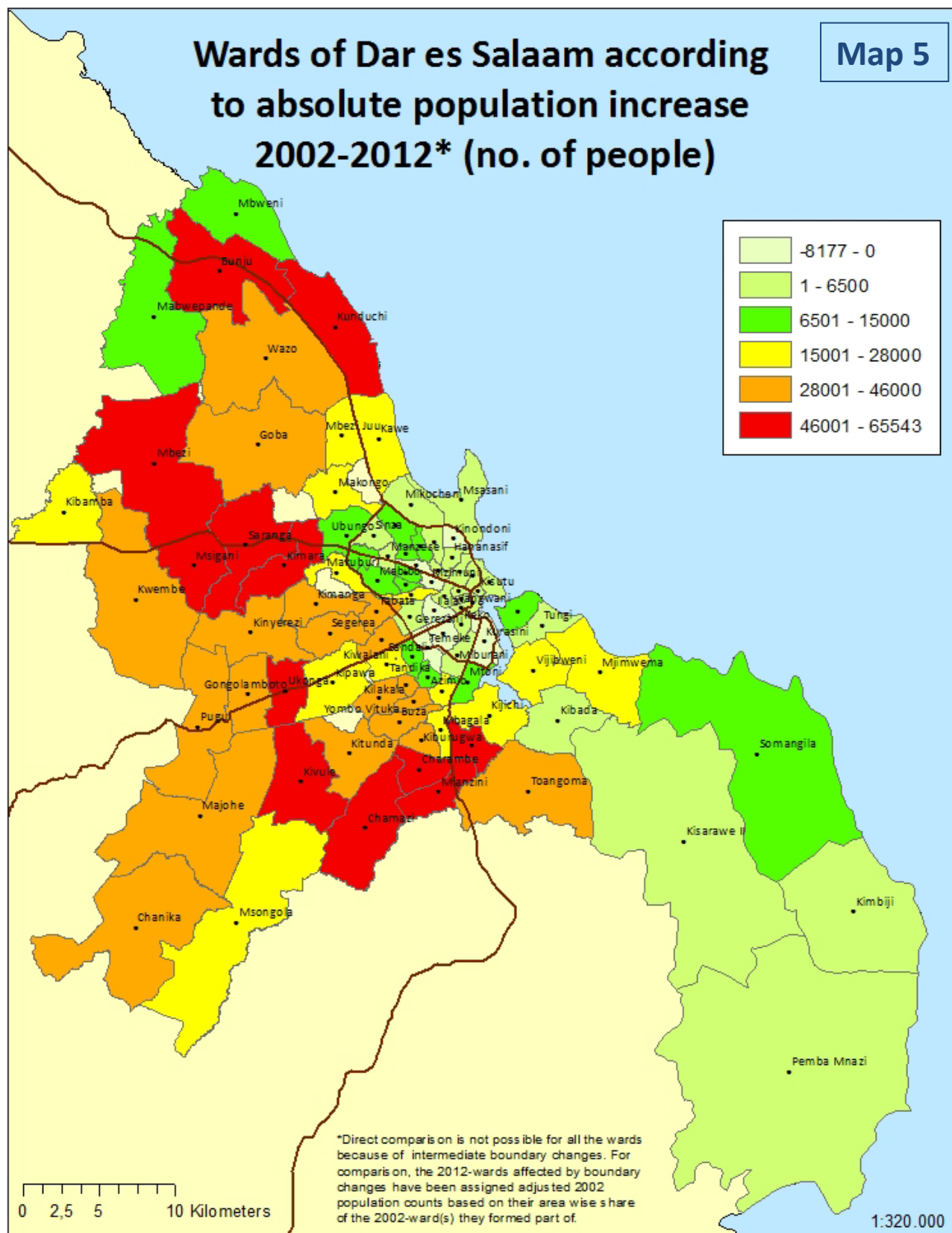
In the south-western municipality of Ilala a huge share of the population increase has also happened in the most peripheral wards (cf. table 7). 16 per cent of total increase happened in the wards of Ilala located more than 15 km away from the city centre. In Ilala a substantial share of the population increase has also happened closer to the centre. 13 per cent of total increase happened in wards of Ilala located at medium distance of 5-15 km from the city centre, while 1 per cent of the increase happened in the city centre itself.

In the southern municipality of Temeke most of the population increase has been accommodated in wards that are closer to the city centre. 28 per cent of total increase happened in Temeke wards located at medium distance of 5-15 km from the city centre. Most of the population increase in medium-distance Temeke wards has happened in the areas along the southern Kilwa Road. Only 2.5 per cent of total increase happened on the medium-distance wards on Kigamboni peninsula. Absolute increases have also generally been quite small in the peripheral southern coastal areas. Only 4 per cent of total increase happened in these peripheral wards of Temeke beyond 15 km from the centre, despite the fact that Temeke's municipal boundaries stretch as far as 45 km from the centre in the southern direction. These peripheral parts of Temeke municipality consists of four large wards that are very thinly populated.

**7. Share of absolute population increase of Dar es Salaam, 2002-2012, according to municipality and distance from city centre**

| Distance from city centre | Kinondoni  | Ilala      | Temeke     | Total Dar es Salaam |
|---------------------------|------------|------------|------------|---------------------|
| 0-5 km                    | 0%         | 1%         | 1%         | 2%                  |
| 5-10 km                   | 6%         | 5%         | 12%        | 22%                 |
| 10-15 km                  | 8%         | 8%         | 16%        | 32%                 |
| 15-20 km                  | 5%         | 10%        | 3%         | 19%                 |
| > 20 km                   | 18%        | 6%         | 1%         | 24%                 |
| <b>Total</b>              | <b>37%</b> | <b>30%</b> | <b>33%</b> | <b>100%</b>         |

Source: Own calculations based on comparison of 2002 and 2012 ward level data. See chapter 2 for a more elaborate explanation of data sources.



## 8. Spatial distribution of population density changes

The wards of Dar es Salaam are quite different in terms of area size. Therefore it is not straightforward to compare the absolute population increases between wards. Absolute increases should also be seen relative to the size of the ward. This section will further nuance the analysis of inter-census population changes by analysing the changes in population densities of wards.

On average the total population density of Dar es Salaam has increased from 1532 people/sq.km. in 2002 to 2688 in 2012 (cf. section 10). This gives an average absolute increase in population density of 1156 people/sq.km. In relative terms average population density has increased with 75 per cent from 2002 to 2012. Almost all wards have experienced increasing population density, but the city average covers quite a lot of variation between wards. Measured in relative terms the population density changes are most dramatic in the peripheral parts of the city (cf. map 6). The most dramatic changes in population density are found in the northern, western and south-western peripheral areas. In most these areas population densities have increased with more than 145 per cent from 2002 to 2012<sup>8</sup>. In the southern direction the most dramatic density changes are found closer to the city centre. Most of the southern wards in the medium distance zone of 10-15 km from the centre have experienced that population density has increased with more than 145 per cent. This is consistent with findings in the two previous sections that population growth has been most significant in the northern, western and south-western peripheral areas, and in the relatively closer southern areas along Kilwa Road. In the southern peripheral areas along the coast population density has increased more moderately with 75-145 per cent. In almost all of the central wards population densities have increased with less than the city average of 75 per cent.

Measured in absolute terms, the population changes in the peripheral areas are not quite as dramatic as the above suggest, though (cf. map 7). Despite large relative change, most of the peripheral wards have experienced absolute increases in population density below the city average of 1156 people/sq.km. This is the case in all the wards which are furthest away from the city centre in all directions<sup>9</sup>, except south along Kilwa Road, where the regional border is much closer to the city centre than in all other directions. Even though the peripheral wards have experienced rapid growth and large absolute population increases, population growth is distributed over so large territories that the absolute increases in population densities are not that significant. Some of the peripheral wards closer to the city centre have experienced slightly larger absolute increases in population density, though, with absolute density increases between 1100-3800 people/sq.km. More intense densification is found relatively closer to the city centre, though not in the most central areas (cf. map 7). There seems to be a zone of intense densification between the western Morogoro Road and the southern Kilwa Road in the wards at medium distance from the centre, outside the ring road of Nelson Mandela Road and Sam Nujoma Road. In these areas population densities have increased with more than 3800 people/sq.km. There is also an area of intense densification north-west of the city centre in the 5-10 km zone.

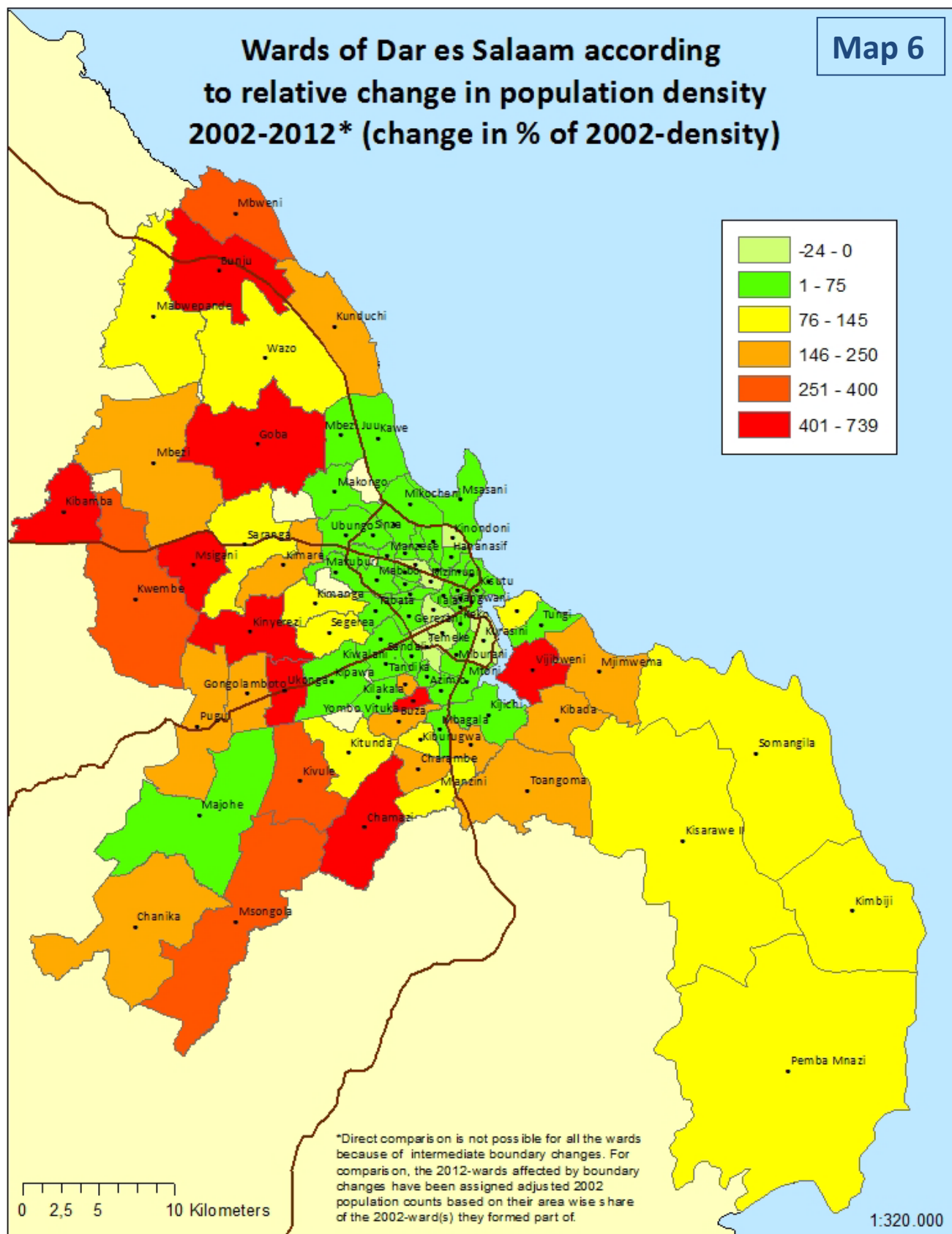
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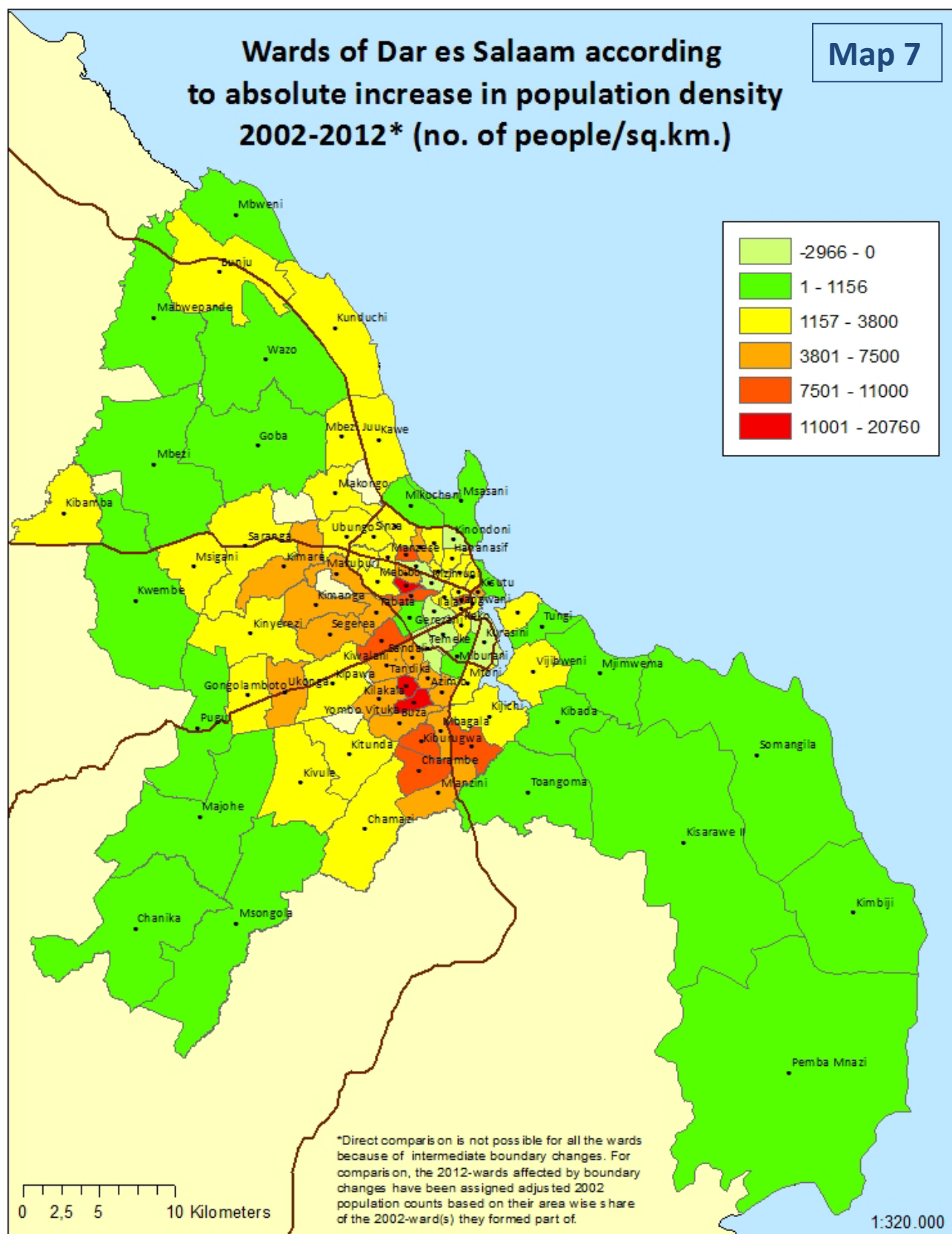
<sup>8</sup> There are four exceptions to this: Mapwepande, Wazo, Saranga and Majohe wards, where population densities have increased with less than 145 per cent from 2002 to 2012. All these wards have been subject to boundary changes and therefore assigned adjusted 2002 population counts based on their area wise size. It is possible that this have disturbed the picture (see section 2 for an elaborate explanation of data comparison). Mapwepande and neighbouring Bunju used to be one ward in 2002, and if the relative density change is measured together for the whole area it is 315 per cent, well above the threshold of 145 per cent. This also goes for Wazo and neighbouring Kunduchi, where the relative density change is 225 per cent for the whole area, and for Saranga and neighbouring Kimara, where relative density change is 174 per cent for the whole area.

Majohe is a new ward in 2012 created by the northern part of 2002-Chanika and the southern part of 2002-Ukonga. The 2002 adjusted count for Majohe is likely higher than it should be, because Majohe is quite large area wise. Therefore the actual density change might be more dramatic.

<sup>9</sup> There are two exceptions to this: Kibamba and Bunju wards, where absolute increases in population density are above city average of 1156 people/sq.km. Both these wards have been subject to boundary changes and therefore assigned adjusted 2002 population counts based on their area wise size. It is possible that this have disturbed the picture (see section 2 for an elaborate explanation). Kibamba and neighbouring Kwembe used to form one ward in 2002, and if the absolute density change is measured together for the whole areas, it is 864 people/sq.km. Well below the city average. This also goes for Bunju and neighbouring Mapwepande, where the absolute increase in population density is 815 people/sq.km. if measured together for the whole area.









## 9. Overall changes in the spatial distribution of the population

The spatial distribution of the recent population increase has naturally affected the overall spatial distribution of the population. This section compares the overall spatial distribution of the population in 2002 and 2012 to assess how significant these overall changes are.

There is a growing number of people and a growing share of the population living in the periphery in 2012 compared to 2002 (cf. table 8). This is also what could be expected given that most the peripheral parts of the city have experienced both rapid population growth and large absolute increases in population. As a result, the peripheral wards beyond 15 km from the city centre have increased their share of the population significantly from only 12 per cent in 2002 to 27 per cent in 2012.

The areas closest to the city centre are still the home of the majority of the population, though (cf. table 8). 73 per cent of the population lived within 15 km from the city centre in 2012. This is a smaller share than in 2002, where 87 per cent lived within 15 km from the city centre, but it is still a pronounced majority. Especially the central wards that are within a 10 km radius of the city centre have decreased their share of the population from 62 per cent in 2002 to 46 per cent in 2012. The most central wards within a 5 km radius of the city centre have decreased their share from 15 to 10 per cent, while the wards in the 5-10 km zone have decreased their share from 47 to 36 per cent. One should keep in mind that these are relative changes. In absolute terms, almost all parts of the city have experienced population growth.

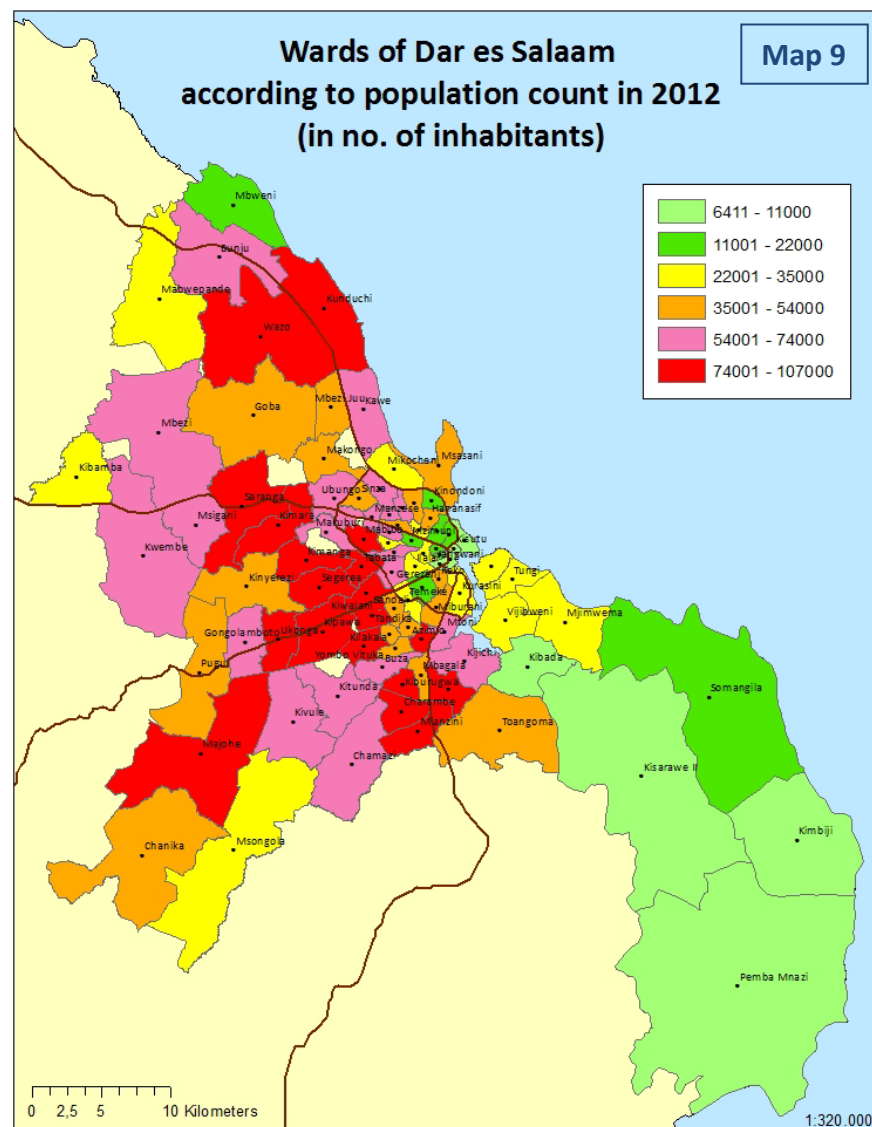
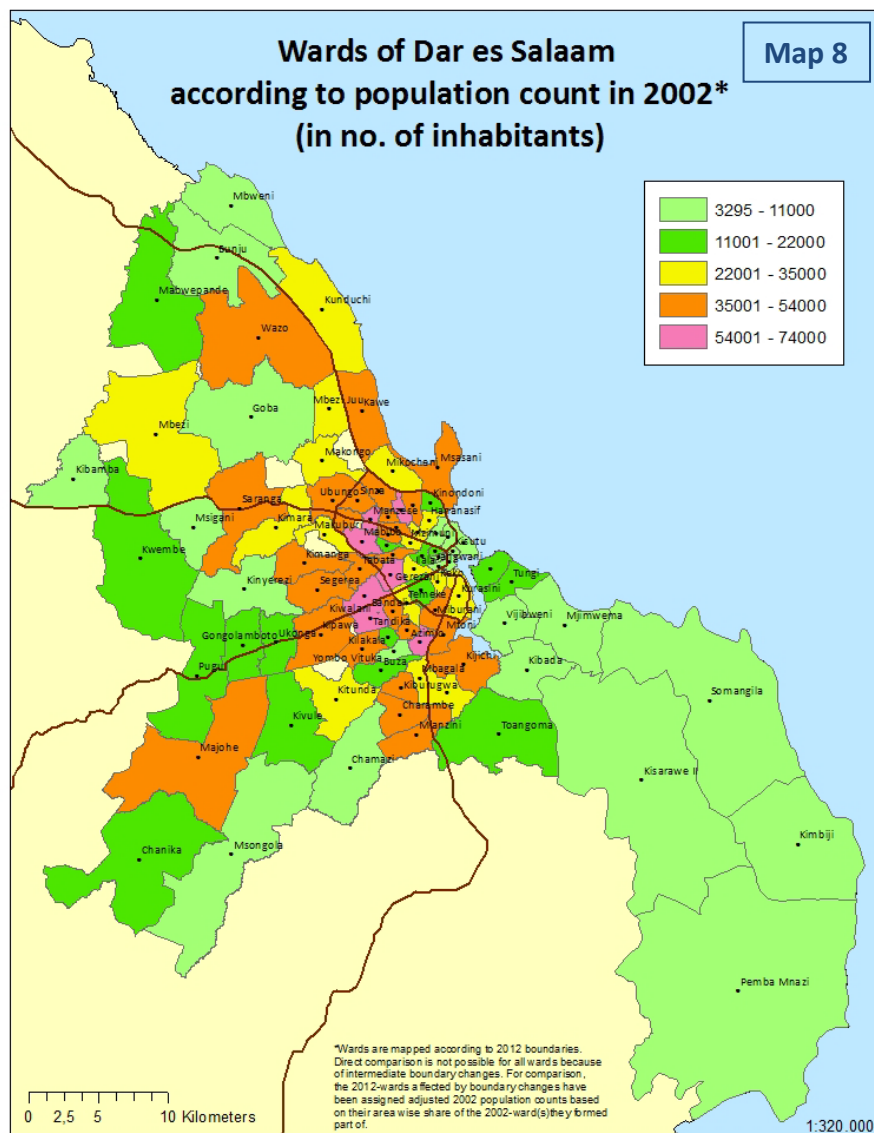
Mapping the spatial distribution of the population in 2002 and 2012 illustrates where population growth in this period has resulted in spatial expansion of the urban area (cf. map 8 and 9). As expected, the peripheral areas to the north, west and south-west of the city centre have all become much more populated. In 2002 the central areas have all the wards with population counts above 35,000 people, while almost all peripheral wards have counts below this threshold<sup>10</sup>. By 2012 the northern, western and south-western peripheral areas have a significant number of inhabitants with many wards above the threshold of 54,000 and some above 74,000. The highest counts are found at medium-distance from the city centre west, south-west and south along Kilwa Road. The southern peripheral areas along the coast remains thinly populated, despite their rapid growth in the 2002-2012 inter-census period.

### 8. Population count and share of total population for Dar es Salaam in 2002 and 2012, according to distance from city centre

| Distance from city centre* | 2002 population count | 2012 population count | Share of 2002 population | Share of 2012 population |
|----------------------------|-----------------------|-----------------------|--------------------------|--------------------------|
| 0-5 km                     | 382,541               | 428,741               | 15%                      | 10%                      |
| 5-10 km                    | 1,178,698             | 1,586,524             | 47%                      | 36%                      |
| 10-15 km                   | 612,718               | 1,168,361             | 25%                      | 27%                      |
| 15-20 km                   | 107,962               | 477,473               | 4%                       | 11%                      |
| > 20 km                    | 205,369               | 703,442               | 8%                       | 16%                      |
| <b>Total</b>               | <b>2,487,288</b>      | <b>4,364,541</b>      | <b>100%</b>              | <b>100%</b>              |

Source: Own calculations based on comparison of 2002 and 2012 ward level data. See chapter 2 for a more elaborate explanation of data sources.

<sup>10</sup> There are three exceptions to this; Wazo, Saranga and Majohe, which are all peripheral wards with population counts above 35,000 in 2002. They have all been subject to boundary changes and therefore assigned adjusted 2002 population counts based on their area wise size. This might have disturbed the picture. Wazo and neighbouring Kunduchi used to be one ward in 2002, and it is possible that Kunduchi should have had a larger share of the 2002 adjusted count that its size suggests. The same might go for Saranga, which formed one ward in 2002 with neighbouring Kimara. Majohe was created by a northern share of 2002-Chanika and a southern share of 2002-Ukonga, and it is possible that Ukonga should have had a larger share of the 2002 adjusted count than its size suggests (see section 2 for an elaborate explanation of data comparisons).



## 10. Overall changes in population densities

As the wards of Dar es Salaam are very different in size area wise, comparing population counts is not completely straightforward. The size of population counts should be seen in relation to the size of the territories they are distributed across. This section compares the spatial distribution of population densities in 2002 and 2012 to supplement and nuance the analysis of changes in the overall spatial distribution of the population.

Population densities in Dar es Salaam are generally quite low. The average population density of Dar es Salaam has increased from 1532 people/sq.km. in 2002 to 2688 in 2012 (cf. table 9). Average population densities have increased in all three municipalities, but mostly in Kinondoni and Ilala. Kinondoni is the most densely populated municipality in both 2002 and 2012, with an increase from 2080 people/sq.km. in 2002 to 3407 in 2012. Population density in Ilala is slightly lower, though close to Kinondoni's, with an increase from 1774 people/sq.km. in 2002 to 3335 in 2012. Temeke is the least densely populated municipality with an increase from 1023 people/sq.km. in 2002 to 1857 in 2012.

Temeke's average population density is so much lower, because the municipal boundaries includes four peripheral wards that are very large area wise, but very thinly populated; Kisarawe II, Somangila, Kimbiji and Pemba Mnazi. These four wards have a combined area of 522 sq.km., but they only had a population count of 43,672 people in 2012 and 23,801 in 2002. If these four wards are taken out of the calculations, a different picture emerges. Then the rest of Temeke is more densely populated than the two other municipalities in both 2002 and 2012, with an increase from 3391 people/sq.km. in 2002 to 6152 in 2012. The average population density of Dar es Salaam also increases considerable from 2235 people/sq.km. in 2002 to 3920 people in 2012.

| 9. Area size and population densities of Dar es Salaam and its three municipalities, 2002 and 2012   |                 |                         |                         |
|--|-----------------|-------------------------|-------------------------|
|  | Area in sq.km.* | Population density 2002 | Population density 2012 |
| Kinondoni  | 521             | 2080                    | 3407                    |
| Ilala  | 366             | 1774                    | 3335                    |
| Temeke   | 737             | 1023                    | 1857                    |
| <b>Dar es Salaam</b>   | <b>1624</b>     | <b>1532</b>             | <b>2688</b>             |
| Source: Own calculations based on comparison of 2002 and 2012 ward level data. See chapter 2 for a more elaborate explanation of data sources. |                 |                         |                         |
| *Area in sq.km. is measured based on 2012 municipal boundaries.  |                 |                         |                         |

Mapping the population densities of wards in 2002 and 2012 (cf. map 10 and 11) shows that low population densities was and still is the norm in most of the peripheral areas of Dar es Salaam. The peripheral areas have experienced some densification in the 2002-2012 period, due to the fact that much of the recent population increase has happened in these areas. In general densities are still quite low in peripheral areas, though. Population densities generally increase towards the city centre, as would be expected, although in the city centre itself population densities are very different from area to area. In the centre there are low density areas like Kivukoni and Upanga right next to high density areas like Kariakoo and Jangwani.

Very low densities of less than 1000 people/sq.km. are only found in the peripheral areas of the city. In 2002 most of the peripheral areas beyond 15 km from the centre had very low densities with less than 1000 people/sq.km. Only 3 peripheral wards had densities above the threshold of 1000 people/sq.km. in 2002, and they all had densities between 1000-2500. By 2012 many of the peripheral wards have crossed the threshold of 1000 people/sq.km. Furthermore, 5 peripheral wards have crossed the threshold of 2500 people/sq.km., and one ward, Ukonga, has crossed the threshold of 7000 people/sq.km. Areas of very low

density, below 1000 people/sq.km., are still found in 2012 in the peripheral areas between the major roads and in the southern coastal areas.

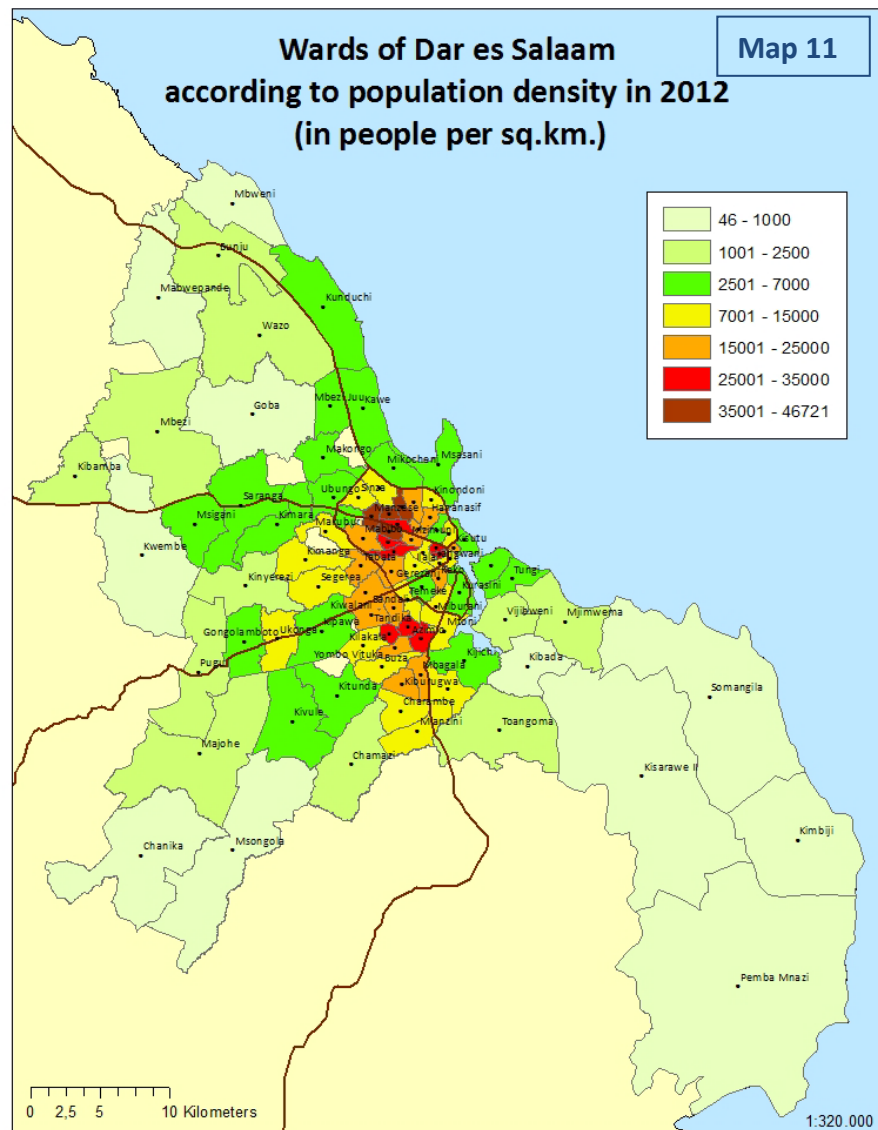
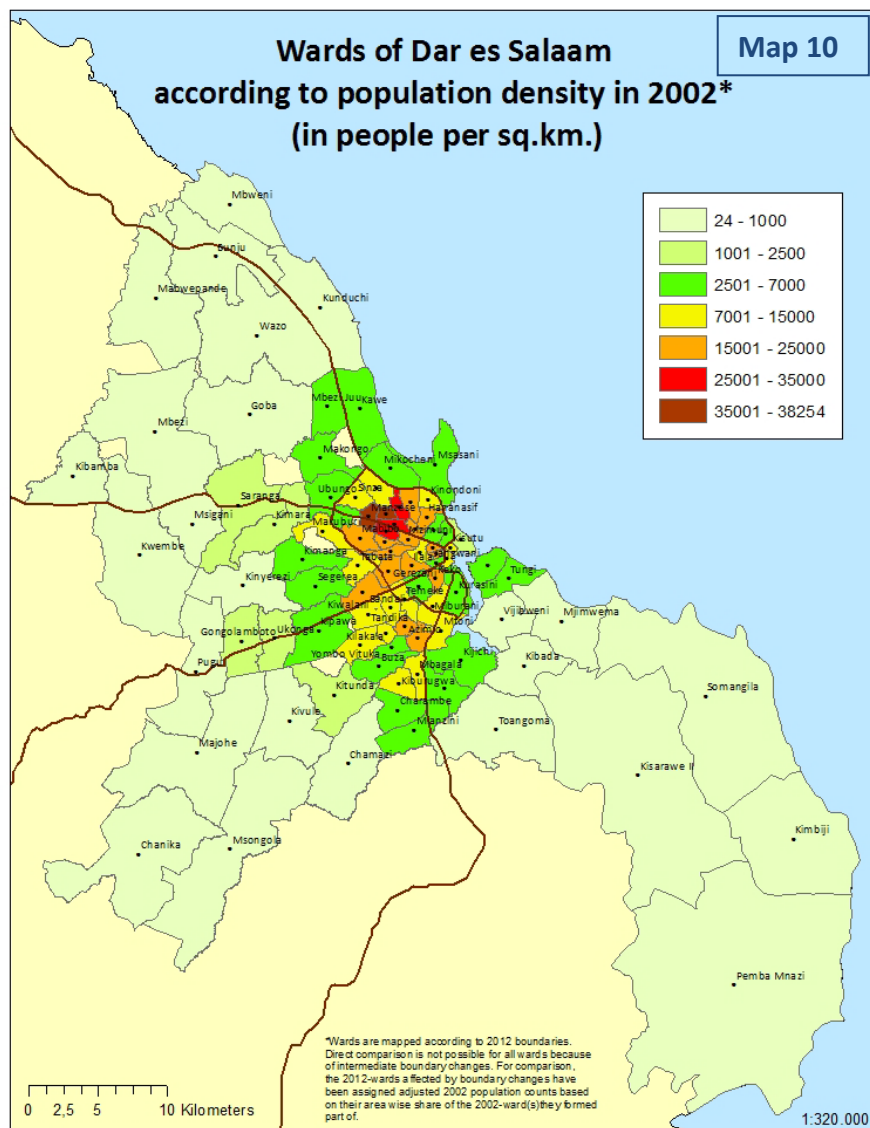
Low densities of 1000-2500 people/sq.km. are also generally found in the more peripheral areas, beyond 15 km from the centre. In 2002 some of the wards in the 10-15 km zone had low densities between 1000-2500 people/sq.km. and density in the central ward of Kivukoni was also below the threshold of 2500. By 2012 all the wards with low densities are found beyond 15 km from the city centre, with the exceptions of a few low density wards on the Kigamboni peninsula located closer to the city centre measured in a straight line.

Fairly low densities of 2500-7000 people/sq.km. are primarily found closer to the centre in the 10-15 km zone. In 2002 these areas almost form a medium-density belt around the central areas of the city. By 2012 it does not look so much like a belt anymore. Some of the wards which were in this group in 2002 have crossed the next threshold of 15,000, and 5 peripheral wards beyond 15 km from the centre have crossed the threshold of 2500, as mentioned above. Fairly low densities of 2500-7000 people/sq.km. are also found in some of the central and wealthier areas like Msasani, Mikocheni and Upanga in both 2002 and 2012.

Medium population densities of 7000-15,000 people/sq.km. are primarily found in the central areas surrounding the city centre, inside or around the outer ring road of Nelson Mandela Road and Sam Nujoma Road and to the south along Kilwa Road. In 2002 most of these wards were located within a 10 km radius from the city centre. Only 3 wards of medium density in 2002, Makuburi, Yombo Vituka and Kiburugwa, are located a bit further away in the 10-15 km zone, though they all have their centroid located just outside the 10 km threshold. In 2012 most of the wards with densities above 7000 people/sq.km. are still located within 10 km from the city centre, but 10 wards are now located further away. 9 wards are located in medium distance zone between 10-15 km from the city centre, and one is located further away; Ukonga ward which has its centroid located just outside the 15 km threshold at 15.6 km from the centre.

High population densities between 15,000-25,000 people/sq.km. are primarily found in the central areas of the city. In 2002 all the wards with densities above the threshold of 15,000 were located within a 10 km radius of the city centre. By 2012 several new wards have crossed the threshold of 15,000, but almost all of them are still located within the 10 km radius. Only one high density ward is also located a bit further away; Kiburugwa ward which has its centroid just outside the 10 km threshold at 11 km from the city centre.

Very high population densities are only found in the central parts of the city, primarily in the zone between 5-10 km from the centre. In 2002 5 wards had population densities above 25,000 people/sq.km.; Makumbushu, Ndugumbi, Makurumla, Manzese and Tandale. They are all located in the 5-10 km zone and form a cluster north-west of the city centre. Two of these wards, Tandale and Manzese, had densities above 35,000 people per sq.km. By 2012 a total of 12 wards have very high population densities above 25,000 people per sq.km. All of them are still located within 10 km from the city centre. Two more wards have joined the northern high density cluster; Mburahati and Kigogo. Two of the central wards, Jangwani and Kariakoo, have crossed the threshold of 25,000, as well as three wards in the 5-10 km zone south-west of the city centre; Tandika, Kilakala and Azimio. Two more of the wards in northern high density cluster, Makumbusho and Makurumla, have crossed the threshold of 35,000 people per sq.km.



## 11 Conclusion

Dar es Salaam has grown very rapidly in the latest inter-census period, with the population almost doubling from 2.5 million inhabitants in 2002 to 4.4 million in 2012. This working paper has presented a spatial analysis of this recent population growth of Dar es Salaam. By combining and comparing different indicators, the paper has attempted to form a whole-some picture of where the city is growing, and where this growth is most significant.

The only correct conclusion to the first part of the question is that the all parts of Dar es Salaam have experienced population growth, with the exception of a handful of central wards with negative 2002-2012 growth rates. Locating where population growth is most significant is a bit more complicated. One needs to compare relative growth rates, absolute population increases and population density changes.

If we look at relative growth rates, there is no doubt that the peripheral parts of the city have grown most rapidly. Many of the peripheral areas have also received the largest shares of the absolute population increase. Rapid growth combined with large absolute increases is primarily found in peripheral areas north, west and south-west of the city centre. It is also found in the southern areas along Kilwa Road which are closer to the centre than the rapidly growing areas in the other directions.

All these rapidly growing areas have also experienced dramatic changes in population density measured in relative terms. In these areas population densities have often increased with more than 145 per cent. Population density changes are not large in absolute terms, though, in the peripheral areas north, west and south-west of the city centre. Population growth is distributed across so large territories that the absolute increases in population densities are quite small. In the southern wards along Kilwa Road the absolute increases in population densities are quite significant, though. These areas seem to part of a zone of intense densification between the western Morogoro Road and the southern Kilwa Road, where there is a concentration of wards at medium distance from the centre with rapid or moderate growth rates, and where some of the largest absolute increases in population densities are found.

Nonetheless, the results of the analysis indicates that recent population growth has resulted in widespread spatial expansion. The spatial distribution of the recent population increase has affected the overall spatial distribution of the population. The peripheral areas to the north, west and south-west of the city centre have all become much more populated. This is also the case for the relatively closer southern areas along Kilwa Road. Despite an increasing share of the population living in the peripheral areas, the majority of the population still live in the central areas or in areas at medium-distance from the city centre. The overall changes in population densities are also somewhat moderate. Low population densities remains the norm in all of the peripheral areas of Dar es Salaam, although some densification has been happening here.

It seems that recent expansion has largely followed the historical pattern of expansion along and in between the four major roads going north, west, south-west and south from the city centre. Population growth in the southern coastal areas, which are not serviced by any major roads, is quite insignificant compared to all other directions. These areas have experienced rapid growth, but the absolute population increases as well as the absolute increases in population densities are quite small and insignificant. These areas remain much less less populated than peripheral areas in all other directions. Even though some of these areas are quite close to city centre measured in a straight line, they are still quite thinly populated because of the estuary of Mzinga Creek separating Kigamboni peninsula from the city centre.

The central parts of the city have generally grown slower than the peripheral areas, and population densities have only increased moderately. That does not mean that the central areas have not experienced significant population increases, though. Moderate and slow growth rates have translated into significant volumes of people, because the central wards were already quite populated in 2002, and in absolute terms, population densities have increased quite significantly. Moderate growth and large absolute population



increases are found in outer central areas west and south-west of the city centre outside the ring road of Nelson Mandela Road. Many of these areas are also part of the above-mentioned zone of intense densification between the western Morogoro Road and the southern Kilwa Road. Interestingly moderate growth rates are also found in the most central wards, although they have experienced only small absolute population increases.

This paper has been developed as part of the initial research for my PhD project exploring how rapid population growth is transforming Dar es Salaam and what forces are shaping these transformations. This working paper is an attempt to locate where the city is growing, and where this growth is most significant. The paper gives some indications of where it might be interesting to study urban growth and transformation more in-depth, and in that sense it forms a solid foundation for further inquiries. An analysis like this still leaves a lot of interesting questions unanswered, though.

The analysis raises the question of why the city is growing more significantly in these particular places. To start unfolding this question, it is necessary to learn more about the lives and motives of the people who are developing and populating these growing areas. Why are they moving here? How are they making a living in these areas? How are they shaping the urban development on the ground? What is the quality of this development? And what is it really like to live in these growing areas?

The analysis also raises the question of whether the city might be growing differently in different places. There is a need to explore differences and similarities in the ways the city is growing in different places. In Dar es Salaam some of the northern peripheral wards and some of the southern areas along Kilwa Road have all experienced rapid growth and substantial absolute population increases. Other than that, these areas might not have much else in common. The drivers of growth might be completely different. People might move into these areas for very different reasons, and population growth might result in completely different kinds of urban development on the ground. To understand these differences in growth experiences, more in-depth case studies of the growing areas of the city are needed.

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## RurbanAfrica - African Rural-City Connections

The African Rural-City Connections (RurbanAfrica) project explores the connections between rural transformations, mobility, and urbanization processes and analyzes how these contribute to an understanding of the scale, nature and location of poverty in sub-Saharan Africa. The RurbanAfrica project is advancing the research agenda on rural-city connections in sub-Saharan Africa by addressing a range of crucial components: agricultural transformations, rural livelihoods, city dynamics, and access to services in cities. Our aim is to generate new insights into the relationship between rural-city connections and poverty dynamics.

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