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DEMYSTIFYING THE GEOGRAPHY OF URBANIZATION IN INDONESIA
(Case Study: Southeast Sulawesi Province)

AUTHORS INFO

Luthfi Muhamad Iqbal
Ministry of National Development Planning/
National Development Planning Agency
(Bappenas) – Republic of Indonesia
luthfi.iqbal@bappenas.go.id

Alvaryan Maulana
Ministry of National Development Planning/
National Development Planning Agency
(Bappenas) – Republic of Indonesia

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Abstract

What is a city? How can we define the boundaries of a city? Despite being the popular subject of research in rapid urbanization, the discussion of the spatial dimension of urbanization is still few in Indonesia. This paper aims to make the geography of urbanization in Indonesia clearer and easier to understand by applying the degree of urbanization (DEGURBA/DoU) methodology. The case study location proposed is Southeast Sulawesi province (SSP)which has distinctive urbanization trajectories with rapid urbanization trends and a relatively stable rural population, but a lack of research regarding its urbanization patterns. This research used Global Human Settlement Layer (GHSL) data as the primary source to conduct spatial analysis to produce the degree of urbanization with complementary national statistical and spatial data to compare with the current conventional classification methodology. The findings show that based on DoU, 39.87% of the SSP population live in urban centers, 22.58% in urban cluster/periurban, and 37.56%. SSP has a total of 49 urban units with 6 urban centers/cities, and 43 urban clusters/towns. By testing the rank-size distribution of SSP's urban units, it shows that SSP's urban systems pattern satisfy Zipf's law with R2 = .9885, and the slope of the fitted line is -0.9554. Based on this result, currently, SSP has 4 medium cities, 2 small cities, 21 large towns, and 20 small towns. In addition, the DoU also has an opportunity to understand how should urban areas be governed and managed, and by whom. Despite the Greater Kendari Urban Area has not yet fulfilled the national's Metropolitan population threshold (1 million pop), the urban management and development should be conducted more collaboratively with neighboring regencies such as Konawe and South Konawe. The advantages are shown by these findings highlight the importance of scaling up this research to a national scale and using finer and nationally available data.

Keywords: Degree of urbanization, GHSL, rank-size distribution, classification

A. Introduction

Where is the limit of a city? When a place will be started called a town? Despite lots of research being aware of the phenomenon of rapid urbanization in Indonesia (Wilonoyudho,

Rijanta, Keban, & Setiawan, 2017) (Hassan & Pitoyo, 2018) the discussion of the spatial dimension of urbanization is still few, and concentrated in Java island as an area of concerns. Most of the research refers the rural-urban terms to the available legal definition of rural-urban areas both administrative and functional terms. The table below shows the different definitions of urban and rural based on each regulation that is still in force in Indonesia:

***Table 1**. Various Rural-Urban Definition in Indonesia*

Regulation Basis	Urban Definition	Rural Definition
(Undang Undang RI No. 26 Tahun 2007 tentang Penataan Ruang, 2007)	an area that has non-agricultural main activities with the structure of the function of the area as a place for urban settlements, the concentration and distribution of government services, social services, and economic activities.	an area that has main activities in the agricultural sector, including the management of natural resources with the structure of the function of the area as a place for rural settlements, government services, social services, and economic activities.
(Undang-Undang RI No. 6 Tahun 2014 tentang Desa, 2014)	-	an area that has main activities in the agricultural sector, including the management of natural resources with the structure of the function of the area as a place for rural settlements, government services, social services, and economic activities.
(Undang-Undang RI No 23 Tahun 2014 tentang Pemerintah Daerah, 2014)	Urban is an area with certain boundaries whose people have main activities in the field of industry and services.	-
(Peraturan Kepala BPS No. 120 Tahun 2020 tentang Klasifikasi Perkotaan dan Perdesaan di Indonesia, 2020)	Urban is the status of an administrative area at the village/kelurahan level that meets the urban village classification criteria.	Rural is the status of an administrative area at the village/kelurahan level that meets the rural village classification criteria.

What made this vague and conflicting legal definition chaotic for urbanization research as well as urban development planning among others are: i) the discontinuity of urban-rural continuum due to definition mismatch and dichotomous definition; ii) agricultural employment and access to services were included in the criterion to define the rural-urban area. Indonesia's definition of cities (as an administrative unit) is at the same level as regencies and villages with kelurahan or urban communities. Thus, understanding a rural-urban continuum in harmonized manner from a sparsed village to an extended mega-urban region is uncommon or difficult due to strong reliance on administrative definition tradition. The finest-scale urban definition so far is by referring to BPS regulation regarding rural-urban classification which defines village (as an administrative unit) into two different characteristics: urban village (Desa perkotaan), and rural village (Desa perdesaan). However, the problem is this classification using access to urban services (access to kindergarten, high school, market, shop, hospital, hotel/billiard/pub, household with fixed telephone and access to electricity) and share of agricultural employment as a criterion to define the urban or rural areas. When it comes to monitoring the access to

services such as for SDGs monitoring and evaluation, urban areas will probably always have better access or performances than rural areas, and in some large and dense settlements that empirically should be defined as an urban area but have lack of services could not be monitored as an urban area without services, instead, it will be classified as a rural area.

People working in agriculture living in cities and towns is not a problem either as they will have better access to markets, focus on more perishable and higher value-added produce, and access to more diverse opportunities to combine farming with working in different economic sectors. For example, in EU-27, 6% of the people working in agriculture live in cities, 24% in towns and semi-dense areas, and the remaining 69% in rural areas (European Union/FAO/UN-Habitat/OECD/The World Bank, 2021). On the other hand, several small cities in Indonesia such as Tual, Subulussalam, and Pariaman have agriculture sector (36.52%, 22.84%, and 16.25% respectively) as the largest economic contribution from in 2019 (BPS, 2019), which are inconsistent with the definition based on Local Government Law 23/2014. In addition, the rising trend of urban agriculture activities and an effort to strengthen urban food systems as a response to the current climate and Covid-19 crises will make a percentage of agricultural employment to define cities and towns no longer relevant.

In 2035, BPS predicted that 66.6% of the Indonesian population will reside in urban areas (BPS, 2015). In this case, Southeast Sulawesi Province has distinctive urbanization trajectories with an overall rapid urbanization trend (growth above the national average, 12.6%) but will experience rural population growth for a while before it will be declining in the end. These unique trajectories will become a potential area of study to balance urban and rural development strategies in achieving optimum sustainable development outcomes amidst rapid urbanization trends. However, with the unclear spatial distribution of urbanization, Southeast Sulawesi Province has been disadvantaged in terms of urbanization strategy intervention as well as national urban development programming. In National Mid-Term Plan (RPJMN 2020-2024) for example, from two cities – Kendari and Bau-Bau, only Kendari is shortlisted as a national priority location for urban area development in the 2020-2024 period (2020). National Spatial Plan (RTRWN) only six activity centers consist of one national activity center (PKN Kendari), and five regional activity centers (PKW Unaaha, PKW Lasolo, PKW Bau-bau, PKW Raha, and PKW Kolaka) are promoted. The direction is to revitalize, develop, enhance the urban function, and accelerate the development of national growth centers (2017) , even though to what extent their urban areas are still unclear.

This paper aims to demystify or make the geography of urbanization in Southeast Sulawesi Province clearer and easier to understand. The method used in this study is a degree of urbanization methodology (Dijkstra & Poelman, 2014) (Dijkstra, et al., 2021) as an alternative approach to national rural-urban classification. The case study proposed is Southeast Sulawesi province, as a sample study location which relatively understudied in terms of urbanization research as well as disadvantaged due to the chaotic urban definition.

B. Methodology

1. Research Design

This research adopting the degree of urbanization methodology (Dijkstra & Poelman, 2014) (Dijkstra, et al., 2021) to identify the geography of urbanization in Southeast Sulawesi province. In general, this research consists of three steps: first, analyzing the settlement model distribution using global human settlement layer data (GHS-SMOD) to categorize rural-urban continuum in Southeast Sulawesi; second, analyzing the population distribution in Southeast Sulawesi using global human settlement layer population data (GHS-POP); third overlaying population grid into settlement model to obtain the information regarding the population size of each settlement; fourth, classifying the degree of urbanization into the smallest spatial unit available (village/urban community level); fifth, comparing the result with the conventional rural-urban classification methods based on Head of BPS regulation No. 120/2020.

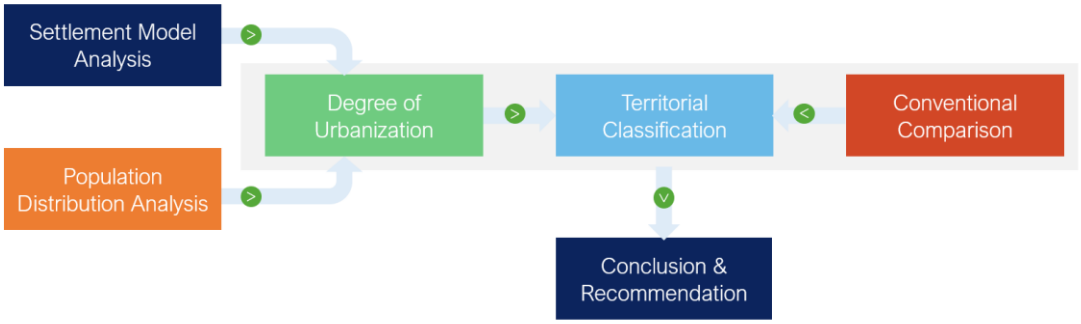

***Figure 1**. Research Framework*

2. Instruments

Instruments used in this research are QGIS Desktop 3.14.16 and Ms. Excel to process spatial and tabular data. The data primarily sourced from the Global Human Settlement Layer (GHSL) consist of settlement model (GHS-SMOD) and population grid (GHS-POP) (Florczyk, et al., 2019) (Schiavina, Freire, & MacManus, 2019) (Pesaresi, Florczyk, Schiavina, Melchiorri, & Maffenini, 2019) as well as village administrative boundaries from the Ministry of Home Affairs, Republic of Indonesia (Kemendagri, 2018). Technical details of the datasets are provided below:

***Table 2.** Technical Details of the Data used for this research*

Data (Type)	Description	Resolution (Projection)
GHS_POP_E2015_GLOBE_R2019A_ 54009_1K_V1_0.tif (raster)	Population density for epoch 2015, values are expressed as decimals (Float)	1 km (World Mollweide)
GHS_SMOD_POP2015_GLOBE_R2019A_ 54009_1K_V2_0.tif (raster)	Settlement typology codes for epoch 2015	1 km (World Mollweide)
Batas Desa (*Village Boundaries*) 2018 (vector)	Village administration boundaries for epoch 2018	(EPSG:4326 - WGS 84 - Geographic) projected

3. Technique of Data Analysis

Data analysis techniques for the application of Degree of Urbanization methodology will be explained in this section, including but not limited to raster extraction, raster symbology, zonal statistic, and territorial unit classification.

a. Raster Extraction

Raster extraction through clip raster by mask layer was performed to analyze the settlement model and population density in the context of Southeast Sulawesi Province. Raster extraction is an algorithm derived from the GDAL grid utility that can clip any raster layer by a vector mask layer. Input raster layers are GHS_POP_E2015_GLOBE_R2019A_54009_1K_V1_0.tif (raster) and GHS_SMOD_POP2015_GLOBE_R2019A_54009_1K_V2_0.tif (raster). Vector mask layer is Batas Desa 2018.

b. Raster Symbology

Raster symbology is an essential process to make raster data properly visible and useful for analysis. GHS POP data is symbolized by contrast multiband color render type to indicate the population cluster within the area of concern while GHS SMOD data is symbolized by palleted/unique values according to settlement model typology codes as shown in Table 3.

***Table 3.** Settlement Model Level 2 Nomenclature, Code, and equivalent terms in Indonesia's context*

Code	RGB	Grid level term	Spatial entity (polygon) Technical term	Municipal level term	Indonesia term equivalent
30	255 0 0	Urban Center Grid Cell (*Kisi Pusat Perkotaan*)	Urban Centre (Pusat Perkotaan) Dense, Large Cluster (Gugus Besar dan Padat)	City/ Large Settlement	Kota/ Permukiman Besar

Code	RGB	Grid level term	Spatial entity (polygon) Technical term	Municipal level term	Indonesia term equivalent
23	115 38 0	Dense Urban Cluster Grid Cell *(Kisi Gugus Perkotaan Padat)*	Dense Urban Cluster (Gugus Perkotaan Padat) Dense, Medium Cluster (Gugus Sedang dan Padat)	Dense Town Dense, Medium Settlement	Kotapraja[1] Padat/ Permukiman Sedang dan Padat
22	168 112 0	Semi-Dense Urban Cluster Grid Cell (*Kisi Gugus Perkotaan Sedang*)	Semi-Dense Urban Cluster (Gugus Perkotaan Sedang) Semi-Dense, Medium Cluster (Gugus Sedang)	Semi-Dense Town Semi-Dense Medium Settlement	Kotapraja Sedang Permukiman Sedang
21	255 255 0	Suburban or Peri-Urban Grid Cell (*Kisi Suburban dan Periurban*)	-	Suburbs or Periurban/ Area Semi-dense area	Suburban / Peri-urban Kawasan berkepadatan sedang
13	55 86 35	Rural Cluster Grid Cell (*kisi gugus perdesaan*)	Rural Cluster (Gugus Perdesaan) Semi-Dense, Small Cluster (Gugus Kecil)	Village/ Small Settlement	Desa/ Permukiman Kecil
12	171 205 102	Low Density Rural Grid Cell (kisi perdesaan berkepadatan rendah)	-	Rural Dispersed Area/ Low Density Area	Kawasan Perdesaan terdispersi/ Kawasan berkepadatan rendah
11	205 245 122	Very Low-Density Rural Grid Cell (kisi perdesaan kepadatan sangat rendah)	-	Mostly Uninhabited Area Very Low-Density Area	Kawasan hampir tidak berpenghuni Kawasan berkepadatan sangat rendah
10	122 182 245	Water Grid Cell (kisi badan air)	-	-	-

Source: (Pesaresi, Florczyk, Schiavina, Melchiorri, & Maffenini, 2019) (Florczyk, et al., 2019) – *adopted*

c. Vector Creation, Vector Overlay and Raster Analysis

Before performing zonal statistics, the GHS SMOD raster layer is converted into a vector layer using a vector creation tool through raster pixels to polygon algorithm. After this step, the intersection from the vector overlay tool is performed to extract overlapping portions of vectorized-GHS SMOD and village boundaries, which will be very useful to defining territorial unit classification. After the overlapping vector is extracted, a raster analysis tool through a zonal statistic algorithm is used to calculate statistics of a raster layer (GHS POP) for each feature of an overlapping polygon vector layer (intersected vectorized-GHS MOD and village boundaries vector). The result will be analyzed using Ms. Excel through a pivot table.

d. Territorial Unit Classification

After all grid cells are classified into settlement model typology and overlayed with a small spatial unit (in this case, village boundaries), the next step is to categorize the spatial units following the formula (Eurostat, 2019) as follows:

a. Cities or densely populated area (*Kota*) – small spatial units that have at least 50% of their population in urban centers
b. Towns and semi dense areas or intermediate density areas (*Kotapraja*) – small spatial units that have less than 50% of their population in urban centres and no more than 50% of their population in rural grid cells
c. Rural areas or thinly populated areas *(Desa)* – small spatial units that have more than 50% of their population in rural grid cells

The classification process is performed using Ms. Excel, including a comparison to conventional rural-urban classification, and then re-joined into the spatial files using join tabular layer with village boundaries spatial data. To avoid the missing values, due to similar village names in different districts/regencies, both join field and target field are recommended to use unique values such as village ID or other identifiers. The detailed technique of data analysis flow is provided below:

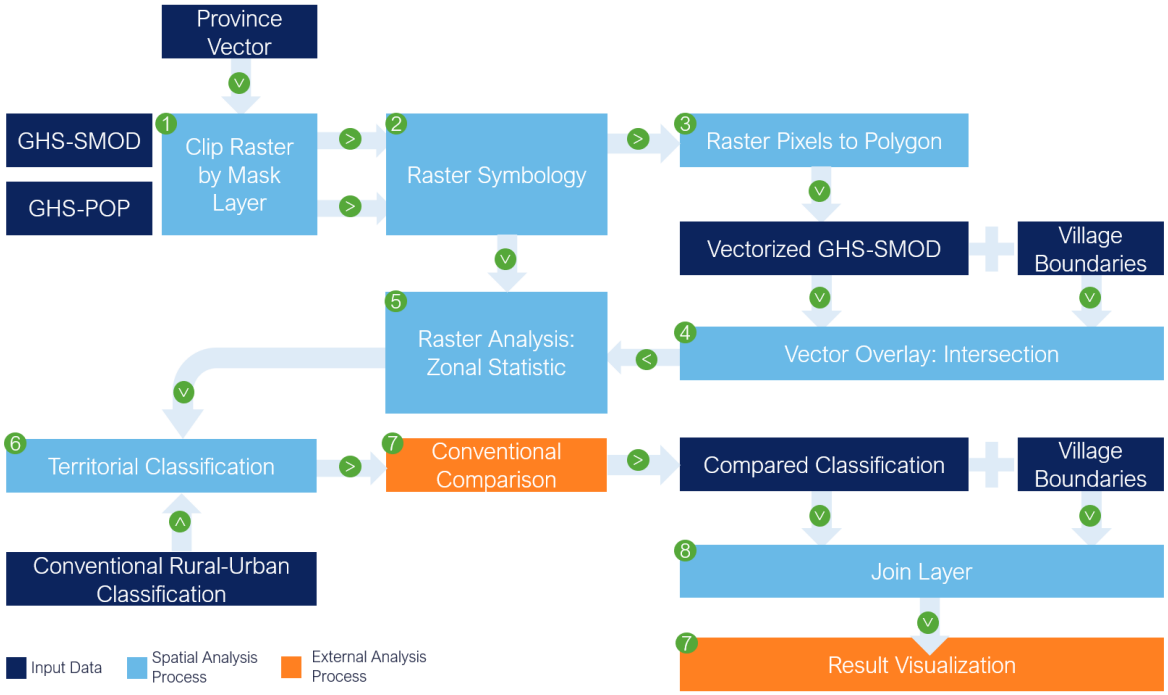

***Figure 2**. Technique of Data Analysis Flow*

C. Findings and Discussion

1. Findings

The maps below illustrate the population density distribution (left) and settlement model (right) in Southeast Sulawesi Province based on Global Human Settlement Layer data. At a glance, Southeast Sulawesi province will be perceived as a predominantly rural province. This perception matches with rural-urban projection published by National Statistics based on intercensal population survey (SUPAS) (BPS, 2015) which stated that the share of the urban population in Southeast Sulawesi is only at 30.86% in 2015 equal to 772,450 people urban population of 2,502,684 people total population in 2015.

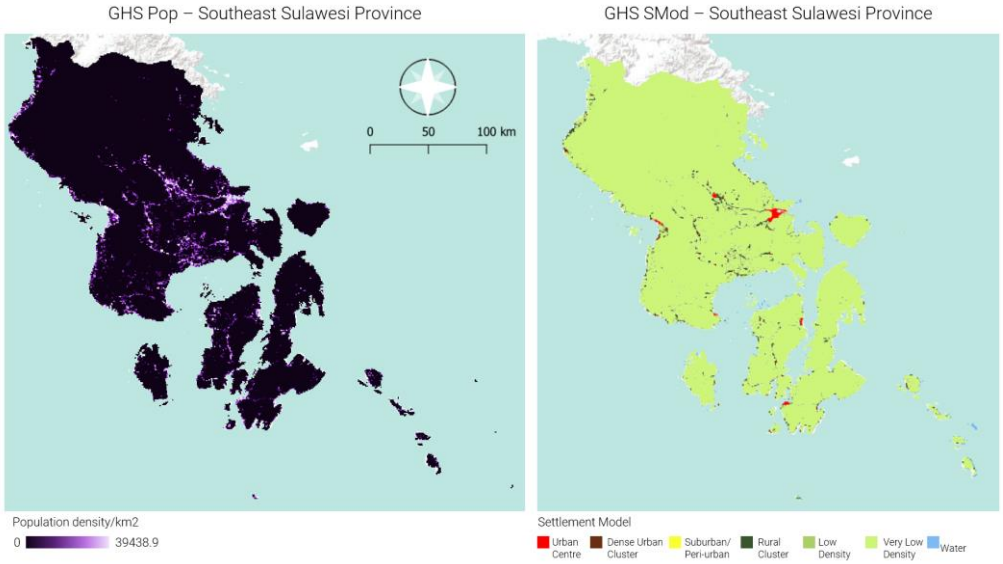

***Figure 3**. Gridded Population Density (left) and Settlement Model (right) of Southeast Sulawesi Province based on Global Human Settlement Layer (GHSL) data for epoch 2015*

According to the Degree of Urbanization methodology, the total population who lives in the urban center (cities) reaches 39.87% or equal to 964,924 population. This figure is followed by rural population (people who live either in a rural cluster, low-density rural areas, or very low-density rural areas) with 37.56% or equal to 909,032 population. The remaining population lives in towns (dense urban cluster or suburban/periurban) with 22.58% or equal to 546,519 population of total population 2,420,475. Thus if the urban population is a combination of people who resides in urban centers/cities and towns, the proportion of the urban population in Southeast Sulawesi province is reached as high as 62.44% or equal to 1,511,443. Despite high population proportion, cities and towns only occupy less than 1% of the total land surface or approximately 263 km square. With a 3% margin of error, approximately 28-34% of the urban population in Southeast Sulawesi is missed when using the conventional approach for rural-urban classification.

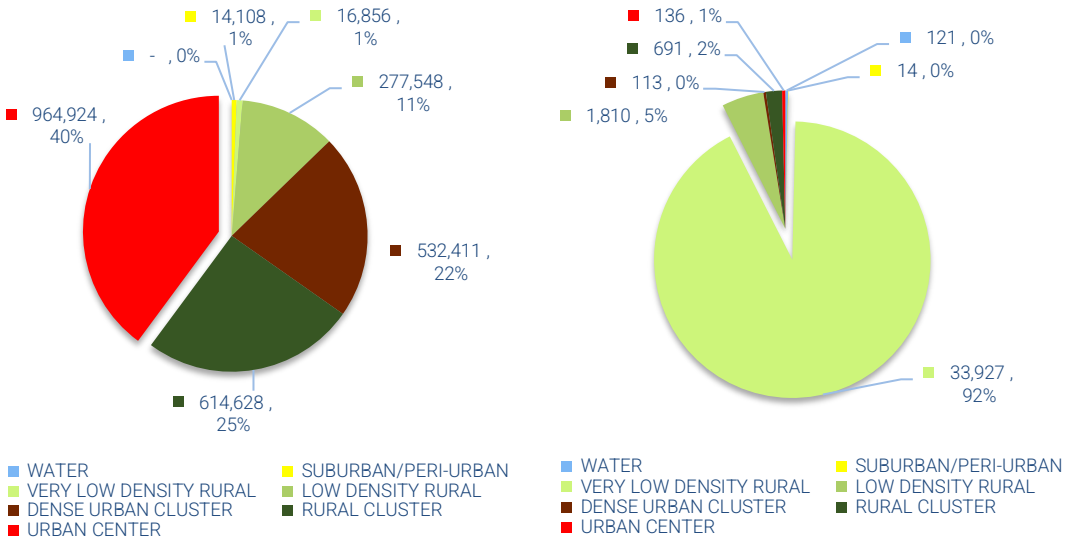

Figure 4. *Share of Population and Total Land Consumption according to Settlement Model in Southeast Sulawesi Province 2015*

Compared to the national data benchmark the differences between total land area is up to 1,256 km square or 3.30% (BPS Provinsi Sulawesi Tenggara, 2017) and the population differences are 82,209 population or 3.28% (BPS, 2015). Detailed area and population in both nominal amount and percentage to total are described in the following table:

Table 4. *Area and Population of Each Degree of Urbanization Class in Southeast Sulawesi Province*

DoU Classification	Area (km2)	Population	%Area	%Pop
Cities	**136**	**964,924**	**0.37%**	**39.87%**
URBAN CENTER	136	964,924	0.37%	39.87%
Towns[1]	**127**	**546,519**	**0.34%**	**22.58%**
DENSE URBAN CLUSTER	113	532,411	0.31%	22.00%
SUBURBAN/PERI-URBAN	14	14,108	0.04%	0.58%
Total Urban	**263**	**1,511,443**	**0.71%**	**62.44%**
RURAL CLUSTER	691	614,628	1.88%	25.39%
LOW DENSITY RURAL	1,810	277,548	4.92%	11.47%
VERY LOW DENSITY RURAL	33,927	16,856	92.16%	0.70%
Total Rural	**36,428**	**909,032**	**98.96%**	**37.56%**
WATER	121	-	0.33%	0.00%
Total Southeast Sulawesi	**36,812**	**2,420,475**	**100.00%**	**100.00%**
National Data Benchmark[2] (Total Southeast Sulawesi)	**38,067[2]**	**2,502,684[3]**	**-**	**-**

[1]*Semi-dense urban cluster grid is not available in Southeast Sulawesi province, hence omitted from the table result*

[2] (BPS Provinsi Sulawesi Tenggara, 2017)

[3] (BPS, 2015)

When this degree of urbanization is applied to municipalities and regencies' levels, this study finds out that there are many "urban entities" in Southeast Sulawesi Province beyond Kendari city and Bau-bau city. From the degree of urbanization analysis, there were identified that all local governments except the North Konawe Regency have urban clusters, where only 7 municipalities and regencies have urban centers. This finding reveals that several urban areas beyond Kendari and Bau-bau city are also eligible to be categorized as "medium cities" and "small cities" according to the Spatial Planning Law. For example, urban centers in Muna and Kolaka have a population that exceeded the 100,000 thresholds, thus can be classified as medium cities. Bombana and Konawe on the other hand can be classified as small cities as they both have exceeded the 50,000 population threshold.

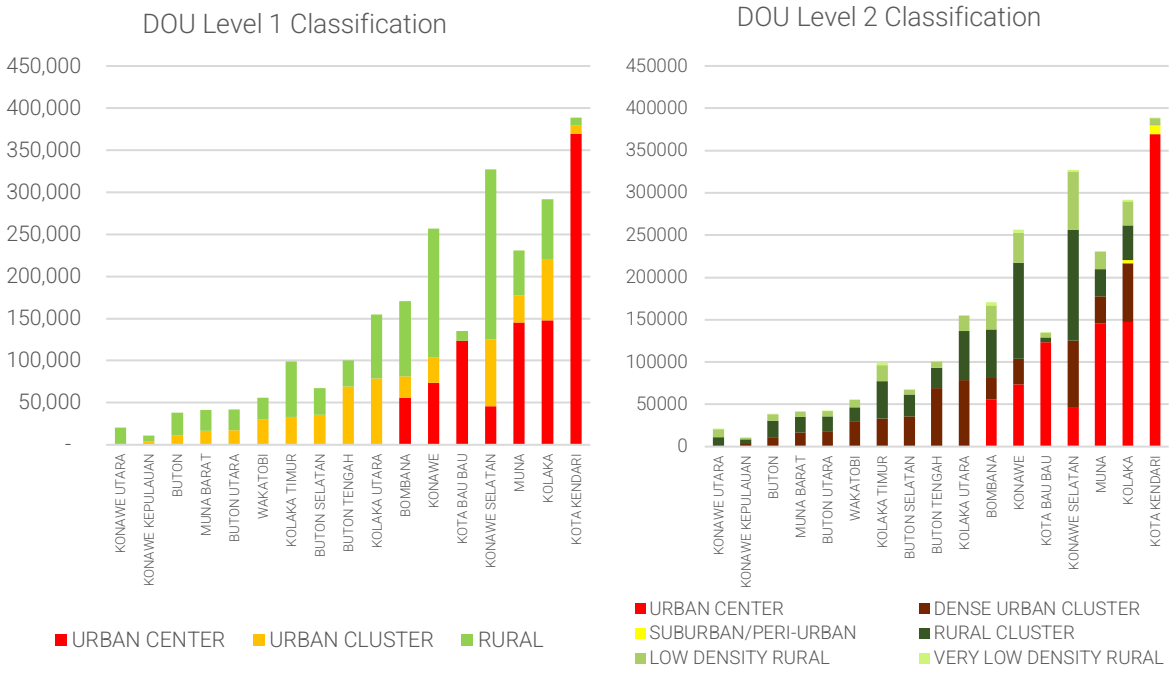

***Figure 5**. Degree of Urbanization Level 1 and Level 2 for Regencies/Municipalities in Southeast Province*

When the results from degree of urbanization (DOU) is compared to rural-urban classification from National Statistics Agency (BPS), the comparison shows that the DOU result has a relatively higher urban population percentage except in North Konawe. In addition, the DOU result for South Buton and West Muna reported a relatively high urban population beyond 40% compared to the BPS result which classify both regencies with zero percent urban population. These gaps will create a void of understanding regarding the urbanization process and neglect the facts about the underserved urban areas.

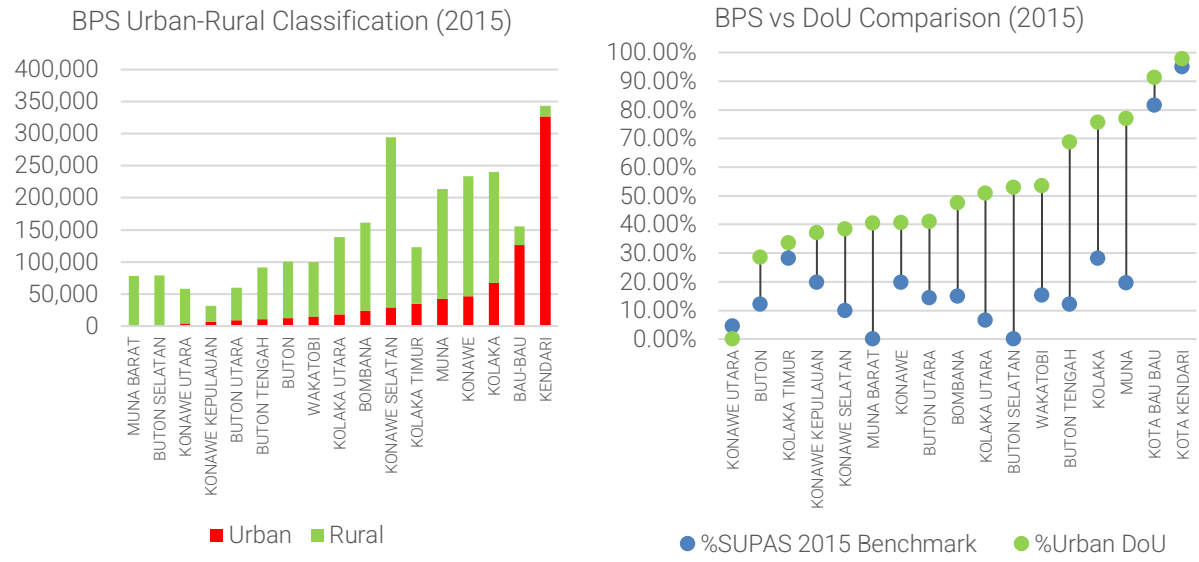

***Figure 6**. BPS Urban Rural Classification (left) and Comparison of urban population percentage between BPS and DOU/DoU (right)*

The section above mainly exposed the finding in the administrative unit either regencies or municipalities. However, it is also important to comprehend the distribution of functional urban entities in Southeast Sulawesi Province. From the analysis, the total urban entities identified in Southeast Sulawesi province are 49 urban units, with 6 urban centers and 43 urban clusters. Of 49 urban units, 3 of them have a suburb/peri-urban grid such as in Kendari Urban Center, Kolaka Urban Center, and Pomalaa Urban Cluster. Two of the urban entities were omitted due to their population size which is below the minimum threshold of 5000 population for urban clusters: namely Tongano Timur as well as Lambale.

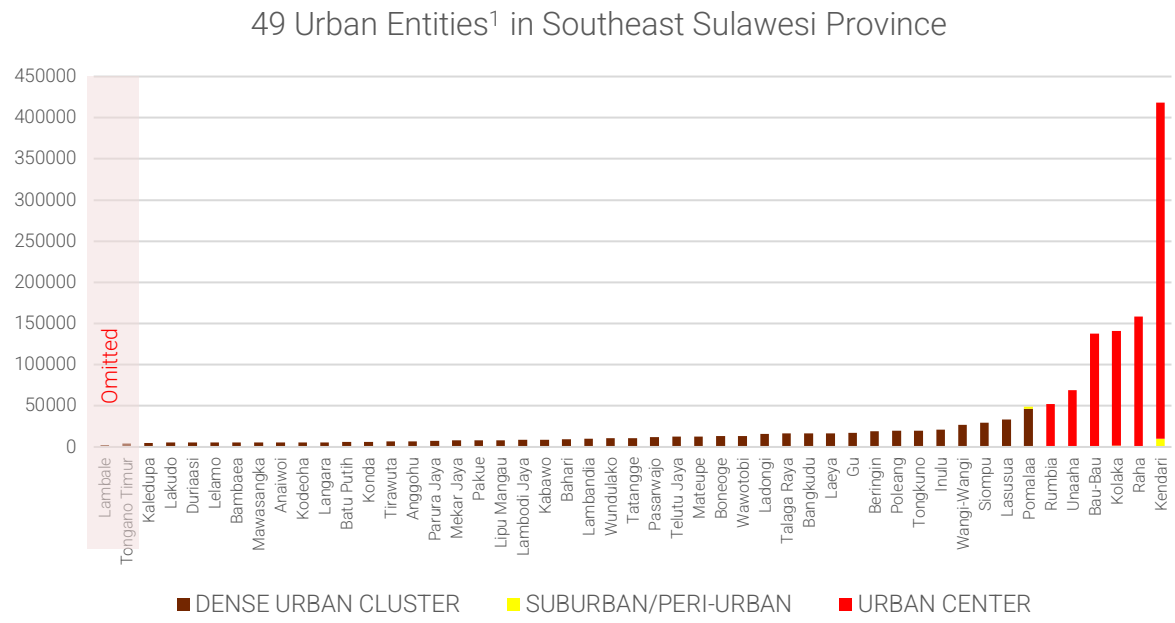

Figure 7. *Urban Entities in Southeast Sulawesi Province based on Degree of Urbanization Typology*

A detailed list of the urban entities according to DOU typologies is provided through the bar chart shown in Figure 7 and spatial visualization for the six largest urban centers (Kendari, Raha, Kolaka, Bau-Bau, Unaaha, and Rumbia) shown in Figure 8.

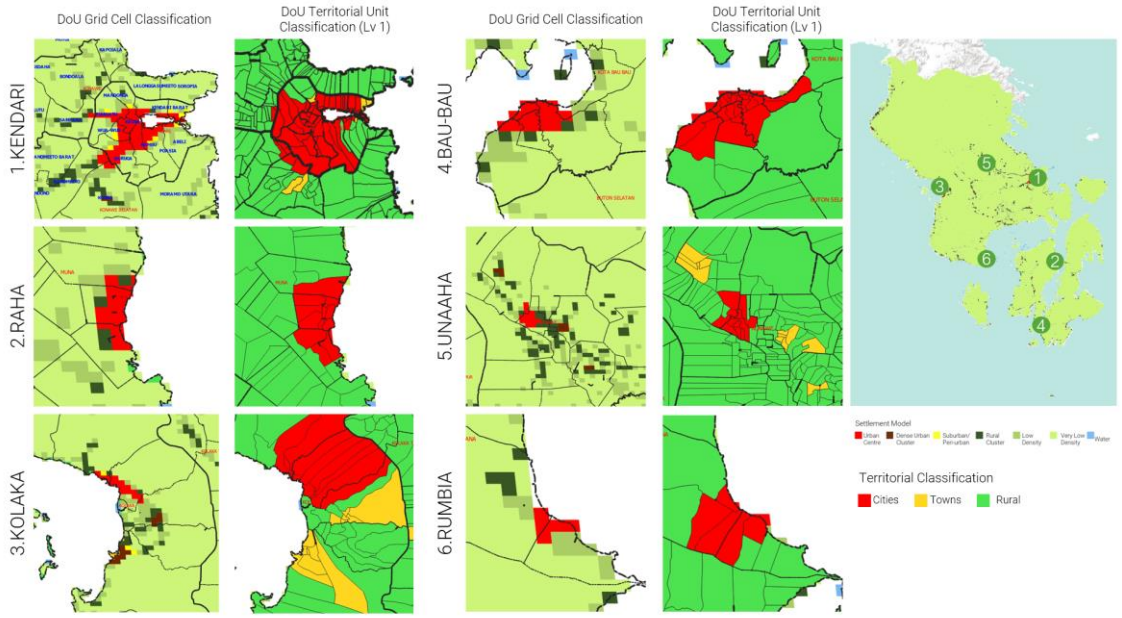

Figure 8. *Degree of Urbanization for most populous urban centers in Southeast Sulawesi Province*

2. Discussion

Based on the finding in previous part, several points can be further elaborated. In the first part, we will discuss the differences in the results of calculating urban areas based on administrative areas using the DoU with the existing method. The next section will discuss how

the results of mapping using the DoU differ from the determination of urban systems based on applicable regulations and their implications.

Differences in the determining urban areas

First, we can discuss the differences between the calculation results from the rural-urban classification (Desa Kota) based on BPS with the DoU method. With all its limitations, the BPS rural-urban calculation method is not able to map several urban areas that already fulfill the population and density threshold. In other words, urban areas were under-represented in the BPS rural-urban classification method. The implication of this miscalculation is the neglect of urban areas so that urban service needs are not met, and the problems are not treated.

Based on Figure 4, urban areas in most districts are under-represented if calculated based on the BPS village-urban method. Moreover, more than a 30% calculation gap is identified in eight administrative areas, if comparing between two different methods. The widest gaps occurred in Muna District (57%), Central Buton District (56), and South Buton District (52%). To be specific, there are more than half of urban areas neglected with the current calculation. An extensive comparison between DoU analysis result and conventional provided below:

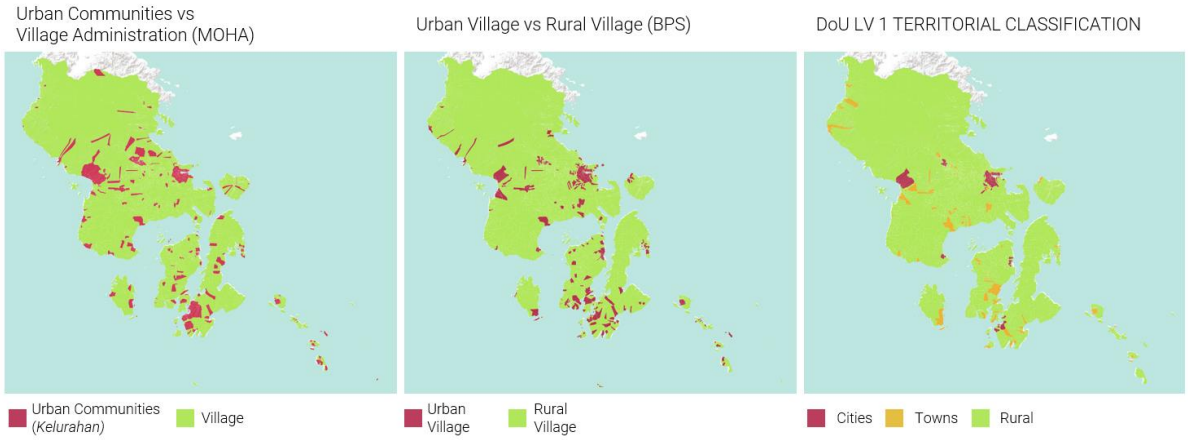

Figure 9. *Urban-Rural Distribution based on Village Administration (Kelurahan/Urban Communities vs Desa/Village: left), Village characteristic (Rural village/Perdesaan vs Urban village/Perkotaan: center), and based on DoU (right)*

This comparison shows that there is a big difference in interpreting urban areas. It indicates the need to simulate and calculate further with a more sophisticated approach in defining urban areas in Indonesia. More specific methods of defining urban areas can build better urban policies. One of the proposals proposed by the OECD is used to examine the relationship between urbanization and economic growth, where development does not always have to be oriented towards the expansion of metropolitan areas, but also through strengthening linkages between medium-sized urban areas. In addition, the DoU implementation provides the ability to monitor the quality of life of urban communities comprehensively, without neglecting urban problems in several areas that are not accounted as urban areas because of the miscalculation.

Degree of Urbanization, Urban Hierarchy and Rank Size Distribution

In this section, we describe the distribution of Degree of Urbanization classification in Southeast Sulawesi Province (SSP) and see how it varies with another approach such as the administrative decision of urban activity centers in spatial plans. Spatial Planning Law (law 26/2007) classified urban areas in Indonesia based on its services capacity which is called Sistem Perkotaan Nasional (urban hierarchy system). It is decided based on the results of the identification of the distribution of functional urban areas. This approach is also complemented by interaction analysis between settlement centers or the range of services in the region. In the analysis of the system of settlement centers, there is also a scalogram analysis used to identify service centers based on the facilities they have. Where the facilities used in this assessment are facilities that characterize the function of social and economic services with the criteria of a single and measurable object and as far as possible have hierarchical or tiered characteristics.

Population	Function
• Metropolitan, > 1 million population • Large city, > 500.000 population • Medium city, 100.000 to 500.000 population • Small city, less than 100.000 population	• Urban area as Pusat Kegiatan Nasional (PKN) • Urban area as Pusat Kegiatan Wilayah (PKW) • Urban area as Pusat Kegiatan Lokal (PKL)

Law 26/2007 on Spatial Planning

This analysis also provides an overview of the grouping of settlements as service centers based on the completeness of their service functions. To find out the service center, a Weighted Centrality Index (WCI) approach is used to measure the number and types of existing facilities so that distribution and centrality can be seen. This centrality is an indicator that shows the service capability of city facilities. This method uses weighting for all types of facilities which are the Combined Centrality Value, to determine or calculate the class interval for determining the order of the region, which is to calculate the number of classes of orders, the length of the class/range, and the division of orders. It classified urban areas into several hierarchies based on population and services capacity.

However, the caveat of determining urban growth center in spatial plans is the delineation of the urban areas is unknown unless it has already been planned. Before any official planning document is issued and stated to what extent the delineation of an urban area is, the urban growth center will be recognized and represented by dots in the map. In addition, due to planning character, the designated urban areas in spatial plan tend to represent an expectation of future spatial distribution rather than to explain the current geographic distribution of urban areas.

DoU provides an understanding of the spatial features of urban areas. While prior study observes the rank-size distribution or urban hierarchy based on administrative boundaries such as municipality population ranking, with DoU to compare more detailed-hierarchy of urban areas is now possible. According to Zipf's law, the growth pattern of cities almost everywhere follows the power law (Gabaix, 1999). Does Zipf's law hold for cities and towns in Southeast Sulawesi province? By conducting a test on 47 of 49 urban entities in Southeast Sulawesi resulting from DoU analysis, the scatterplot, as shown in Figure 10, confirmed that the Southeast Sulawesi urban system satisfies the Zipf's law with R2 = .9885, and the slope of the fitted line is -0.9554. This result also supports the highlighted importance of the proper definition of a city to improve the fit to Zipf's law (Arshad, Hu, & Ashraf, 2017).

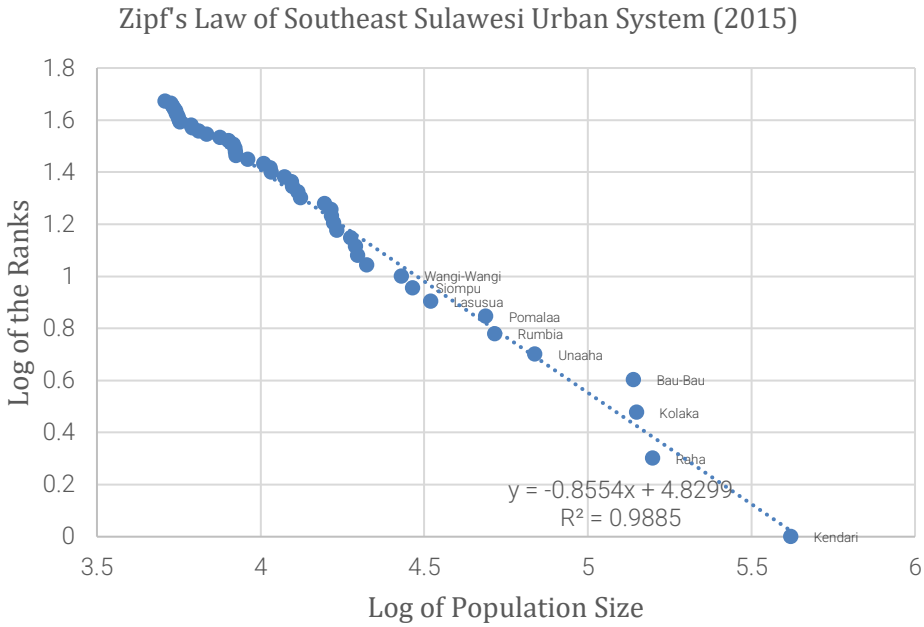

Figure 10. *The plot of the log of the ranks (y) versus the log of the population size (x) of the cities & towns in Southeast Sulawesi Province*

Assuming that the share of the population between cities and regencies in Southeast Sulawesi is constant to the baseline (2015) composition, and the total population of Kendari urban area is 1.279 times larger than the population of Kendari Municipality. By adopting the projected population in 2045 published by BPS (BPS, 2020), the changes of urban systems in Southeast Sulawesi Province is expected to be as follows:

***Table 5**. Comparison between baseline 2015 and projection 2045 according to the Zipf's Law prediction*

Classification	2015 (Baseline)	2045 (Projection)
Large City (500k – 1 M)	-	Kendari (1)
Medium Cities (100k – 500k)	Kendari, Raha, Kolaka, Bau-Bau (4)	Raha, Kolaka, Bau-Bau, Unaaha, Rumbia (5)
Small Cities (50k – 100k)	Unaaha, Rumbia (2)	Pomalaa, Lasusua, Siompu, Wangi-wangi, Inulu, Tongkuno, Poleang (7)
Large Towns (10.000 – 50.000)	Pomalaa, Lasusua, Siompu, Wangi-wangi, Inulu, Tongkuno, Poleang, Beringin, Gu, Laeya, Bangkudu, Talaga Raya, Ladongi, Wawotobi, Boneoge, Maetupe, Telutu Jaya, Pasarwajo, Tatangge, Eundulako, Lambandia (21)	Beringin, Gu, Laeya, Bangkudu, Talaga Raya, Ladongi, Wawotobi, Boneoge, Maetupe, Telutu Jaya, Pasarwajo, Tatangge, Eundulako, Lambandia, Bahari, Kabawo, Lambodi Jaya, Lipu Mangau, Pakue, Mekar Jaya, Parura Jaya, Anggohu, Tirawuta, Konda, Batu Putih, Langara, Kodeoha, Anaiwoi, Mawasangka, Bambaea, Lelamo, Duriaasi, Lakudo, Kaledupa (34)
Small Town (5.000-10.000)	Bahari, Kabawo, Lambodi Jaya, Lipu Mangau, Pakue, Mekar Jaya, Parura Jaya, Anggohu, Tirawuta, Konda, Batu Putih, Langara, Kodeoha, Anaiwoi, Mawasangka, Bambaea, Lelamo, Duriaasi, Lakudo, Kaledupa (20)	***

***require future assessment of new urban cluster class from current suburbs/rural cluster/low density/very low density rural areas

Another discussion in this section is about the potential urban area captured by the analysis. There is an urban area corridor located in the central and southern parts of the main area of the Southeast Sulawesi province. The dense urban corridors occupy the major provincial road, such as the corridor between Kendari and Unaaha. The dense urban area also can be seen at transmigration locations such as in the town of Lodongi in East Kolaka Regency. On the south coast, there is Andoolo and another smaller corridor on Muna Island. Another corridor is also visible in the northern part of the west coast of the Southeast Sulawesi province, which is the main trans-Sulawesi route connecting South Sulawesi.

If we look at the administrative boundaries, seven administrative areas already have an urban center. Apart from the two municipalities, there are five districts (Konawe, South Konawe, Kolaka, Bombana, and Muna) that already have urban centers. Each urban center in each district is the service center of that district. In 2045, 7 new urban centers are expected to be added to the province's urban systems.

This trend is advantageous where district capitals usually have the privilege to have specific regulations to manage their urban issues. In less fortunate settings, urban areas that do not have the status of a capital city become neglected, and their urban problems are left unanswered. But still, the proposed policy is to regulations that recognize these urban areas regardless of their administrative status. Ideally, the district government is provided with the tools to regulate and manage urban problems at a certain location that are indicated to be new urban areas (dense urban cluster). A problem like traffic congestion, zoning regulation, and service provision become common problems in the newly emerged urban area.

Transboundary Urban Area and implication to Urban Governance

The last section of the discussion is to what extent information regarding the geography of urbanization can be beneficial to determine how to govern and manage cities or towns. Who is responsible for overseeing as well as monitoring the urban development and growth. Government regulation No. 28/2018 on local government cooperation has mandated the obligation to cooperate for two or more local governments where directly contingent to foster efficiency in public services provision while addressing cross-boundaries externality. This mandate, however, is seen as not effective in fostering more cooperation between local governments, particularly in urban management and governance issues.

The DoU methodology could apprehend whether an urban area is within administrative boundaries or has cross-jurisdictional features. From this analysis, for example, most of the urban areas (35) are located within a district with multiple villages, and only 5 urban areas that located within a village. In addition, 8 urban areas have an extent span over more than one district but within a regency or a city, and only 1 urban area which expands in more than one regencies/city.

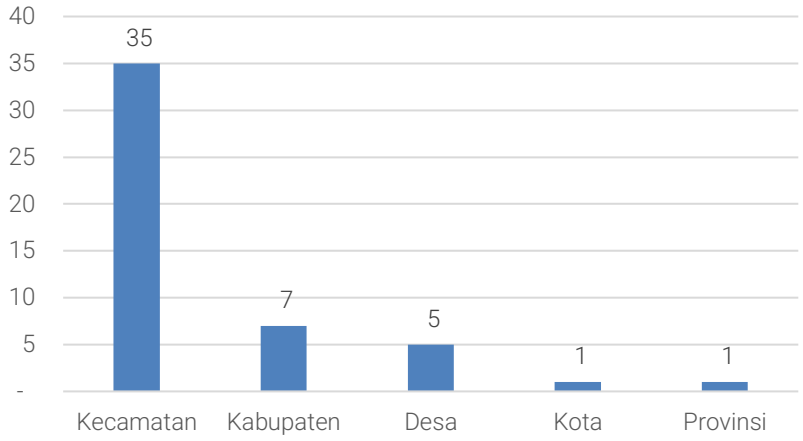

Figure 11. *Number of Urban Area based on Minimum Level Urban Governance Coordinating Body*

In Indonesia's context, the regional approach for urban management is still focused only on one million-plus city or metropolitan regions. Although, this study exhibits the possibility of fragmented urban governance, particularly in a multi-jurisdictional functional urban area where there is more than one local government entity shared one urban center.

Table 6. *Recommendation for Minimum Level of Urban Governance Coordinating Body*

Terminology	Minimum Level of Urban Governance Coordinator	Urban Areas
Kotaraya	Province-level or cities/regencies' cooperation	Kendari (Kendari, Konawe, Konawe Selatan)
Kota	City/regency-level or district cooperation	Beringin, Kolaka, Raha, Rumbia, Unaaha, Wangi-Wangi, Wundulako, Bau-Bau (8)
Kotapraja	District (kecamatan)-level or village/urban community (kelurahan) cooperation	Rumbia (5) Pomalaa, Lasusua, Siompu, Inulu, Tongkuno, Poleang (7)nGu, Laeya, Bangkudu, Talaga Raya, Ladongi, Wawotobi, Boneoge, Maetupe, Telutu Jaya, Pasarwajo, Tatangge, Eundulako, Lambandia, Bahari, Kabawo, Lambodi Jaya, Lipu Mangau, Pakue, Mekar Jaya, Parura Jaya, Anggohu, Tirawuta, Konda, Batu Putih, Langara, Kodeoha, Anaiwoi, Mawasangka, Bambaea, Lelamo, Duriaasi, Lakudo, Kaledupa (27)
	Village/urban community (kelurahan)-level	Bangkudu, Boneoge, Lambale, Lelamo (4)

Figure 12 shows the functional urban area does not recognize administrative boundaries. In the case of Kendari's functional urban area, the urban area has spread to other administrative areas such as Konawe Regency and South Konawe Regency. Based on these findings, a new approach to managing cities is needed that can move beyond administrative boundaries.

There are at least seven subjects of intergovernmental (Tarigan, 2009), namely improving public services, managing border areas, spatial planning, disaster management, poverty alleviation and reduction of regional disparities, resource utilization, innovation to increase the role of provinces, and region proliferation. Meanwhile, several types of inter-regional cooperation make it possible to resolve these transboundary development issues (Taylor, 2003) ranging from the simplest in the form of a handshake agreement between two regional heads, to jointly formed authorities, often known as the joint secretariat. In Indonesia, where local governments delegate control, management, and responsibility to a body that is jointly formed and consists of representatives of these local governments. However, urban management seems to need to consider a more solid form, like higher regional bodies from the provincial level, that act as a neutral joint body that handles general issues that are larger than local issues of one region or regional issues, that have sufficient authority to implement the policy.

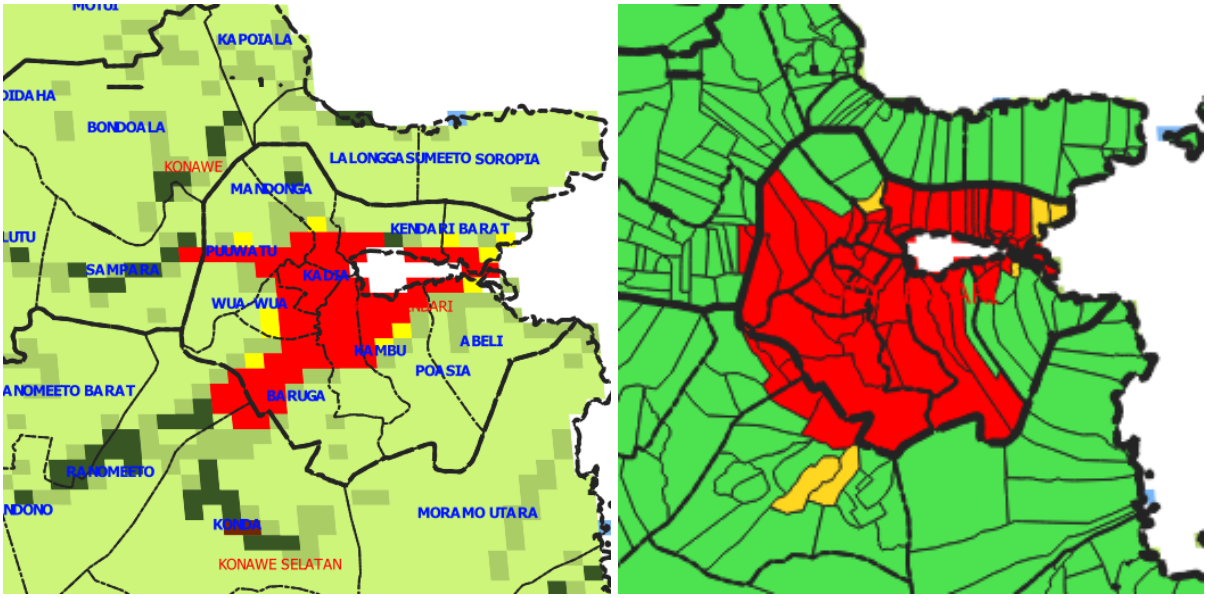

Figure 12. *Kendari Urban Area: Extended beyond boundary into South Konawe (Ranomeeto and Konda) and Konawe (Sampara)*

D. Conclusion

There are differences regarding the way urban areas are defined, starting with the definition of urban areas and how to project new urban areas to plan for future urban development. This paper seeks the enhanced approach in mapping urban areas. More accuracy in determining urban areas will have a positive impact both in the preparation of plans and their implementation as well as their outcomes because they will be more integrated and, in the end, will create efficiency and effectiveness of implementation.

However, this concept requires the availability of non-spatial data related to population and spatial data with the required level of detail. The application of the concept of the degree of urbanization will be very useful in the control process (monitoring and evaluation) although it also requires data support on a detailed scale

The findings of this paper can also provide input for the system of cities as well as the legal definition of urban areas that have so far been contained in regulations. What about cities which are legally designated as urban areas because they have a service function but empirically do not meet the requirements to become urban areas. Indeed, the determination of administrative cities and the distribution of service centers is not necessarily a technocratic decision because there are other considerations such as socio-political. However, this approach will cause other problems.

On the other hand, this approach also captures areas that already qualify as urban areas but are not designated as by regulation. The absence of such a determination eliminates the opportunity for the region to obtain the financing and development it needs. In other words, this

empirical evidence can strengthen the foundation of urban policy in Indonesia by providing more detailed evidence on urban delineation.

It may also impact institutional setting that suggest that the planning and development of an urban area can not be decided solely on administrative boundaries of local government. More detailed delineation may draw a whole new urban boundaries amongs several jurisdicion. Cooperation and collaboration between regions are necessary. It may change the transaction cost between authorities that shared the functional urban area shared responsibility to handle problems and meet needs, development, services, and urban management.

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