The Impact Analysis of “Tanah Desa” Land Utilization on Environmental Components at Sinduadi, Mlati, Sleman, Yogyakarta Special Region, Indonesia

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Key words: “Tanah Desa”, land management, land utilization, environmental impact, Indonesia

SUMMARY

“Tanah Desa”, which can be in the forms of “Pelungguh” land, “Pengarem-arem” land, “Tanah Kas Desa”, and land for public use, is land whose origins are from the sultanate and/or duchy which is managed by the village government. The land use management based on customary rights granted by the sultan or duke to manage and collect/take products from sultanate land (Sultan Ground) or duchy land (Paku Alaman Ground) to the village government in carrying out village administration for a period of time as long as it is used. This research is aimed at: (1) identifying the land utilization of "Tanah Desa" and their distribution; (2) analyzing the impact of “Tanah Desa” land utilization on environmental components. This research was conducted at Sinduadi Village, Mlati Subdistrict, Sleman Regency, Yogyakarta Special Region, the Republic of Indonesia consisting of 128 “Tanah Desa”. The analysis units are all parcels of “Tanah Desa”. Data collection was done through: (a) Interpretation of the “Tanah Desa” map; (b) Pleiades High Resolution Satellite Imagery Interpretation; (c) Interviews with village government bureaucrats and land authorities; (d) Field observation. Data analysis techniques include: (1) GIS technology as a way of spatial analysis; (2) cross tabulation, chi square, and Likert scale analysis techniques are used to explain the impact of “Tanah Desa” land utilization on environmental components. The results of the research are: (1) “Tanah Desa” was sporadically distributed in 3 region types, namely the Rural-Urban, Urban Fringe, and Urban-Rural zones. “Tanah desa” is dominated by “Tanah Kas Desa” in the form of settlement land utilization; (2) The form of “Tanah Desa” land utilization has an impact on economic aspects, while the abiotic, biotic, social and cultural components are not affected. The direction of “Tanah Desa” land utilization is determined by the impact on groundwater availability as a major factor, while the impact on soil fertility and vegetation density is as a minor factor. The suggestion of this research is the utilization of “Tanah Desa” needs to consider the type of area and its environmental impact as a preventive effort against long-term excess.

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1. INTRODUCTION

The need for land are increasing along with population growth, the availability of land for human activities is decreased. The limited land has an impact on land use changes to accommodate many activities. The same phenomenon occurs in "Tanah Desa", which is mostly productive land and is located in high accessibility. Tanah Desa in scientific phrase is the same as village land, while in technical term it is called "Tanah Desa" with some specific criterias.

Tanah Desa is land whose origins are from the sultanate and/or duchy which is managed by the village government. Tanah Desa has 4 (four) types of land: "tanah kas desa", "pelungguh", "pengarem-arem", and land for public purposes (Daerah Istimewa Yogyakarta, 2017c). The land use management based on customary rights granted by the sultan or duke to manage and collect/take products from sultanate land (Sultan Ground) or duchy land (Paku Alaman Ground) to the village government in carrying out village administration for a period of time as long as it is used.

Various information indicates that there are some problems with counterproductive Tanah Desa land management, such as illegal trading, uncontrolled land use, and unsuitable land utilization (Daerah Istimewa Yogyakarta, 2017a). This is a village government decision which contradicts the function of Tanah Desa as one of the village's original assets, as well as a strategic village asset. It is focus on economic factor and ignore the environmental aspects. Proper management of Tanah Desa will have a positive impact on village income and community welfare.

The spatial analysis of Tanah Desa is needed to obtain an integrated holistic consideration. It is due to Tanah Desa is located sporadically throughout the Yogyakarta Special Region/Daerah Istimewa Yogyakarta (DIY) and has unique abiotic, biotic, economic, and socio-cultural attributes. Therefore it is necessary to map the distribution of Tanah Desa which contains data on the land use and land utilization. The necessity for spatial data and ecological information in land management is very important because the land utilization of Tanah Desa has not been optimal. Tanah Desa distribution is spread out and the area of land parcels is varied, making it difficult to identify. This certainly makes it hard to make policies on land management.

The changes of land functions can certainly have spatial and ecological impacts, including: sporadic or irregular patterns of land use change (Puspitasari & Pradoto, 2013), the area of productive rice fields has decreased (Habibatussolikhah, et al., 2016), decreasing groundwater conservation functions (Maria & Lestiana, 2014), and escalation of CO_2 emission (Widayati, et al., 2012).

The existence of laws and regulations in the form of Act Number 13 of 2012 concerning the Privileges of the DIY, Special Region Regulation Number 1 of 2017 concerning Management

and Utilization of Tanah Desa, and Regulation of the DIY Governor Number 34 of 2017 concerning Tanah Desa Land Utilization has implications for village land management, both to be managed by the direct land authority (village government, bureaucrats, and retired officials) as well as by other parties (tenants). One vital aspect is that there is no detailed information about the use and utilization of Tanah Desa at the Land and Spatial Planning Agency. This can lead to improper use of Tanah Desa and ignoring environmental factors.

2. THEORETICAL REVIEW

2.1 Land Use

According to Vink (1975) in Ritohardoyo (2013), in geographic concept, land is as a certain area above the earth's surface, in particular includes all the objects that make up the biosphere that can be considered to be permanent or migratory in the area covering the atmosphere, and below the area includes land, and parent rock (material), topography, water, plants and animals, and various effects of past and present human activities, all of which have a significant impact on human land use, present and future. Mabbut (1968) in Ritohardoyo (2013) suggests a limitation of the meaning of land as a combination of surface and near-earth elements which are important for human life.

The meanings of land above indicate that land is one of the natural resources that is very important for human life, given the needs of the community both for sustaining their lives and their socio-economic and socio-cultural activities. Land is a type of resource considering its existence as an object or condition that can be valuable if its production, process or use can be understood. Therefore, from the environmental aspect of land use, it requires full attention to control its sustainability (Ritohardoyo, 2013).

Current land use is a sign of the dynamics of human (either individual or community) exploitation of a collection of natural resources. Land use arises as a result of the needs of human activities. This human activity takes the form of a place to live, livelihood, transportation and others. For example, urban areas are usually made up of settlements, offices, and industries. In contrast to rural areas which are usually used as agricultural land, plantations, and livestock. Land use is used to improve the welfare of the land owner. Land owner will change the use of land in order to generate greater profits.

2.2 Tanah Desa

Tanah Desa is land whose origins are from the sultanate and/or duchy which is managed by the village government. Tanah Desa has 4 types of land: “tanah kas desa”, “pelungguh”, “pengarem-arem”, and land for public purposes (Daerah Istimewa Yogyakarta, 2017c). The land use management based on customary rights granted by the sultan or duke to manage and collect/take products from sultanate land (Sultan Ground) or duchy land (Paku Alaman Ground) to the village government in carrying out village administration for a period of time as long as it is used.

Act 13/2012 Article 32 states that the sultanate and duchy are declared as legal entities. In this case, the sultanate is the subject of rights that has ownership rights to Sultan Ground (SG) and the duchy is the subject of rights that has ownership rights over the Paku Alaman Ground (PAG). SG and PAG found in all districts within the DIY area. The sultanate and duchy have the authority to manage and utilize SG and PAG for the maximum purpose of cultural development, social interests and community welfare.
Governor Regulation Number 34/2017 regulates the utilization of Tanah Desa as follows:
Tanah Desa is land whose origin is from the sultanate and/or the duchy which is managed by the village government based on "anggaduh" rights, the types of which consist of:

a. tanah kas desa;
b. pelungguh;
c. pengarem-arem;
d. land for public use.

Anggaduh are customary rights granted by the sultanate or the duchy to manage and collect/take products from SG or PAG to the village administration for a period of time as long as it is used; Pelungguh is is used for additional income for the village bureaucrats; Pengarem-arem is used for allowances for the retired village officials; Tanah Kas Desa (TKD) is used to support the administration of village government; land for public is used for community interests, including markets, fields, roads, and cemeteries;
The utilization of TKD shall be carried out by: (a) cultivated independently, (b) leasing, (c) building for transfer or building for handover, and (d) joint use. Its must obtain a permit from the sultanate or duchy. In the case of utilization of TKD which is cultivated on its own for agriculture, it is not necessary to obtain permission from them;
Pengarem-arem can be leased to institutions or the community and can be used by other parties to construct buildings with the mechanism of building for delivery or building for transfer.

2.3 Eco-spatial Analysis

Geographical land tenure studies pay special attention to human interactions with the environment (Wrigley 1967 in Bintarto and Hadisumarmo (1979), and emphasize more on its orientation to problems, in terms of human interaction with the environment.
Three approaches are usually used for geographic studies, namely the spatial approach, the ecological approach, and the regional complex (Yunus, 2001). The approach used in this research is spatial and ecological approach, hereinafter referred to as an "eco-spatial" approach, which emphasizes descriptions of land tenure conditions and community socio-economic conditions related to housing development.
Land use change in the suburbs are emphasized on changes in control of agricultural land to residential land, both in terms of distribution and the process of change (ecological). This is different from the spatial approach which emphasizes the intensity of housing development on land ownership changes (Jauhari, 2016).

3. METHOD

3.1 Location

The research was conducted using a case study in Sinduadi village, Mlati sub-district, Sleman district, DIY. The location selection was based on the consideration that Sinduadi village is a suburban area (urban fringe) of Yogyakarta, which in theory has more complex problems than rural areas.

3.2 Population and Analysis Unit

Based on BPN documents in 1925 to 1940, the total Tanah Desa in the study area was 128 parcels. This research carried out a re-inventory through field observations in 2019. In this case, all Tanah Desa parcels were used as research analysis units with the consideration that each Tanah Desa had unique characteristics from abiotic, biotic, social, economic, and cultural aspects.

3.3 Materials and Tools

1. Map of the original old village (1925-1940) or reproduction;
2. Rectified High Resolution Satellite Image of Pleiades Multispectral 2015;
3. Questionnaire.
4. Garmin GPS Map 78s;
5. Asus Zenfone M2 smartphone;
6. GPS Map Camera Android application.
7. Orthogonal Scanner Large format high resolution HP Designjet HD Scanner A0/42 series;
8. Asus Laptop A442U with Intel Core i5 8250U Processor and 12 GB DDR4 RAM;
9. ArcGIS 10.5 Software;
10. Microsoft Office 2016 software (Word and Excel);
11. Statistical Package for Social Sciences (SPSS) 25 software.

3.4 Variables

The variables in this study include: type, location, area, use and utilization of Tanah Desa. Apart from that, there are also perceptions of village land owners on soil fertility, groundwater availability, air quality, vegetation density, security and comfort, livelihoods, and community culture.

3.5 Data Collecting Techniques

The method of collecting data in general uses the following techniques:
1. Interpretation of Village Maps for Tanah Desa location, area, and land use;
2. The satellite imagery interpretation includes Tanah Desa location, area, and land use;

3. Interviews with village government and land authorities in the form of questionnaires related to data: administrative location, land utilization, soil fertility, groundwater availability, air quality, vegetation density, security, comfort, livelihoods, and community culture.
4. Field observations for measuring the coordinates of the Tanah Desa parcels, documenting, and updating data.

3.6 Data Processing Techniques

1. Interpretation of the village map and the satellite imagery overlay using Arc GIS software to obtain information on: the location and area of Tanah Desa;
2. Tabulation of the results of documentation and interviews regarding types of Tanah Desa land use;
3. Tabulations from the results of documentation and interviews include abiotic (soil fertility, groundwater availability, air quality), biotic (vegetation density), social (security, comfort), economy (livelihoods), and culture (customs).

3.7 Data Analysis Techniques

1. Analysis of the Tanah Desa Distribution
The distribution analysis begins with scanning the village map and cropping the satellite imagery. Furthermore, their overlay were carried out after the georeference and scale equalization processes. The digitization process is performed after there are no geometric problems. The next step is to enter the attribute data in the digitization results with Arc GIS, so that a draft map is obtained. Field validation was executed to ensure the current condition of this in the study location, so that map updates could be generated to obtain valid village maps. The area is calculated based on the area data available at the BPN or village office and using the coordinate method. The form of land use and utilization is based on existing data at the village office and field observation.

2. Analysis of the Impact of Tanah Desa Utilization on Environmental Components
Analysis of the impact of the current utilization of Tanah Desa on the abiotic, biotic, social, economic and cultural components of the environment is based on a recapitulation of respondents' perceptions. In this case, the factors assessed by the scoring method using the Likert scale include perceptions of: soil fertility, groundwater availability, air quality, vegetation density, comfort and security, livelihoods, and community culture. Furthermore, an analysis was carried out using the Cross Tabulation and Chi Square methods to see the impact of the utilization of Tanah Desa on the environmental component associated with the characteristics of the area.

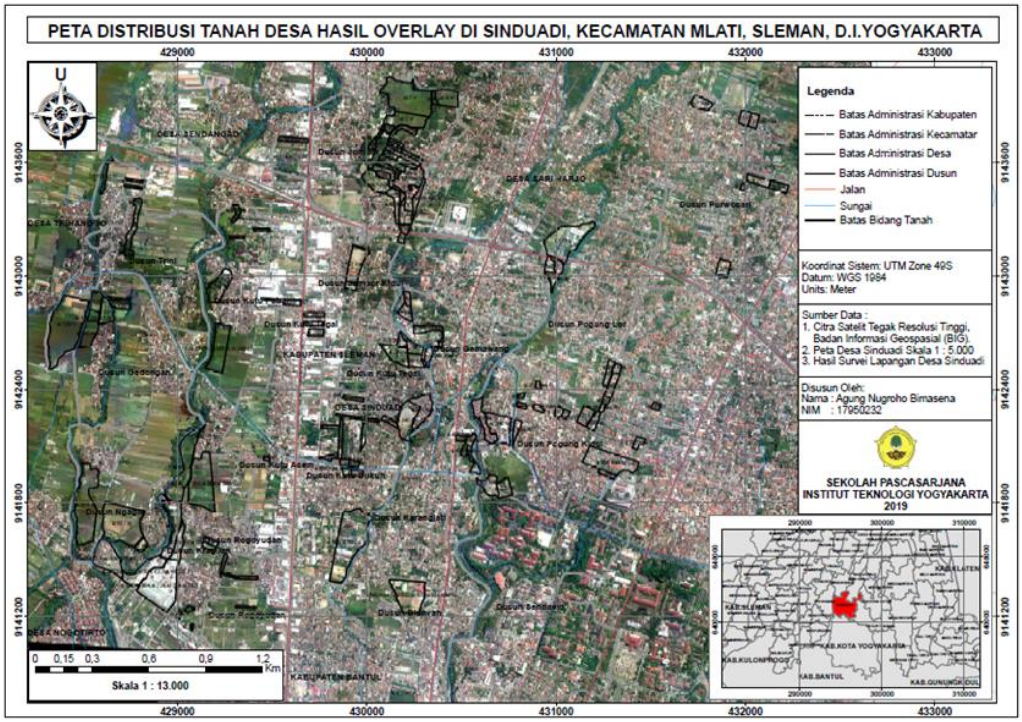

Figure 1: Tanah Desa Distribution Map (line map and satellite imagery overlay)

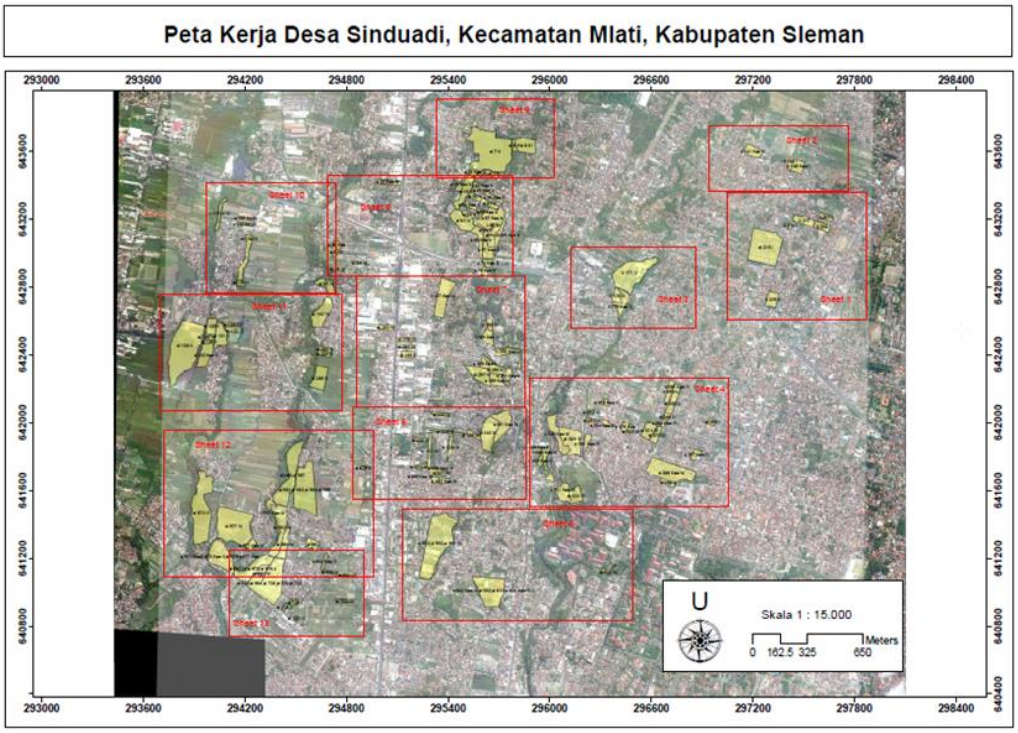

Figure 2: Index of the Working Map

4. RESULT AND DISCUSSION

4.1 Distribution of Tanah Desa Land Use

The Tanah Desa in Sinduadi is located in 16 out of 18 hamlets. Karangjati and Sendowo are 2 hamlets that do not own village land.
Based on the characteristics of the area, the hamlets in Sinduadi can be classified into 3 types, namely: (1) Rural-Urban; (2) Urban Fringe; and (3) Urban-Rural. In this case each of them is scattered in the following locations:
1. Jetis and Gedongan;
2. Ngaglik, Kragilan, Kutu Asem, Kutu Dukuh, and Jombor Lor;
3. Patran, Rogoyudan, Kutu Tegal, Jombor Kidul, Gemawang, Karangjati, Blunyah Gede, Pogung Lor, Pogung Kidul, Sendowo, and Purwosari.

Table 1: Characteristics of Tanah Desa Areas

Zone	Area Characteristics		
	Location	Land Use	Infrastructure
Rural-Urban	west side	Agriculture domination	Collector and local roads
Urban Fringe	south, mid, dan north sides	Agriculture and non agriculture	Arterial, collector, and local roads
Urban-Rural	south, mid, north, and east sides	Non agriculture domination	Arterial, collector, and local roads

(Source: Data processing, 2019)

The results of the overlapping of Tanah Desa map and satellite imagery after the georeference process and scale equations are linked with the attribute data using Arc GIS, so that a draft map is obtained which is used as a working map in Figure 2.
Furthermore, the Tanah Desa was validated to ensure current conditions in the study location based on field observations and informants. In this case the latest data is categorized based on the Regulation of the Governor of DIY Number 34 of 2017 concerning Tanah Desa Utilization in Figure 3 and 4.
Researchers found several things as follows:
1. Tanah Desa based on its type is sporadically distributed with the largest to the smallest percentage are TKD, Pelungguh, Public Use, and Pengarem-arem land. This shows a logical argument that the use of Tanah Desa for village administration and incentives for village officials is a priority, while public facilities are in the next sequence. Land for retired village officials has the smallest percentage, because it is suspected that restrictions on the time and area of Pengarem-arem land based on Pergub No. 34/2017 have been effective. In this case, the time limit for land use is 8 years with a maximum area of 20% of the land of Pelungguh;
2. Tanah Desa covering an area of 10.10% is identified as having changed into area of settlements, trade, and services controlled by individuals. In this case, the researchers suspect that these changes are caused by the land consolidation project and Sinduadi ring road;

3. 8.59% a mixture of TKD and Pelungguh (uncertainty boundaries). This is allegedly due to changes in boundaries that are not known by village government and has the potential for illegal transaction.

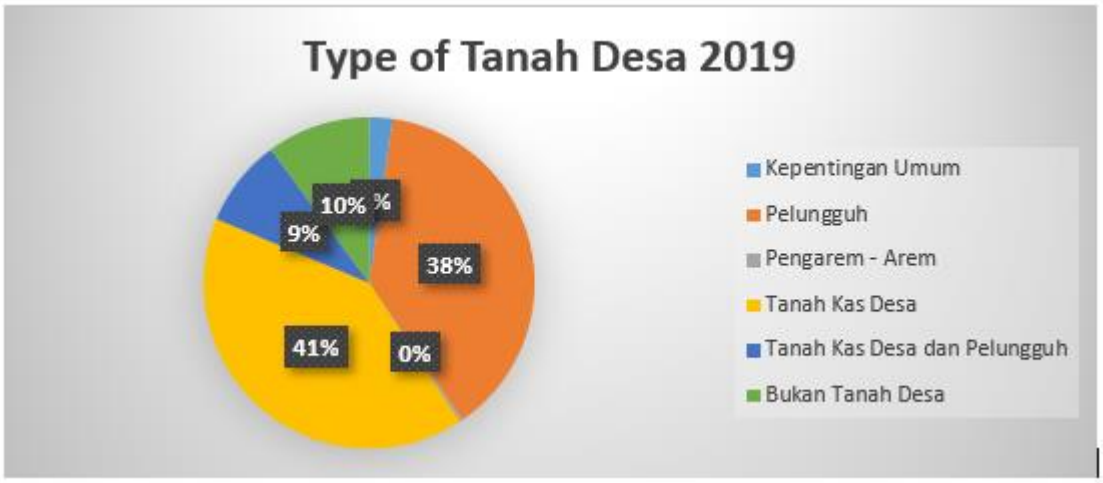

Figure 3: Diagram of Tanah Desa types based on DIY Governor Regulation Number 34 of 2017 concerning Tanah Desa Utilization (Source: Data processing, 2019)

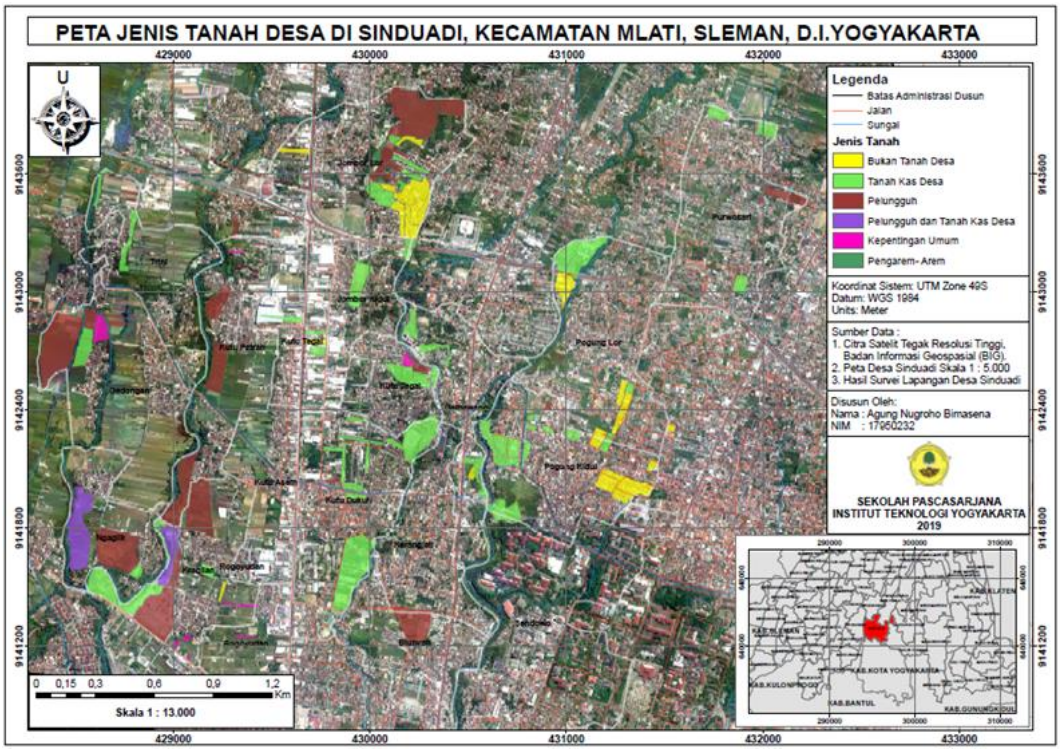

Figure 4: Tanah Desa Type Map (Source: Data processing, 2019)

Researchers do not explore further related to legal actions on the land in the form of buying and selling, exchanging, and so on. However, the findings of 10.10% of Village Land that have changed private ownership and 8.59% of Village Land with unclear field boundaries require follow-up from the village government and Dispertaru to update information regarding the distribution of types of Village Land, so that the existence of Village Land is maintained.
The use of village land was identified in 2 categories, namely: Agricultural and Non-agricultural. In this case, the area of each category is calculated using a graphical method. The land uses are presented in Figure 5 and Figure 6.

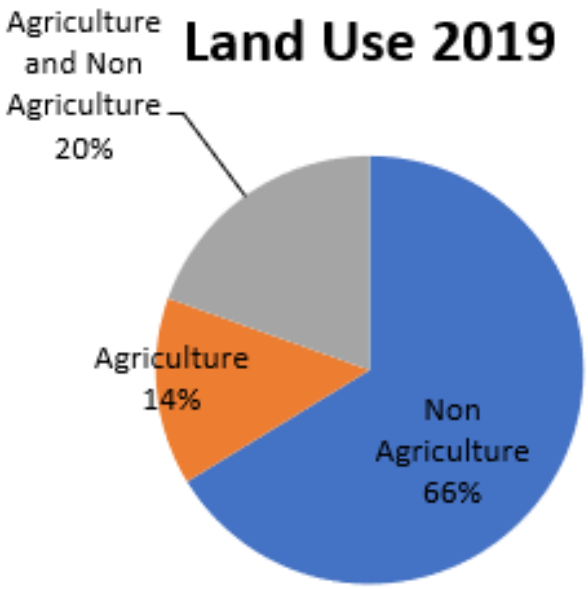

Figure 5: Land use diagram (Source: Data processing, 2019)

Recent land use (2019) for village land in the study area shows the dominance of non-agricultural uses. In this case non-agricultural has a proportion of 66%, agriculture 14%, and mixed 20%. The forms and proportions of land use include: housing 35.9%, industry 20.3%, services 13.3%, open land 10.9%, plantation 10.9%, and rice fields 8.6%.
The distribution in an eco-spatial manner (Figure 6) illustrates that the central to eastern side and stretching from north to south are Urban-Rural, whereas in the west side it consists of characteristics of the Urban Fringe and Rural-Urban areas.This shows that the change in agricultural land use to non-agricultural is influenced by the Yogyakarta city which borders the Sinduadi in the east and south, as well as the capital city of Sleman in the north. Two arterial roads, namely the Magelang road (Yogyakarta-Magelang) and the northern ring road, as well as the Jogja Kembali Monument (Monjali) road and the Kaliurang road are thought to have had an effect on land use change in the surrounding Tanah Desa.

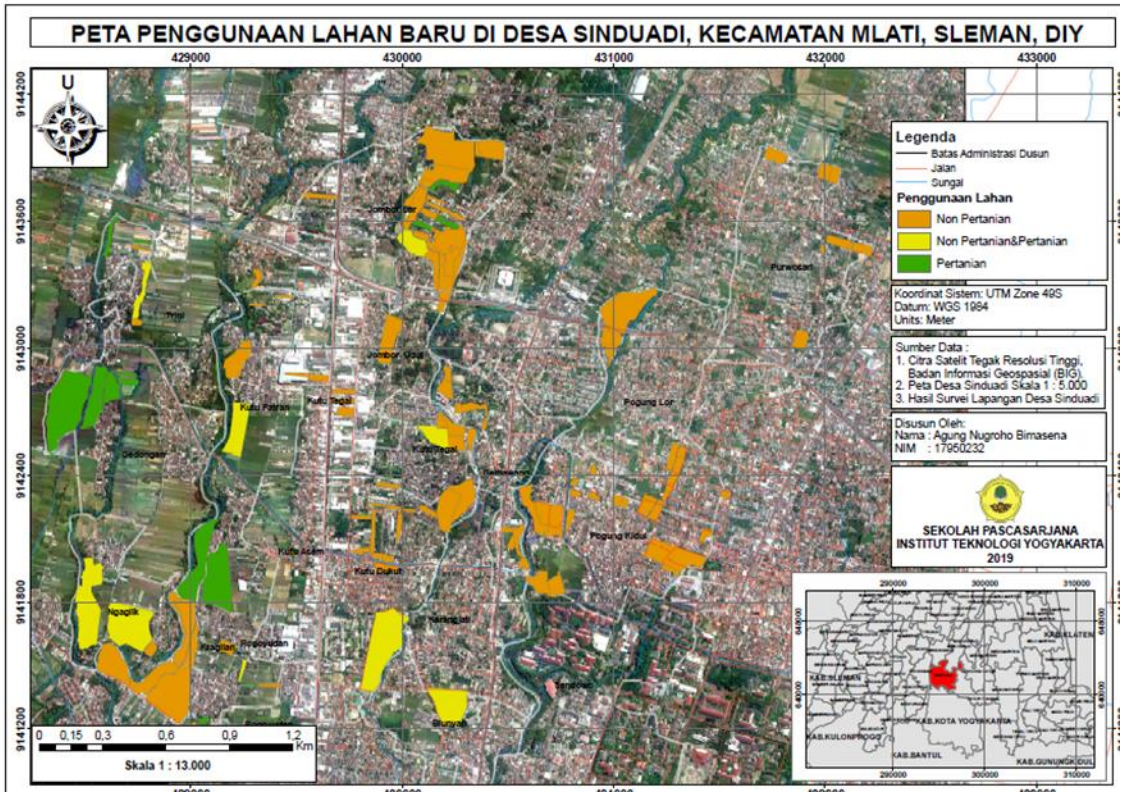

Figure 6: Tanah Desa Land Use Map 2019 (Source: Data processing, 2019)

4.2 The Impact of Current Tanah Desa Land Utilization on Abiotic, Biotic, Social, Economic and Cultural Components of the Environment

Respondents' perceptions about the impact of the current utilization of Tanah Desa on the abiotic, biotic, social, economic, and cultural components are the benchmarks in this study.

In this case, the factors assessed by the scoring method using the Likert scale include perceptions of: soil fertility, groundwater availability, air quality, vegetation density, security and comfort, livelihoods, and community culture with the results as presented in Table 2.

The perception of some Tanah Desa owners stated that soil fertility was decreasing, while other respondents stated that it was constant and none of them stated that there was an increase in soil fertility. Eco-spatially, respondents in rural areas with the Rural-Urban zone stated that land still had the same fertility level. For the most part, respondents who stated that fertility was decreasing live in zone that had relatively large changes in agricultural land use to non-agricultural (Urban Fringe and Urban-Rural zones).

The results of the analysis of groundwater availability have similarities with soil fertility. In this case, all respondents in the west side who have the Rural-Urban type stated that there was no change in groundwater availability. Some respondents who lived in the Urban Fringe and Urban-Rural zones stated that the groundwater condition was still constant, while others stated that the groundwater level had decreased.

In general, the air quality was stated to have decreased by the respondents. This is felt based on the increase in temperature and dust. However, the results of scoring analysis using a Likert

scale are still in the "fixed" range. If it is related to the component of vegetation density, the researcher feels the need to pay attention, because this factor has decreased relatively even though it is not yet in the "reduced" category. Respondents who answered “fixed” only on a small portion of village land which is included in the Rural-Urban zone.

Table 2: Scoring of Environmental Components with Likert Scale

No	Ecological Factor	Index	Condition
1	Soil Fertility	49%	FIXED
2	Groundwater Availability	49%	FIXED
3	Air Quality	46%	FIXED
4	Vegetation Density	36%	FIXED
5	Security	59%	FIXED
6	Comfort	58%	FIXED
7	Livelihood	90%	CHANGING
8	Culture	53%	FIXED

Source: Data processing, 2019

Security was generally stated as constant, only a small proportion stated that it had decreased due to increased population density. Respondents who stated that there was an increase in security was also due to the increasing number of people living in the area. This happened in the Urban Fringe zone, which saw a decrease in crime, due to increased housing. The security component is thought to have a relationship with the comfort factor. In the context of social comfort, respondents stated "permanent", with the reason that there are still many indigenous people who live in the same hamlet.

Most respondents in the Urban Fringe and Kota-Desa zones stated that livelihoods were changing. In this case because it is influenced by changes in business trends, for example: boarding and culinary businesses around the UGM, UTY, and MMTC campuses, as well as urban development, including: Jogja City Mall, entertainment venues, and so on. Most people have additional jobs, including: opening shop, laundry, and so on and changing professions as parking attendants, online motorcycle/taxi drivers, and others.

Culture in this case is patrolling, *wiwitan*, *kenduri*, and so on. In general, in all types of territories, customs are still preserved, although not all cultural heritages are held routinely as before.

To obtain a more comprehensive conclusion about the extent to which the Regional Characteristics and Land Use influence ecological factors in the research area, the Cross Tabulation and Chi Square analysis was carried out on the 8 environmental components studied. Details of the results can be seen in table 3.

The research findings explain that the classification and proportion of the characteristics of the Sinduadi Village area include: the rural-urban zone 9.4%, the urban fringe zone 32.8%, and the urban-rural zone 57.8%. The characteristics of the area are not related to comfort, livelihoods and culture. The components of soil fertility, groundwater availability, air quality, vegetation density, and security were associated with area types, but with a “weak” level of correlation.

The land use aspect has a strong relationship with soil fertility, groundwater availability, and vegetation density. Air quality and culture also suffer weakly from the form of land use, while the components of security, comfort, and livelihood have no association.

Table 3: Analysis of Cross Tabulation and Chi Square of Area Characteristics and Land Utilization factors for Ecological Components

No	Ecological Factor	AREA CHARACTERISTIC		LAND UTILIZATION	
		Association	Correlation	Association	Correlation
1	Soil Fertility	Related	Weak	Related	Fair
2	Groundwater Availability	Related	Weak	Related	Fair
3	Air Quality	Related	Weak	Related	Weak
4	Vegetation Density	Related	Weak	Related	Fair
5	Security	Related	Weak	Unrelated	Very Weak
6	Comfort	Unrelated	Very Weak	Unrelated	Weak
7	Livelihood	Unrelated	Very Weak	Unrelated	Very Weak
8	Culture	Unrelated	Weak	Related	Weak

Source: Data processing, 2019

It is indicated that the impact on soil fertility and vegetation density is not a priority for certain land use considerations, because the results of the study indicate that agricultural land use tends to shift to non-agricultural. Researchers suspect that land owners place more emphasis on the impact of groundwater availability as a determining factor for land utilization. The impact on air quality as well as social, economic, and cultural aspects around the Tanah Desa is thought not to be considered in determining the direction of certain land utilization.

5. CONCLUSION AND SUGGESTIONS

1. Tanah Desa is spread sporadically in 3 types of areas, namely the Rural-Urban, Urban Fringe and Urban-Rural zones. Tanah Desa is dominated by TKD with the largest land utilization in the form of settlements;
2. The Tanah Desa utilization has an impact on economic aspects, while the abiotic, biotic, social and cultural components are not affected. The direction of Tanah Desa land use is determined by the impact on groundwater availability as a major factor, while the impact on soil fertility and vegetation density are the minor factors.
3. Tanah Desa should be re-identified, both in terms of area, distribution, land use, and land utilization to obtain the latest data;
4. Tanah Desa utilization needs to consider the type of area and environmental impact in an integrated manner as a preventive effort against long-term excess.

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BIOGRAPHICAL NOTES

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