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AN ANALYSIS OF LAND USE CHANGE, SPATIAL PLAN AND REGIONAL DEVELOPMENT LEVEL IN BOGOR CITY

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ABSTRACT: Bogor City is located 60 kms from the Indonesian Capital Jakarta and 120 kms from Bandung the capital of West Java Province. Strategic agricultural land and inexpensive land prices have to invest in agricultural and non-agricultural sectors. Land use conversion is inevitable, although the government has set up the regulation to control land usage (Act No 26 year 2007). This research are conducted: (1) To analyze existing land use of Bogor City (land use in 2014). (2) To analyze the land use change in period of 2005-2012. (3) To analyze the consistency of existing land use compare to spatial allocation in the RTRW of Bogor City. (4) To identify regional development hierarchy levels in Bogor City. (5) To determine factors that influence land use change. This research was started with a land use map that was retrieved from an administrative map 1: 5000 scales to Iconos image of Bogor City in years of 2005 and 2012. Consistency and inconsistency were obtained by overlaying the 2012 land use map and land allocation map of Bogor City years 2011-2031 (RTRW map). PODES is used to determine the regional hierarchy level by multiple regression methods. Existing land use classified into 9 land use, in sequence from the largest one are: mixed garden, irregular settlement, rice field, regular settlement, trading area, water body, dryland farm, open land and government office area. Dryland farm land use changes into 2 land use, open field land use change into 6 land use and rice field land use change into 6 land use. The consistent use of the existing land use compare to RTRW is 40.95% while inconsistence existing land use is 59.05%. During the period of 2006 to 2012, most of the regional development hierarchies in Bogor City were relatively constant (42 villages / 61.8%), 12 villages (17.6%) are increasing in the hierarchy, whereas 14 villages (20.6%) are decreasing in the hierarchy. Factors that influencing land use change of Bogor City in the period of 2005-2012 are: the extent of agricultural land in 2005, the growth of social facilities, and the growth of economy facilities.

Keywords: Land Use Conversion, Land Use Inconsistency, Regional Hierarchy, Spatial Plan

1. INTRODUCTION

Regional development should be carried out through more integrated and directed spatial planning so that limited resources can be utilized effectively and efficiently. One effort to achieve this is through the integration and harmony of development in a well-organized spatial pattern. Therefore, spatial planning is needed, both in the process of planning, utilizing and controlling space utilization as an integral whole system, and implemented in an integrated, synergic and sustainable manner, with the creation of an orderly, organized, harmonious and balanced environment [1] [2] [3] [4] [5].

According to [6] [7] [8] [9] [10] Indonesia's economic growth which continues to increase fluctuation has an impact on increasing regional development. The development of a region is marked by the development of the economic sector and the increase in the completeness of public facilities such as schools, shops, industries, and so forth. The construction of massive public facilities in the developing regions has attracted residents of other regions and this process has significantly increased population growth. Food needs require agricultural land to produce, while settlements and public service facilities require public facilities and built land. These conditions resulting in the use of agricultural land will have a great chance to be converted into non-agricultural use.

Bogor is one of the Jakarta hinterlands, in addition to Bekasi, Depok and Tangerang which have undergone many land use changes. Geographically, Bogor City is located between 106^{0} 48'BT and 6^{0} 26 "LS. The geographical position of Bogor City in the middle of the Bogor Regency region and its location very close to the national capital, is a strategic potential for economic development and growth and services, the center of national activities for industry, trade, transportation, communication, and tourism [1] [2]. As a result of the rapid development triggered

by increase of population, resulting in the conversion process of land use can not be avoided in order to meet the necessities of life. Rapid development occurs in the Bogor City in all sectors including industrial estates, the Central Business District (CBD), and housing. Amount of open land decreases and makes green open space in the city of Bogor diminish.

The research objectives are: (1). Knowing the existing land use in Bogor City (2). Knowing land use change of Bogor city year 2005 and 2012. (3). Analyzing consistency/inconsistency of land under allotment of Bogor City Spatial Plan space. (4). Analyzing Indonesia economic municipalities and territories in Bogor based on data from Bogor City Village Potential. (5). Knowing factors that affect land use Change of Bogor City.

2. RESEARCH METHODS

The study was conducted in the Bogor City, West Java. The primary data and secondary data collection conducted in Bogor City, while analysis of data held in the Division of Planning and Regional Development Studio, Department of Soil Science and Land Resources, Faculty of Agriculture, IPB University.

Data collection includes primary and secondary data. Primary data consists of filling of checking form in the field and actual land use documentation . Secondary data consists of the Iconos image of Bogor City in 2005 and 2012 , the administrative map of Bogor City in 2011 , the map of Bogor City RTRW for 2011-2031 , data on Village Potential of Bogor City in 2006 and 2012

The land use map was obtained from digitizing the 1: 5000 scale Bogor City administration map of the corrected image using the iconos image of Bogor City in 2005 and 2012, and producing a map of the Bogor City land use in 2005 and 2012. Elements of interpretation are used according to Lint and [39] [40], namely : (1) hue is the color or relative brightness of the object in the photo, indicating the presence of gray levels observed in black and white aerial photographs. (2) colors can be presented in three elements (*hue, value, chroma*), (3) patterns are macro characteristics used to describe spatial layout in images, (4) Texture is the frequency of hue changes in aerial photo imagery , (5) size is the consideration of the shape of the object in relation to the scale of the photo, (6) Form, refers to the general configuration of an object as recorded in remote sensing images, (7) Shadows, associated with the shape and height of objects, (8) Site, describes the position of the face of the earth and the image observed in relation to the appearance around it, (9) Associations, designate a community of objects that have a certain uniformity or several closely related objects where each forms the existence of another. From the results of digitize of using land use the grouped interpretations are obtained into nine land use classifications: namely (1) mixed gardens, (2) rice fields, (3) dryland farm, (4) irregular settlements, (5) regular settlements, (6) trading area, (7) government office area, (8) open land, (9) water body.

Bogor City can be determined by the overlap (overlay) of 2012 land use map with spatial patterns map (RTRW 2011-2031). Overlapping maps are queried based on the logic of inconsistency matrices that produce maps of inconsistencies in the space use of Bogor City.

The level of development of the region is obtained from the results of the data analysis of the Bogor City Village Potential year 2006 and 2012 using the Scalogram Method. Scalogram method is used to find out the hierarchy in an area. Determination of the hierarchy of centers of growth and service is based on the determination of the number and types of units of infrastructure and social economic facilities available. This method produces a higher hierarchy or ranking at the growth center that has more number and type of facilities. Determination of regional development level is divided into three, namely :

1) Hierarchy I, if the development index is ≥ (average + standard deviation)
2) Hierarchy II, if the average <development index <(average + standard deviation)
3) Hierarchy III, if the development index <average

Facilities analyzed were grouped based on similarity and resemblance to nature into five categories, namely: (1) educational facilities (Number of Nursery School (TK) Public and Private, Primary School (SD) Public and Private, junior high school public and private, high school public and private, SMK public and private, the Academy State and Private, SLB Public and Private and Boarding Schools / Madrasah Diniyah Private, (2) Social facilities (Number of mosque, Christian church, Catholic Church, Temple, (3) health facilities (Number of Hospital, Maternity Hospital (RSB), Polyclinic /clinic, community health center, auxiliary community health center, Doctors Practice place, Midwives Practice Sites, Posyandu and pharmacies), (4) economic facilities (number of telephone kiosks/warpostel/warparpostel, internet kiosk (warnet), supermarkets/department stores/ mini markets , restaurants, food stalls, grocery stores/shops, hotels, Lodging (hostel/motel/inn/ guesthouse), Cooperative, Minimarket, KUD ,

KOPINKRA, KOSPIN, Commercial Bank, People's Credit, Private Seminary, Foreign Language Course, Computer Course, Fashion Course, Beauty Course, Leather Industry, Industry from wood, industry of precious metals and metals, woven industry, pottery /ceramic industry, industries of woven fabric, food and beverage industry), (5) accessibility (distance from nearest nursery school, nearest elementary school, closest junior high school, closest high school, closest vocational school, The hospital to the nearest facility, the maternity (RSB) to the nearest facility, the polyclinic to the nearest facility, the health center to the nearest facility, the auxiliary community health center to the nearest facility, the commercial bank to the nearest facility, the nearest people's credit bank).

The factors affecting land use change were analyzed by multiple regression with the stepwise forward method in Statistik 7 software . Changes in land use which are analyzed are changes in agricultural land to non-agricultural land (built land) in the period of 2005-2012. The data variables used in multiple regression analysis are presented in Table 4. The multiple regression equations used are:

$Y = Ao + A_IX_I + A_2X_2 + ...A_nX_n$

Y = Dependent variable (destination variable).

X_i = Independent variable (i), with i = 1 , 2 , ...

A_i = regression coefficient i.

Table 1 . Variables for Multiple Regression

Destination variable (Y)	Predictor variables (X)
Changes in the area of agricultural land into non-agricultural land (built land)	(X1) Population Growth
	(X2) Growth of Social Facilities
	(X3) Growth of Economic Facilities
	(X4) Growth of Educational Facilities
	(X5) Growth of Health Facilities
	(X6) Village Development Index
	(X7) Allocation of Agricultural Land (ha)
	(X8) Allocation of Built-up Land (ha)
	(X9) Agricultural Land Area 2005 (ha)
	(X10) Built Land Area 2005 (ha)

3. RESULTS AND DISCUSSION

Land use found in Bogor City are: (1) mixed gardens, (2) rice fields, (3) dryland farm, (4) irregular settlements, (5) regular settlements, (6) trading area, (7) government office area, (8) open land, and (9) water body. Map of spatially existing land use of Bogor City served in Figure 1.

Mixed Gardens

Mixed gardens are a form of dryland farming with mixed crops and usually mixed gardens are planted with cultivated crops and woody trees. The majority of mixed gardens are scattered in irregular settlements [11] [12] [13] [14] [15] [16]. Mixed gardens are interpreted as bright, slightly coarse texture, varying colors, patterns clustered adjacent to settlements or following river pathways [17] [18] [19] [20] [21] [22]. The appearance of the object in the image and photograph of the mixed garden field observation was presented in Figure 2.

Rice Fields

Rice field is a form of wetland farming with the main commodity of rice crops [23] [24] [25] [26] [27] [28]. Rice field is interpreted in the form of an almost uniform pattern that is limited by embankments, dark / light hues, patterns of uniform textured plots.

Dryland Farm

Dryland farm is a form of dryland farming with diverse commodities and is usually dominant in crops, pulses and tubers in a plot of land .The fields are interpreted with varied plots of brown mixed with green, with rectangular shapes, rather smooth textures and group patterns.

Irregular Settlements

Irregular settlements are a group of buildings with a uniform shape, size and distance between houses. Irregular settlements are interpreted to vary in size, rather bright hue, rather coarse texture, square pattern with spreading / unclear road networks.

Regular Settlements

Regular settlements are a group of buildings that are used as dwellings with the shape, size and distance of one house to another as well as spread throughout the sub-district. Regular settlements are interpreted to vary in size, rather bright hue, rather coarse texture, square pattern with clear and firm road network.

Trading Area

The trading area is an area that is intended for trade and service activities, including the warehousing that is expected to be able to bring benefits to the owner and provide added value to an urban area [29] [30] [31]. The Trading area is interpreted as white or grayish white, finely textured, rectangular and located near roads [32] [33] [34].

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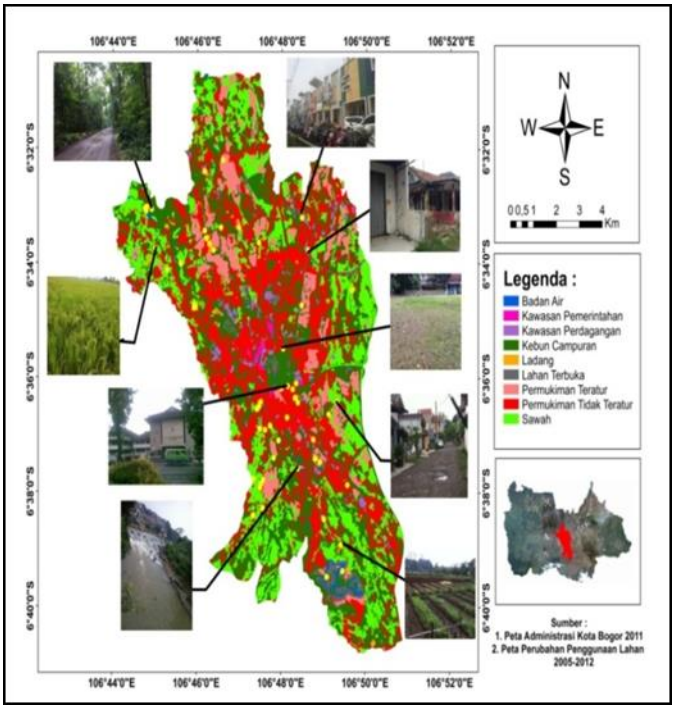


Figure 1. Existing Spatial Distribution of Bogor City Land Use

Figure 2. Appearance of objects in remote image and photograph of field observations of mixed gardens

Government Office Area

The Government Office area is a place to carry out everything related to government, both political, administrative and office activities. Government office areas are interpreted as rectanggular, patterns are regular and close to the main road.

Open Land

Open land is an empty land and land without vegetation cover. Open land is interpreted as varies of hue depend on soil moisture, reddish dark brown color, varies in size, fine texture.

Water body

Water body is a group of water located in an area consisting of rivers, rivers border and lakes (Minister of Public Works, 2007). Water bodies are interpreted as lengthways or widening, blackish and blue with diffuse patterns

Changes in Land Use in Bogor City Period of 2005-2012

Changes in land use in Bogor City period of 2005 -2012 presented in Table 2. The extent of unchanged mixed garden during the period 2005-2012 was 3.361.6 ha, while the largest conversion of mixed garden during that period was the conversion from mixed gardens to irregular settlements of 401.2

ha, to rice fields was 156.2 ha, to regular settlements was 32.3 ha, to open land was 21.7 ha, to trading area of 12.7 ha, respectively. The smallest conversion of mixed gardens was to government office area amounting to 2.6 ha.

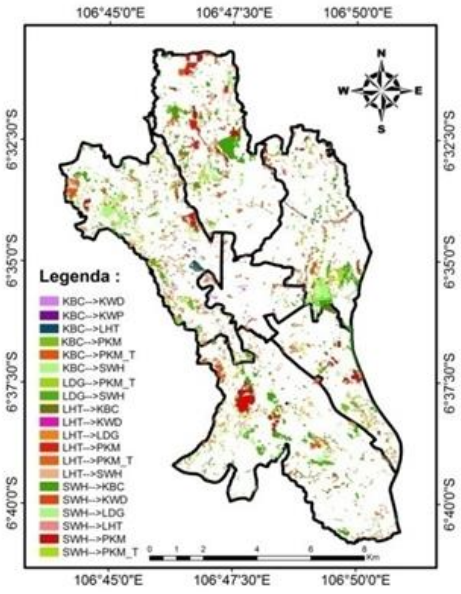
Rice extent that does not change over the period of 2005-2012 amounted to 2.358.5 ha, while the largest conversion of rice fields during that period were into mixed gardens 375.0 ha, to irregular settlements 200.5 ha, to regular settlements is 156.8 ha, to open land 29.9 ha, and to dryland farm 23.0 ha, respectively. The smallest conversion of rice fields is to trading area, which is 17.0 ha. The area of unchanged dryland farm during the period of 2005-2012 amounted to 42.8 ha. The largest conversion of dryland farm over that period into rice field in the amount of 71.7 ha, and the smallest conversion into irregular settlements of 26.6 ha.

The use of land as irregular settlements, regular settlement, trading area and government office area in the period of 2005-2012 were all unchanged, irregular settlement remained the same 3,014.9 ha, regular settlement 752.7 ha . trading area 207.6 ha, and government office area 43.0 ha, respectively. The area of unchanged open land during the period of 2005-2012 is 163.0 ha. The biggest open land conversion during the period 2005-2012 is the conversion into regular settlements 51.8 ha, to mixed plantations 48.9 ha, to rice fields by 29.1 ha, to irregular settlements is 13.5 ha, and to dry land farm is 7.2 ha, respectively. The smallest conversion is conversion to trading area is 6.9 ha.

Table 2 . Bogor City Land Use Change Matrix Period of 2005-2012

Land Use 2005 (ha)	Land Use 2012 (ha)								
	KBC	SWH	LDG	PKM_T	PKM	KWD	KWP	LHT	BDA
KBC	3,361.6	156.2	-	401,2	32.3	12.2	2.6	21.7	-
SWH	375.0	2,358.5	23.0	200.5	156.8	17.0	-	29.9	-
LDG	-	71,1	42.8	26.6	-	-	-	-	-
PKM_T	-	-	-	3,014,9	-	-	-	-	-
PKM	-	-	-	752,7	-	-	-	-	-
KWD	-	-	-	-	-	207.6	-	-	-
KWP	-	-	-	-	-	-	43.0	-	-
LHT	48.9	29.1	7.2	13.5	51.8	6.9	-	163.0	-
BDA	-	-	-	-	-	-	-	-	76.2

Expl: KBC = mixed gardens, SWH = rice fields, LDG = dryland farm, PKM_T = irregular settlements, PKM = regular settlements, KWD = trading area, KWP = government office area, LHT = open land, BDA = water body.



Expl: KBC = mixed gardens, SWH = rice fields, LDG = dryland farm, PKM_T = irregular settlements, PKM = regular settlements, KWD = trading area, KWP = government office area, LHT = open land, BDA = water body.

Figure 3. Spatial distribution of land use change in Bogor City in 2005-2012

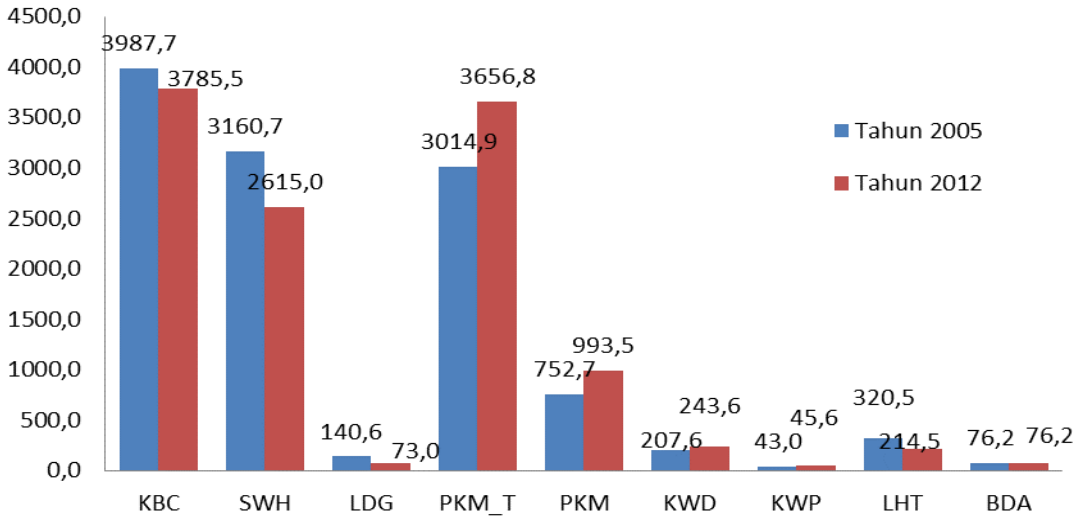


Figure 4. Graph of Changes in Bogor City Land Use for 2005-2012

Figure 4 showed a graph of changes in these land uses for the period of 2005-2012. From Figure 4 can be seen mixed gardens have decreased 202.2 ha (1.73%). In 2005 mixed garden area was 3, 987.7 ha and in 2012 it changed to 3,785.5 ha. The area of rice field was also decline. The decrease in paddy fields during that period was 545.7 ha (4 , 66 %) . The area of dryland farming decline. In 2005 an area of dryland farm is 140.6 ha and in 2012 changed into 73.0 ha. Decrease in the rice field during the period of 2005-2012 is 67, 6 ha (0.58%). Irregular settlement areas experienced an increase 641.9 ha (5.48%) from 3,014.9 ha to 3,656. 8 ha.

In the period of 2005-2012, regular settlement areas experienced an increase in area 240,8 ha (2.06%) from 752.7 ha in 2005 become 993.5 ha in 2012. The trading area increase in 36.0 ha (0.31%) area from 207.6 ha to 243.6 ha.

Consistency / Inconsistency of Land Use in 2012 with the Bogor City Spatial Plan for 2011-2031

A matrix between 2012 land use and the Bogor City spatial plan for 2011-2031 is presented in Table 3. From the Table 3, it can be seen that the largest consistent value lies in West Bogor sub-district as an irregular settlement with an area of 1,178 ha. For water bodies the greatest consistency lies in West Bogor sub-district that is equal to 29ha. In the government office area the greatest consistency lies in middle Bogor sub-district that is equal to 48ha. In the trading area the biggest consistency value lies in middle Bogor sub-district that is equal to 120ha. In the mixed garden the greatest consistency lies in West Bogor sub-district that is 157 ha. In open land the greatest consistency value lies in North Bogor and Tanah Sareal sub-districts amounting to 1 ha. In the dryland farm the value of the greatest consistency lies in the West Bogor sub-district of 8 ha, in regular settlements the greatest consistency value is located in the North Bogor sub-district, which is equal to 91 ha , and in the rice field the greatest consistency lies in West Bogor sub-district which is equal to 60ha. From these data it can be seen that land use spread in Bogor City which is in accordance with the space allocation of the RTRW is equal to 6,079ha (40.95%).

The largest inconsistent of land use is located in South Bogor sub-district as a mixed garden, which is 1,593 ha. On the other land, the biggest consistency as a water body lies in the West Bogor sub-district which is 24 ha. On governments office area the only inconsistency lies in the Middle Bogor sub-districts amounting to 9 ha, On trading area, the biggest inconsistency lies in the Middle Bogor sub-district amounting to 23 ha. On open land the biggest inconsistency lies in the North Bogor sub-district amounting to 102 hectares. The dryland farm, the biggest in consistency lies in the West Bogor sub-district amounting to 62 ha. In the irregular settlement the biggest in consistency lies in the West Bogor sub-district is equal to 436 ha, wheareas in regular settlements lies in the Tanah Sareal sub-district amounting to 36 hectares. The rice fields greatest inconsistency lies in South Bogor sub-district in the amount of 469 ha. From these data it can be seen that land use spread in the Bogor city that has not been suitable or is not in accordance with the RTRW space allocation is equal to 8,766 ha (59.05%).

Table 3 . Consistency of Land Use in 2012 with The Allocation of The Spatial Plan (RTRW) for 2011-2031

Consistency of Land Use in 2012 with RTRW allocation	West Bogor	South Bogor	Middle Bogor	East Bogor	North Bogor	Tanah Sareal
Inconsistent →Area (ha)	2001	2597	523	746	1579	1320
Mixed Gardens	1132	1593	370	477	955	752
Rice fields	279	469	8	114	250	238
Dryland Farm	62	32		2	15	33
Irregular Settlements	436	391	93	126	200	195
Regular Settlements	27	18	2	24	35	36
Trading Area	15	6	23	2	21	5
Government Office Area			9			
Open land	41	61	17	1	102	57
Water body	9	27	1		1	4
Consistent →Area (ha)	1606	1404	565	514	970	1020
Mixed Gardens	157	100	42	34	23	67
Rice fields	60	35		13	12	29
Dryland farm	8	1				
Irregular Settlement	1178	1163	331	386	759	764
Regular Settlements	63	40	22	42	91	87
Trading Area	116	46	120	39	83	68
Government Office Area			48			
Open land					1	1
Water body	24	19	2		1	4

Table 4 . The Region Development Level or Hierarchy Level of Bogor City in 2006 and 2012.

Hierarchy level	In 2006	In 2012
1	Pabaton, Sareal Land, Babakan, Kedung Badak, Cibogor, Paledang, Pasirmulya, Ciwaringin Sub-districts.	Babakan, Bondongan, Ciwaringin, Empang, Kebon kalapa, Kedung Badak, Margajaya, Pabaton, Paledang, Sukaresmi, Tanah Sareal Sub-districts.
2	Babakan Pasar, Baranang Siang, Bondongan, Cibuluh, Cilendek Barat, Empang, Gudang, Kayumanis, Kebon kalapa, Loji, Margajaya, Menteng, Muarasari, Pakuan, Panaragan, Semplak, Sempur, Sindangsari, Sukadamai, Sukasari, Tanah Baru Sub-districts.	Cilendek Barat, Curug, Genteng, Gudang, Harjasari, Kedungjaya, Kencana, Kertamaya, Loji, Menteng, Pasirmulya, Sindangsari, Sukasari, Tegal Gundil, Tegalega Sub-districts.
3	Balumbangjaya, Bantar jati, Batu Tulis, Bojongkerta, Bubulak, Cibadak, Cikaret, Cilendek Timur, Ciluar, Cimahpar, Cipagiri, Cipaku, Curug, Curug mekar, Genteng, Gunung Batu, Harjasari, Katulampa, Kebon Pedes, Kedung Halang, Kedung Waringin, Kedungjaya, Kencana, Kertamaya, Lawanggintung, Mekarwangi, Mulyaharja, Pamoyanan, Pasirjaya, Pasirkuda, Rancamaya, Ranggamekar, Sindangbarang, Sindangrasa, Situgede, Sukaresmi, Tegal Gundil, Tegalega Sub-districts.	Babakan Pasar, Balumbangjaya, Bantar Jati, Baranang Siang, BatuTulis, Bojong Kerta, Bubulak, Cibadak, Cibogor, Cibuluh, Cikaret, Cilendek Timur, Ciluar, Cipagiri, Cimahpar, Cipaku, Curug bloom, Gunungbatu, Katulampa, Kayumanis, Kebon Pedes, Kedung Halang, Kedung Waringin, Lawanggintung, Mekarwangi, Muarasari, Mulyaharja, Pakuan, Pamoyanan, Panaragan, Pasirjaya, Pasirkuda, Rancamaya, Ranggamekar, Semplak, Sempur, Sindangbarang, Situgede, Sukadamai, Tajur, Tanah Baru Sub-districts.

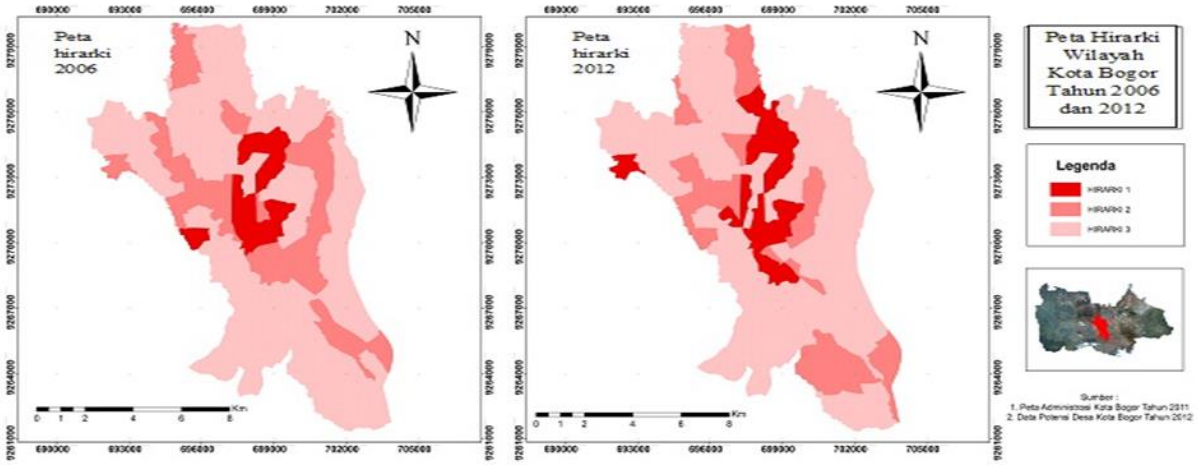


Figure 5. Spatial Distribution of Regional Hierarchy Level of Bogor City in 2006 and 2012

Table 5 . Hierarchy growth in the periode of 2006 to 2012

No.	Village (Kelurahan)	Hierarchy Increase (2006-2012)
1	Bondongan, empang, kebon kelapa, margayajaya	2 -> 1
2	Sukaresmi	3-> 1
3	Curug, Harjasari, Kedung Jaya, Kencana, Kertamaya, Tegal Gundil, Tegalega	3-> 2
No.	Village (Kelurahan)	Hierarchy Decreas (2006-2012)
1	Pasir mulya	1 -> 2
2	Cibogor	1 -> 3
3	Babakan Pasar, Baranangsiang, Cibuluh, Kayu Manis, Muara Sari, Pakuan, Semplak, Sempur, Sindang Sari, Sukadamai, Sukasari, Tanah Baru	2 -> 3

Regional Development Level

Based on the previous determinant formula of regional development level or determinant hierarchy, hierarchy levels throughout the villages of Bogor City in 2006 and 2012 are presented in Table 4 and spatial distribution as in Figure 5.

Based on a scalogram analysis results increase, in 2006. the number of village with hierarchy 1 is 8 villages, hierarchy 2 is 21 villages, and hierarchy 3 is 39 villages . In 2011 there was a change in the level of regional development in the Bogor City, where the number of villages with a hierarchy 1 became 11 villages, hierarchy 2 decrease became 15 villages and hierarchy 3 increase became 42 villages. Regions that experienced a hierarchical level change from 2006 to 2012 are follows: became hierarchy 1, namely: Bondongan, Empang, Kebon Kalapa, Margajaya and Sukaresmi Sub-Districts. This happens because of the villages an increase in the number of facilities available, among others, increasing the number of educational facilities, economic facilities, health facilities, social facilities as listed in previous Table 4. In contrast, the Pasir Mulya village decrease from hierarchy 1 in 2006 to hierarchy II in 2012. This decrease in the hierarchy level can be caused by an increase in the number and type of facilities in other villages while the increase in facilities for this sub-district is not too significant or there has not been an increase in facilities at all.

Factors Affecting Changes in Land Use

Factors that caused changes in land use were analyzed by the forward stepwise method. The results of the analysis can be seen in Table 6. Based on the results in Table 6, there are several variables that have a very significant statistical effect with a p-level value of < 0.05 (less than 5%), namely: growth of social facilities and the extent of agricultural land in 2005. From the above Table 6, the R- *Square* (R^2) value is obtained. of 0.486. This shows that the model is only able to explain the diversity of data of 0.486. Interpretation of factors that have a very significant affects changes in land use are as follows:

Table 6. Changes in land use in the Bogor City

Land Use Change Factors	Beta	Std.Err. of beta	t (57)	p-level
Population growth	0.193	0.131	1.470	0.147
Growth of Social Facilities	0.249	0.120	-2.077	0.042
Growth of Economic Facilities	0.201	0.102	-1.967	0.054
Growth of Educational Facilities	-0.048	0.106	-0.454	0.652
Growth of Health Facilities	0.023	0.110	0.209	0.836
Village Development Index	-0.057	0.122	-0.470	0.640
Agricultural Land Allocation (ha)	0.047	0.120	0.387	0.700
Allocation of Built up Land (ha)	0.140	0.177	0.789	0.433
Agricultural Land Area 2005 (ha)	- 0.581	0.183	3.178	0.002
Area of Built up Land 2005 (ha)	0.136	0.144	-0.945	0.349
R *Square* (R^2)		0.486		

1. Growth of social facilities

The results of the regression analysis show that the growth coefficient of social facilities is negative, that is 0.249. This means that the higher the growth of social facilities, the change in agricultural land use into built-up land increases. The growth of social facilities can occur due to the increase in the number of built-up land such as settlements and industrial estates so that the construction of social facilities is increased for the convenience of the community. In this case, every one difference of the social facility growth unit increases the potential for conversion by 0.249 ha.

2. Area of Agricultural Land

Regression results show the coefficient of agricultural land area is positive with a value of 0.581. This shows that the more extensive agricultural land , the occurrence of changes in agricultural land use into built-up land is increasing. This can happen because accessibility in these locations is becoming more conducive because the surrounding land has become built up land such as settlements and industrial estates which ultimately encourage the conversion of agricultural land into built-up land. This can be caused by land demand by investors. In this case, each difference in one unit area of agricultural land increase land conversion potential of 0.581 ha.

3. Growth of economic facilities

The results of the regression indicate that the growth coefficient of economic facilities is positive [35] [36] [37] [38] [39] [40], which is equal to 0.201. Because the p-level value is close to 0.05. so that economic facilities can be declared to be factors that influence changes in land use. The growth of these economic facilities can occur due to the increase of built-up land such as trading areas, government office areas, regular settlements and irregular settlements in an area. In this case, each difference in one-unit growth in economic facilities increases the potential for land conversion by 0.201ha

4. CONCLUSION

Land use existing, consists of nine types of land use, in order from the largest to the narrowest is: mixed garden, irregular settlement, rice field, regular settlements, trading area, water body, dryland farm, open land, the area of government office area. Changes in land use in the Bogor City on mixed garden, the changing patterns of land use change into six land use, the dryland farm turns into 2 land use, open land turned into six land use and rice field turned into 6 land use. Changes in land use seen from the broad decline in the 2005-2012 period were the highest rice fields, which amounted to 4.66%, followed by mixed gardens, open land and dryland farm, while those experiencing the highest wide increase were irregular settlements of 5. 48% followed by regular settlements, trading area and government office areas. From all types of land use, land use that is consistent in accordance with space allocation of RTRW for 40.95% and inconsistent (not appropriate) of 59. 05%. Thus there are still many land uses that are not consistent with the space allocation of RTRW in the of Bogor City. The level of area development in Bogor City during the period of 2006 and 2012, the majority (42 villages / 61.8%) did not change the hierarchy of the area and a small percentage had increased hierarchy (12 villages / 17. 6%), while decreasing hierarchy of region 14 villages (20. 6%). The factors that have a very significant effect on land use change in Bogor City in 2005-2012 are the extent of agricultural land in 2005 and the growth of social facilities. In addition, economic facilities growth is also significantly effect in land use change.

5. ACKNOWLEDGEMENTS

To realize ideal land use, synchronization between spatial pattern planning of the RTRW and existing land use is needed by taking into account the carrying capacity of the

environment. Therefore, land use must be planned properly and carefully in order to provide benefits and reduce the risk of natural disasters. This study produces extensive data and allotment of land use that is dynamic or can change each year. For this reason, further research is needed to make predictions of land use for the future, for example 10 years to go or the next 20 years. In addition, the Bogor City government is advised to increase control over the conversion of agricultural land use to non-agricultural use.

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