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Optimization Of Regional Spatial Plan Implementation In Handling Of Space Utilization Of Water Resistance Area (Case Study: Water Resistance Area Of Ciamis Regency)

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ABSTRACT

This research is entitled Optimization of Regional Spatial Plan Implementation in Handling of Space Utilization of Water resistance area, Case Study: Water resistance area of Ciamis Regency. The formulation of the problem in the study are; 1) What is the typology of the potential and problems of water resistance area in Ciamis Regency; 2) How is the implementation of the function of the RTRW in handling the use of space in the water catchment area in Ciamis Regency? This research aims to optimize the application of the RTRW to realize the consistent function of water resistance area in the Ciamis Regency. The analytical methods include weighting, superimpose, and qualitative description. The results obtained: 1) in the existing conditions, land uses are unsuitable for water resistance area, such as settlements and seasonal agriculture. Existing settlements have the potential to continue to grow in line with the demands of population development which will continue to grow; 2) the ability of the area to absorb rainwater in the research location varies in potential. Likewise, the potential for settlement development in the research location has different capabilities. Ideally, the potential for settlement development is in a location with low water absorption capacity. However, the facts that occur at the research location are inconsistent. So there need to be directions to accommodate all of these potentials while still optimizing the water absorption function; 3) Local government efforts to convert all research sites into forest areas will be faced with obstacles in freeing existing settlements, converting rice fields into forests and potential developments that need to be anticipated. On this basis, the concept of **zero runoff** and **agroforestry** is expected to be a solution to accommodate the potential for settlement development and seasonal agriculture while still paying attention to the preservation of the function of water resistance area.

Keywords: Optimizing RTRW, Handling Spatial Utilization, and water resistance area.

INTRODUCTION

Based on the Ciamis Regency Spatial Plan, there is a part of the Ciamis Regency area designated as a protected area in the form of a water catchment area of approximately 9,182 (Nine thousand one hundred and eighty-two) hectares or about 6.42% of the total area of Ciamis Regency which has an area of 143,020 Ha. The water catchment area is spread over nine sub-districts out of 26 in Ciamis Regency. There are 9 sub-districts that have water resistance area in Ciamis Regency, namely Cikoneng, Cihaurbeuti, Panjalu, Lumbung, Kawali, Cipaku, Sadananya, Sindangkasih and Panumbangan sub-districts. See figures 1.1 and 1.2 below.

However, on the other hand, Ciamis Regency has the potential to continue to grow and develop. Ciamis Regency is bordered by 2 city

administration areas, namely Ciamis City and Banjar City, so Ciamis Regency is expected to be able to support the development of the 2 urban areas. Of course, Ciamis Regency will receive abundant development from the 2 urban areas. Ciamis Regency is one of the gateways to West Java Province, bordered by Central Java Province. Based on the population aspect during 2012-2016, Ciamis Regency's relatively large population growth rate of 2.34% / year.

Internally, residential areas have grown in the water catchment area, and some water resistance area in Ciamis Regency are included in urban areas. This is, of course, that existing settlements have the potential to continue to grow and develop, especially in parts that have a relatively high level of driving development. In addition, the use of undeveloped land for agricultural activities, if it is not following land conditions, can reduce or even damage the function of the area as a water catchment.

Based on these conditions, there is a need for handling efforts from the Ciamis Regency Government to optimize the sustainability of the function of the water catchment area in the Ciamis Regency at this time and as an effort to anticipate uncontrolled developments.

The formulation of the problem

The Ciamis Regency Government, through Regional Regulation (Perda) No. 15 of 2012 concerning the Regional Spatial Plan (RTRW) of Ciamis Regency in 2011-2031, stipulates that there are parts of Cikoneng, Cihaurbeuti, Panjalu, Lumbung, Kawali, Cipaku, Sadananya, Sindangkasih and Panumbangan as a water catchment area. However, the fact is that before the RTRW Regional Regulation was stipulated, there were parts of the water area that had become residential areas. Some parts of the area have become the capital of the sub-district (urban area), with residential areas that have the potential to continue to grow. This will result in the water catchment area not functioning optimally. In addition, the majority of the population working in the agricultural sector needs to be anticipated in the use of areas for agricultural activities that do not support the function of water resistance area. Based on these conditions in the water catchment area, in existing conditions, there has been a spatial conflict, and the potential for further development is in line with the potential drivers of existing development.

Research Objectives

The objective of this research is to optimize the application of the RTRW in an effort to realize the consistent function of water resistance area in Ciamis Regency.

Research Objectives

This research has the following objectives:

1. Knowing the potential and problems of water resistance area based on factors that can affect the sustainability of water resistance area by:
   a. Knowing the potential of the area's ability to absorb water.
   b. Knowing the level of potential development of villages.
   c. Knowing the potential land for the development of residential land and agricultural cultivation.
2. Knowing the distribution of potential typologies and problems in water resistance area at this time and their trends in the future.
3. Develop the basic concept of strategy preparation.
4. Develop efforts to handle the use of water catchment area space.

Benefits of Research

As an effort to control and utilize space, the preparation of programs for handling water resistance area and efforts to utilize environmentally sound water resistance area.

LITERATURE REVIEW

1. Level of Potential Water Infiltration Capability Water

A resistance area is an area that has a high ability to absorb rainwater so that it is a place to fill the earth's water (akifer) which is helpful as

a water source. Protection of water resistance area is carried out to provide sufficient space for rainwater infiltration in certain areas to provide groundwater needs and prevention, both for the subordinate area and the area concerned. The criteria for water resistance area are high rainfall, soil structure that absorbs water and geomorphological forms that can absorb rainwater on a large scale. (Decree of the President of the Republic of Indonesia, Number: 32 of 1990, concerning Management of Protected Areas).

Aspects must be considered in determining water resistance area, including slope conditions, soil types and rainfall. These three aspects and their relationship to infiltration can be seen in the table below.

Table 1. Relationship between Slope Slope and Infiltration

No	Slope (%)	Description	Infiltration	Grade
1	<8	Flat	Large	5
2	8-15	Sloping	Slightly large	4
3	15-25	Wavy	Moderate	3
4	25-40	Steep	Slightly small	2
5	>40	Very steep	Small	1

Source: Fahmi, 2016:5

Table 2. Relation of Soil Type with Infiltration

No	Soil Type	Infiltration	Entisol
1	Complex	Large	5
2	Andisol	Slightly Large	4
3	Inceptisol	Medium	3
4	Ultisol Complex	Slightly Small	2
5	Alluvial Soil	Small	1

Source: Maria, Lestiana, 2014:80

Table 3. Relationship between Rainfall and Infiltration

No.	Class	Annual Average Rainfall (mm)	Infiltration	Grade
1	I	< 2500	Small	1
2	II	2500 - 3500	Medium	2
3	III	3500 - 4500	large	3
4	IV	4500 - 5500	Large	4
5	V	>5500	Very large	5

Source: Fahmi, 2016:6

2. concept Zero run off for built-up land

Zero Delta Q Policy (ZDQP) is a policy to maintain the amount of runoff/runoff discharge so as not to increase from time to time , and increase the chance of water to infiltrate into t nah. **(Wangsa Susana, Soekarno, Dwijayanto, 2012: 2)**

3. The concept of Agroforestry

The conversion Forest land to agricultural land is realized to cause many problems such as decreased soil fertility, erosion, extinction of flora and fauna, floods, droughts and even global environmental changes. Agroforestry is one of the land management systems that may be offered to overcome the problems that arise due to the conversion of forest land to

agriculture and, simultaneously, overcome the food problem. In simple terms, agroforestry means planting trees on agricultural land. Agroforestry is a new branch of science in agriculture and forestry that tries to combine elements of plants and trees. **(Hairiah, Sardjono, Sabarudin, 2003:1)**

RESEARCH METHODOLOGY

To perform the analysis, supporting data are needed as can be seen in the table below.

Table 4. Analysis Activities, Analysis Methods and Data Required

No.	Analysis	Analysis Method	Data Required
1	Level of potential water absorption capability	● weighting ● Superimpose Map	● Soil Type Map ● Rainfall Map ● Slope map ● Village administration map ● Land Use Map
2	Level of area development potential:	● Weighting ● Superimpose Map	
	❖ Accessibility	Weighting	Map of road network function
	❖ Capability Attractiveness	Weighting	Central system map Activity
	❖ Development Capacity	Weighting	Map of distribution of built up land
3	Availability of potential space for settlement and agriculture development.	Superimpose Map	● Slope Map ● Land Cover Map
4	Distribution of Potential Typology and Problems in water resistance area s	● Superimpose Map Qualitative Descriptive	Results of previous
5	Develop assumptions/basic concepts of strategy development.	Qualitative Descriptive	
6	Develop a strategy	Qualitative Descriptive	

RESULTS AND DISCUSSION

A. Analysis of Potential and Problems of water resistance area s

1. Potential Level of Water Infiltration Capability

Assessment of the level of potential water absorption capacity using variables/parameters of rainfall, slope, soil type and existing land cover. See the table below.

Table 5. Level of Potential Water Infiltration Capacity

No	Location	Number of Score	Index Value	Area (Ha)	Distribution	Classification Potential
1	1	8	471	4,66	Cihaurbeuti	Low
2	2	9	529	55,8	Cihaurbeuti, Cikoneng, Panumbangan, Singdangkasih	Low
3	3	10	588	223,32	Cihaurbeuti, Cikoneng, Kawali, Lumbung, Panjalu, Panumbangan, Sindangkasih	Low
4	4	11	647	685,18	All	Low
5	5	12	706	1.576,58	All	Low
6	6	13	765	2145,5	All	High
7	7	14	824	2.868,28	All	Tinggi
8	8	15	882	1.152,03	All	Tinggi
9	9	16	941	333,79	All	Tinggi
10	10	17	1.000	11,92	Cihaurbeuti, Cipaku, Kawali, Lumbung, Panjalu, Panumbangan	Tinggi

Source: Analysis Results, 2020

2. Analysis of Potential Development of Cultivation Areas

The preservation of the function of water resistance area in the study area will, among other things, be influenced by the potential development of aquaculture areas. This is in line with the demands for space development needs for cultivation activities, namely the demands for settlement development in line with the population that will continue to grow. In addition, following the regional economic base in the form of agriculture, including seasonal crop farming, the need for space for the development of seasonal agriculture needs to be anticipated for its development.

a. Potential for Development of Villages

The ability to change areas or the potential for development of villages will be assessed based on accessibility, attractiveness and ability to grow. The higher the level of change in the area, the higher the threat of disturbance to the sustainability of the water catchment area. This can be seen in the table below.

Table 6. Village Development Capacity

No.	District/Village/Sub-district	Accessibility	Ability Attractiveness	Ability to Grow and Shift Agricultural Land	Total	Index Value	Classification
1	Cihaurbeuti sub-district						
	Village Cihaurbeuti	1.000	666	597	2.263	918	High
	Cijulang Village	200	333	0	533	216	Low
	Padamulya Village	800	666	354	1.820	738	High
	Village Pamolokan	800	666	419	1.885	764	Height
	Village Pasir Tamiang	800	666	447	1.913	776	Height

No.	District/Village/Sub-district	Accessibility	Ability Attractiveness	Ability to Grow and Shift Agricultural Land	Total	Index Value	Classification
	Sukahaji Village	200	333	38	571	232	Low
	Sukahurip Village	200	333	203	736	298	Low
	Sukamaju Village	200	333	369	902	366	Low
	Suka Setia Village	1.000	666	260	1.926	781	High
	Sumberjaya Village	1.000	666	610	2.276	923	High
2	Cikoneng sub-district						
	Darmacaang Village	200	333	0	533	216	Low
	Nasol Village	200	333	191	724	294	Low
3	Cipaku sub-district						
	Bangbayang Village	200	333	6	539	219	Low
	Ciakar Village	200	333	56	589	239	Low
	Cipaku Village	200	333	0	533	216	Low
	Sukawening Village	200	333	0	533	216	Low
4	Kawali Subdistrict						
	Sindangsari Village	200	333	54	587	238	Low
	Talagasari Village	200	333	0	533	216	Low
5	Lumbung sub-district						
	Village Cikupa	200	333	0	533	216	Low
	Village Lumbung	400	666	84	1.150	466	Low
	Village Rawa	400	666	60	1.126	457	Low
	Desa Sukaharja	200	333	41	574	233	Low
6	Panjalu sub-district						
	Ciomas Village	800	333	438	1.571	637	High
	Village Kerta Mandala	400	1.000	509	1.909	774	High
	Mandalare Village	400	333	267	1.000	406	Low
	Panjalu Village	800	1.000	378	2.178	883	High
	Sandingtaman Village	800	333	350	1.483	601	High
7	Panumbangan sub-district						
	Banjarangsana Village	400	333	415	1.148	466	Low
	Golat Village	800	666	1000	2.466	1000	High
	Kertaraharja Village	200	666	163	1.029	417	Low
	Village Manglayang	800	333	642	1.775	720	High

No.	District/Village/Sub-district	Accessibility	Ability Attractiveness	Ability to Grow and Shift Agricultural Land	Total	Index Value	Classification
	Panumbangan Village	800	666	537	2.003	812	High
	Payungsari Village	400	333	24	757	307	Low
	Sindangherang Village	800	666	169	1.635	663	High
	Sindang Mukti Village	200	333	138	671	272	Low
	Sukakerta Village	800	666	322	1.788	725	High
	Village Tanjung Mulya	800	666	285	1.751	710	High
8	Sadananya Subdistrict						
	Village Bendosari	200	666	0	866	351	Low
	Gunungsari Village	200	333	0	533	216	Low
	Tanjungsari Village	200	333	10	543	220	Low
9	Sindangkasih Subdistrict						
	Budiasih Village	200	333	9	542	220	Low
	Village Budihardja	200	1.000	96	1.296	526	High
	Sukamanah Village	200	1.000	165	1.365	554	High
	Sukaresik Village	200	333	12	545	221	Low

Source: Analysis Results, **2020**

a. Potential Land Suitability for Settlement Development and Seasonal Agriculture

In line with population development that will occur, it has implications for the demands for space requirements for settlement development. Suitability Potential land settlement and seasonal agriculture will be determined based on actual land use conditions and slope factors. For more details see the table below.

Table 7. Availability of Potential Space for Settlement Development and Agricultural Activities of Seasonal Crops

No	Potential Development	Area (Ha)	Distribution
1	Non Potential Land	3.552,12	All Districts
2	Existing Settlements	1.079,58	All Districts
3	Agriculture	2.153,79	All Districts
4	Potential Lands Cultivation Development	2.216,79	All Districts

Source: Analysis Results, 2020

b. Potential for Cultivation Area Development

Potential for cultivation area development is the result of an assessment by means of superimposition and weighting between aspects of potential development of villages and the availability of potential land for cultivation area development. This can be seen in the table below.

Table 8. Potential Development of Cultivation Areas

No	Potential Development	Area (Ha)	Distribution
1	Land No Potential	3.552,12	All Districts
2	Existing Settlements	1.079,58	All Districts
3	Agriculture	2.153,79	All Districts
4	High Development Potential	1.479,31	Cihaurbeuti, Panjalu , Panumbangan, Sindangkasih
5	Low Development Potential	737,48	All Districts

Source: Analysis Results, 2020

3. Potential Typology and Problems of water resistance area s

Based on the superimposed results and the weighting between the potential ability area to absorb water and the potential for regional development, at least 7 typologies were found as follows:

1. Zone 1 (No Cultivation Potential)

This zone is an area that is on a slope > 15%. In this zone, there need to be efforts to prevent landslides and improve the area's quality as a water catchment.

2. Zone 2 (Existing Settlement)

The settlement zone is a zone that is not very suitable for water resistance area that are located spread out. This zone covers an area of 1,064.04 hectares or 12.05% of the total catchment.

3. Zone 3 (Eternal Rice Field Farming)

This zone is a potential opponent of rice fields designated as Sustainable Food Agricultural Land (LP2B), spread throughout all villages/sub-district in water resistance area. Rice fields are a type of land use unsuitable for water resistance area. Overall, this zone covers an area of 2,153.52 Ha or 24.40% of the total water catchment area.

4. Zone 4 (Potential for Settlement Development and Seasonal Agriculture)

This zone is the most potential area for developing settlement and agricultural activities, namely non-residential and rice fields, on a slope of < 15%. The development of settlements in this zone must be accompanied by the requirements of settlements that can maintain sustainability as water resistance area. In addition, the development of agricultural activities does not reduce the function of the area as a catchment. Furthermore, the potential zones for the development of settlements and seasonal agriculture can at least be grouped into 4 typologies which are determined based on the ability/potential of the area to absorb rainwater with the level of area potential for the development of settlement cultivation activities and seasonal agriculture. The 4 typologies are as follows:

1. Zone 4. A is a zone of high absorption potential and a high potential for regional development. This zone is potentially critical due to the high development potential that will threaten the conversion of land into settlements in areas with high water absorption potential.
2. Zone 4. B is a zone of low absorption and high development potential. This zone is the most potential zone for settlement development because the high development potential is in areas that have low water absorption potential.
3. Zone 4. C is a zone of high absorption and low development potential. This zone is potentially critical due to the potential for conversion to seasonal agricultural land in areas with high water absorption potential.
4. Zone 4.D, which is a zone of low absorption potential and low

development potential. This zone is the most potential zone for seasonal agricultural development because the potential for low development is in areas that have low water absorption potential.

For more details see the image below.

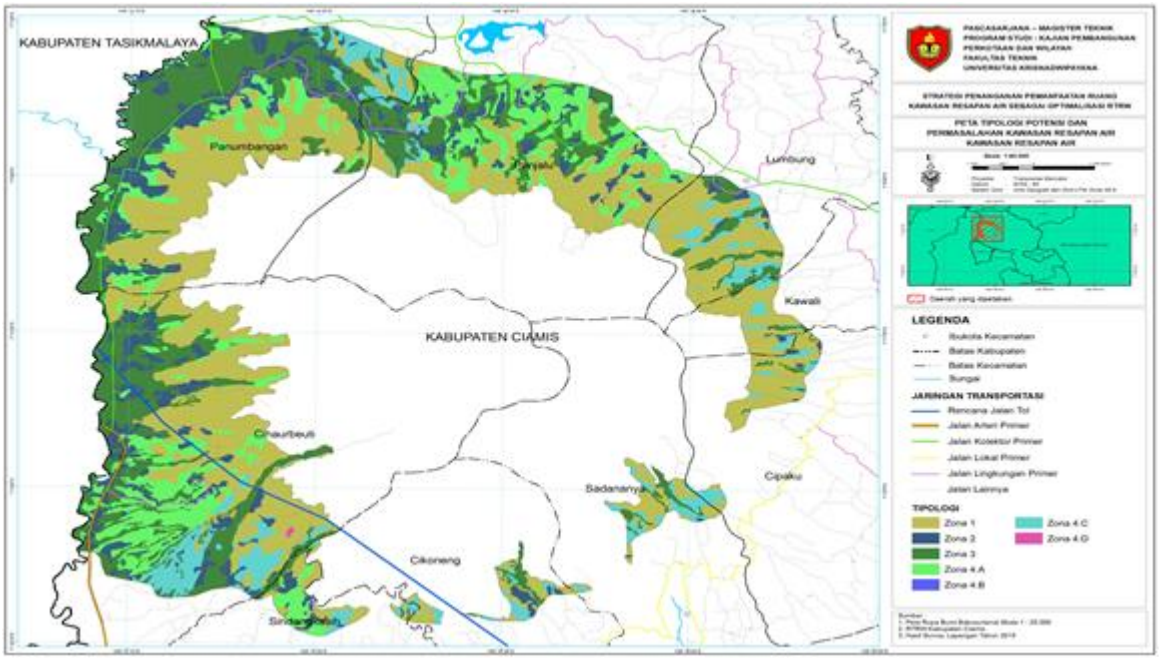

Figure 4 Typology of Potential and Problems of water resistance area s

B. Basic Concepts of Handling Spatial Utilization based on RTRW

The basic concept of formulating efforts to realize the optimization of the RTRW in the utilization of water catchment area space in the research area by accommodating existing conditions and anticipating trends in future developments while still paying attention to environmental sustainability, namely:

1. Not developing settlement cultivation activities and seasonal agriculture in areas with a slope of > 15% to maintain slope stability and at the same time preserve the function of water resistance area.
2. Continue to maintain existing settlements. This is based on the constraints of the local government's funding capacity to relocate existing settlements.
3. Continue to maintain the existing rice field farming area. This is in line with the local government's stipulating existing rice fields as Sustainable Food Agricultural Land (LP2B).
4. Develop urban and rural settlements in areas with a high level of development potential while taking into account the ability of the area to absorb rainwater.
5. Develop seasonal agriculture in areas with a relatively low level of development and pay attention to the area's ability to absorb rainwater.
6. Develop and organize settlements with the concept of zero runoff.
7. Develop and organize agricultural activities through the concept of agroforestry.

C. Handling of Space Utilization of water resistance area s as Optimizing the Implementation of the RTRW of Ciamis Regency

Based on the basic concept of developing catchment areas, the efforts to handle the utilization of space utilization of water resistance area are proposed as follows:

1. Preservation of Areas

Conservation of areas is carried out by maintaining plantation land and forest plants in sloping areas > 15% (some zone 1) to maintain slope stability and the area's ability to absorb rainwater.

1. Area

Improvements to the area are carried out in the following ways:

1. Replacing seasonal crops with forest plants in areas with a slope of > 15% (some zone 1) to maintain slope stability and increase the area's ability to absorb rainwater.
2. Developing infiltration wells through government assistance in existing residential areas to realize the zero runoff concept. This effort is directed at the Typology-2 Zone, namely at the location of settlements that have grown in water resistance area. Overall this zone has an area of about 1,064.04 hectares spread across water resistance area, especially in urban areas.
3. According to the Agroforestry concept, developing forest plants in an integrated manner in the existing rice field farming area. This is done in the typology of zone 3.

1. stipulation of Provisions for Zero Run-Off Strict

This effort is directed at the typology of Zone 4A, namely the zone of high absorption potential and a high potential for development of the area. Effort Based consideration of settlement development is directed at parts of the area that have high development potential. However, on the other hand, the exact location is an area with a high level of rainwater infiltration capability. To continue to pay attention to the preservation of the function of water resistance area, the development of settlements is accompanied by a strict application of the zero runoff concept, namely that all components of the residential space are not allowed to result in increased water flow into the drainage system or rivers. The components of the space include residential houses, facilities, road networks, and utility networks.

More specifically, the zero runoff provisions that can be applied are as follows:

1. Obligation to provide infiltration wells in each building plot to apply all rainwater to groundwater in each building plot.
2. Mandatory biopore infiltration holes to further optimize rainwater that seeps into the ground. This facility is placed in parts of the built-up land where infiltration wells do not reach surface water runoff.
3. Mandatory use of materials that readily absorb rainwater
4. Mandatory environmentally friendly septic tanks strictly.
5. Required to provide reservoirs/infiltration ponds so that rainwater that falls in the area is absorbed optimally.

2. The determination as a Priority for Settlement Development

This effort is directed at the typology of Zone 4B, namely a zone of low absorption and high development potential. This typology is the most suitable condition for the development of settlements. Namely, the development of settlements is directed at parts of the area that have high development potential and have relatively low ability to absorb rainwater. However, to preserve the function of the area as a water catchment, the development of settlements is accompanied by the application of the concept of zero runoff not strictly, i.e. only some components of the residential space are not allowed to result in increased water flow into the drainage system and rivers. The components of the space include residential houses, facilities and utility networks. Meanwhile, the road network and reservoirs/infiltration ponds are not mandatory. Rural settlement communities usually have the

relatively low economic capacity, so this is not too burdensome for rural people.

3. Development of Integrated Seasonal Agriculture for Forest Crops

The agricultural sector is the base sector for Ciamis Regency and particularly water resistance area. Agricultural activities not following water resistance area can reduce the function of water resistance area. On the other hand, agricultural activities that interest residents often do not support the function of water resistance area. Ideally, the water catchment area is entirely forest area. One alternative solution is agroforestry, namely planting annual woody plants (trees) and crops/seasonal crops on the same land for farmers in water resistance area. This will increase the function of the water catchment area and the farmers' income. So that agricultural activities in water resistance area have high and profitable marketing opportunities for the community, they are directed to choose superior commodities.

This effort is directed at the typology of Zone 4C, namely the Zone of High Infiltration Potential and Low Development Potential. This area has a low level of development, so it is more suitable for developing agricultural activities than residential ones. However, to preserve the function of the area as a water catchment, the development of seasonal agriculture is accompanied by the application of the concept of agroforestry. Following the high absorption potential, the development of seasonal plants is integrated with the most suitable plant species for water resistance area, namely forest plants.

4. Development of Integrated Seasonal Agriculture for Plantation Crops

This effort is directed at the typology of Zone 4D, namely the Low Infiltration Potential Zone and Low Development Potential. Agriculture compared to residential areas. In addition, this area has a low absorption rate, making it most suitable for developing seasonal agricultural activities. However, to preserve the function of the area as a water catchment, the development of seasonal agriculture is accompanied by the application of the concept of agroforestry. Following the relatively low water absorption potential, tolerance is allowed to develop seasonal agriculture in an integrated manner with plantation crops (not necessarily with forest plants).

For more details see the image below.

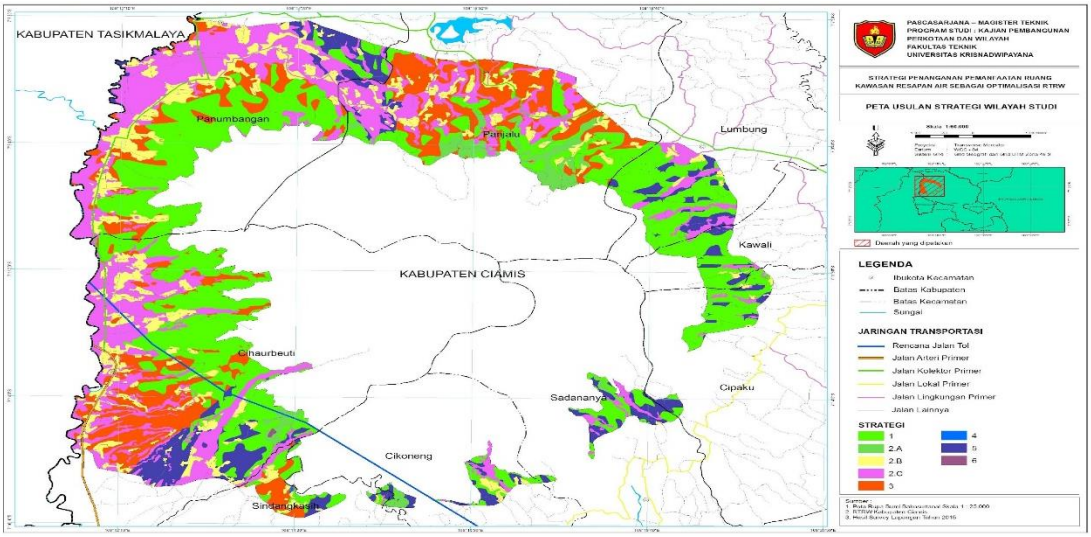

Figure 5. Proposed Handling

CONCLUSION

In the existing condition, land uses are unsuitable for water resistance area, such as settlements and seasonal agriculture. The

existing settlements have the potential to continue to grow in line with the development of the population, which will continue to grow. Likewise, seasonal agriculture needs to be anticipated for its spatial development. The area's ability to absorb rainwater has different potential. Likewise, the potential for settlement development has different capabilities. Ideally, the potential for settlement development is in a location with low water absorption capacity. However, there is an inconsistency, so there needs to be a direction to accommodate all these potentials and still optimize water absorption function. The local government's efforts to make the most of the forest area are faced with obstacles to freeing existing settlements, converting rice fields into forests and the potential for development of settlements that need to be anticipated. On this basis, the concept of developing **zero run-off settlements and agroforestry** is expected to be a solution to accommodate the potential for settlement development and seasonal agriculture while still paying attention to the preservation of the function of water resistance area as stipulated in the Ciamis Regency Spatial Plan.

RECOMMENDATIONS

There are critical locations that are a priority to be handled by the government of Ciamis Regency. The ability to finance development in Ciamis Regency is relatively limited, including implementing programs for handling water resistance area, such as making infiltration wells and biopori. The form of agroforestry activities is directed at rice fields with high water absorption potential in all sub-districts covering an area of 1,895.25 hectares. In addition, it is proposed a revision of the RTRW of Ciamis Regency in the delineation of urban and rural settlements following the proposed handling efforts by taking into account the level of potential development of the area and the potential for water absorption in the area.

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