

## DEVELOPMENT OF THE CONSERVATIVE VILLAGE MODEL IN THE UPSTREAM BRANTAS RIVER

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**ABSTRACT:** Water spring (WS) conservation in the upstream area of Brantas River is intended to protect the potency of the main water spring in East Java Province that is being threatened. The threat occurred is caused by a lot of dry water springs, the lowering of river discharge in the dry season, the dam shallowness leading to the flood and the lack of water. Although the conservative activity has involved many agencies, a non-profit organization, local people and the higher education, the achievement rate is still low. The partial activities in the form of the pilot project, in the end, give priority to togetherness that is the establishment of village conservation. The variety of conservative village has been developed by many agencies in accord with the goal and its concept. For the recent time, the conservative village which has been established does not have any capability to take the roll as the pilot that led to the spirit of the other village society conservation. The physical condition variety of the river stream area and social society in upstream Brantas River influence the condition of the conservative village. Therefore, the research is done the research to find the formulation of conservative village condition in upstream Brantas which is conditioned to establish the conservative culture as the implementation of daily activity part. The evaluation result of middle-term village development planning by comparing the conservative need from the analysis shows that conservation has not become the important issue. Therefore it is suggested a regulation to compose village RPJM in order to pay attention to the rules of water spring resources conservation. Thus, composed village RPJM, if it is implemented, will improve the flow coefficient value without decreasing the importance of the other sector development.

*Keywords: upstream area of Brantas River, conservative village, the new model*

### 1.INTRODUCTION

Conservation is an important part of water resource management activities [1], which to date has been done in various forms of effort. In the upstream region of the Brantas River, conservation efforts carried out in the form of a combination of vegetative methods, mechanical, and constructive [2]-[3]. Efforts partial activity in the form of a pilot project eventually improved with more effort of togetherness, namely the establishment of the conservation village. Various models of the conservation village (MDK) have been developed by various agencies, in accordance with the purpose and concept. Until now, conservation village which has been formed yet is able to act as a pilot that could lead to the spirit of conservation of other villagers. Various forms of the conservation village have been developed by various agencies, in accordance with the purpose and concept. Variations of physical conditions and social communities in the

watershed upstream of the Brantas River would greatly affect the shape of the corresponding conservation village. Therefore, this research aims to find a formulation in the form of Brantas upstream watershed conservation, the village has a culture that “conservation is a part of day-to-day activities “. Research activities require a period of 3 years: the 1<sup>st</sup> year is a sorting the sampling of villages that will be developed as MDK, 2<sup>nd</sup> year is a preparation stage in the development of programs and MDK activities, while the 3<sup>rd</sup> year is the socialization and dissemination of results.

The flood disaster in Indonesia has continued to increase, both the frequency of occurrence and the damage [4]-[6]. This reflects the destruction of the environment (vegetation) on the majority of the watershed (DAS) [7]-[9] and seemed to illustrate that control efforts remained unsuccessful. Various conservation efforts have been made, either by vegetative methods, mechanical, and constructive. Efforts to engage the public in conservation activities have been

carried out starting from mass communal work, and eventually developed the concept of the conservation village. Variation problems in the field resulted in each location has its own potential and needs, so that the necessary MDK appropriate. As a model village in the upper Brantas watershed conservation by the Central River Region (BBWS) Brantas has been initiated since its formation, Tlekung Village which is administratively located in the District Junrejo, Batu. However, the future development, until now there has been a lot of other villages where people are driven to follow. Thus it can be considered that Tlekung as MDK in the Upper Brantas River has not managed to effectively serve as a model, so it is necessary to develop models of other conservation village.

The problems of the Study that is identified are formulated as follows: 1) Which is the elected village that is developed as a model?; and 2) How is the conservation need analysis of the natural water spring done?

## **2. MATERIALS AND METHODS**

### **2.1 Theoretical Review**

The Ministry of Forestry [5] provides an alternative use of the model in the analysis of soil conditions, namely: a model with a review of erosion potential (TBE) and the ability to absorb rainwater review (Infiltration) [6]. Models with suitable infiltration orientation if there is happening flood and drought [10]-[11], whereas if the model fits TBE if problems occurred are erosion and sedimentation. Watershed Management Agency (BPDAS) East Java using TBE model for analyzing the condition of the land in the Brantas river (BBWS Brantas, 2013). The selection of these methods needs to be careful, since if the problems in the management of natural resources in the form of floods, generally also accompanied by sedimentation problems. Comparing the results of the analysis of the two methods would tend to be not the same, given the TBE model is strongly influenced by the soil substance thickness and vice versa.

### **2.2 Land Suitability and Selection of Plant**

Land suitability analysis can be performed based on the terms and conditions of land to grow crops, and hydrological. Thus, in an area, it is possible there are several types of plants suitable for planting. Selection of plant species can be done with some consideration, hydrological, economic, cultural, and beauty. The selection is based on hydrological indicators of the ability to

use the plant canopy interception of rainwater. The economy analysis uses indicators of productivity and the potential market for agricultural cultivation. Culture analysis, customs, and identity associated with the region (name of the village, sub-district). While beauty analysis, associated with the ability of plants to create an attractive impression, either individually or in groups of plants.

### **2.3 Conservation Village Model (MDK)**

The Ministry of Forestry , Directorate General of Forest Protection and Nature Conservation since 2007 , in collaboration with the Environmental Services Program ( ESP ), which is funded from the U.S. Agency for International Development ( USAID ) , developed a conservation village in 16 conservation areas in West Java , Central Java / Yogyakarta , East Java , Aceh and North Sumatra .

Most of the conservation village is located in the upstream region of the watershed. Therefore, the development of village conservation model is one approach to achieve integrated the spring management, in order to support forest governance and better conservation. The village is a conservation initiative that participatory conservation efforts. This initiative is very important and relevant to the condition of conservation areas in Indonesia.

The concept of empowerment is believed to be the most effective way to bring the community together continued sustainable development. Then BBWS Brantas River makes the MDK concepts with emphasis on public education. To pursue it, BBWS Brantas River has made a variety of community development programs in the region upstream precisely in Batu and Malang Regency, and make Tlekung Village, Batu as MDK.

### **2.4 Methods**

This research produces three conservative village models: (1) Sumber brants village, representative of the village that has the majority of agricultural culture area in conservative area, (2) Bumiaji village, representative of the village that has majority area for agriculture cultivation in agriculture area, (3) Sisir district, and representative of the village with the majority of treading area and village tourism object.

The study was conducted in three stages: the pilot stage of village elections are used as a model, model development, and testing and dissemination of results. In the selection process of the village, the whole village in Batu grouped based on profession and work location characteristics of the population. Each group

selected represents the villages. MDK development carried out through the following steps: 1) Selection of villages to be developed as a model; 2) Procurement Data RPJM Des and physical characteristics of the data fields of the selected villages; 3) Batu's Government procurement policy information and Conservation Plan BP DAS; 4) Analysis of the critical condition of the land and environmental sanitation; 5) Analysis of land conservation needs and sanitation systems; 6) RPJM evaluation comparing DES programs that had been developed with the needs of conservation and sanitation; 7) Revised Development Plan Des, conducted jointly with the community orientation that all activities in accordance with the principles of conservation; and 8) Testing the model by applying the method MDK development in other villages, to get a repair material.

### **3.RESULTS AND DISCUSSION**

#### **3.1 Village election as a model**

The entire village / urban are grouped based on the type of economic activity and activity locations, and selected representatives of each, Sumber Brantas, Bumiaji Village, and the Sisir Village. Sumber Brantas as Conservation Village Model Type I represent villages with a majority of agricultural cropland in conservation areas. Bumiaji village as a Conservation Village Model Type II represents the village with the majority of the area of land for agricultural cultivation in the agricultural area. Sisir village as a Conservation Village Model Type III represents the majority of the village with a regional trade area and tourist village.

#### **3.2 Identification Model Land Condition**

Land conservation is an activity that is not easy to do because it requires a relatively long time and involves the community. This activity becomes expensive if the area of land conservation should be relatively large. Therefore, it is necessary to determine the exact location. The locations are selected based on the condition of the land, which can identify based on the physical condition of the land, rain, and use.

Several models of identification field conditions have been developed, there are: Model Identification of Land Condition indicators of the magnitude of the land 's ability to absorb water rain ( hereinafter referred to as Land Capability Model Rain absorb water ) and a model with an indicator of erosion potential ( hereinafter referred Land Erosion Hazard Rate Model ) . In practice,

the watershed management programs are generally used models of Land Erosion potential.

The use of these two models to the conservation of water resources according to the author is not appropriate, given the indicators of success in the management of natural resources is not only the success of flood control but also how long it can last major building functions. Because of the need for the development of a model to identify the condition of the land, so it can improve the accuracy of use of an existing model.

In the Land Capability Model absorb rainwater, the paradigm used is the greater degree of infiltration, the smaller the surface runs off, so the flood discharge is reduced and vice versa basic flow increases. Thus, this model is very suitable to be applied if the issues raised are only fluctuations in the debt of the river.

Determination of potential erosion in the potential land erosion model uses the parameters erosion that occurs on the land surface and the thickness of the soil substance. The paradigm used is that the erosion of the land soil substance the thinner the layer of soil if the soil will be more easily depleted. Thus, this model is actually more suitable if relates to agricultural cultivation, but if it is associated with efforts to maintain the function of the reservoir bin, then it is less precise models. This is because the land surface erosion on soil substance thicker it will be more dangerous because if not treated immediately will make danger the reservoir catchment conditions. The model should be developed using the paradigm that: 1) The higher ability to absorb rainwater land the river flow fluctuations will be lower, so that the Natural Resources is getting easier to use; and 2) The greater amount of sediment produced an area the faster the reservoir cannot function, so that the more difficult the use of the Natural Resources.

Therefore, these two developed a model to identify the condition of the land with the following strategies: 1) Modifying Model Land Erosion potential hereinafter called Model Land Erosion potential modifications; and 2) Merging Models of Land Erosion potential modifications to the Land Capability Model Rain absorb water, hereinafter referred the Model Identification Land Condition of Natural Resources Management.

#### **3.3 Conservation Village Model**

Conservation Village Model development is done by way of 1) Knowing the boundaries of the village, with the source of RBI maps of Indonesia (RBI) or the Regional District Maps; 2) Identifying the condition of the land, the land of identification models with natural resources management review; 3) Identifying environmental



Fig. 1. The Land Condition Map Overview Management of Natural Resources [12]

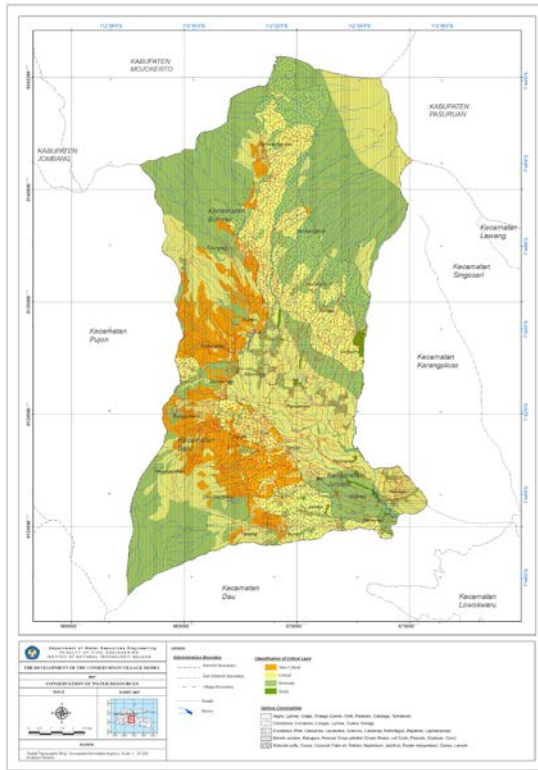


Fig.2. Vegetative Conservative Needs Map of Batu City

If at a site proposed for other types of crops planted, it can be selected in accordance with the terms matching and growth. With vegetative conservation, it will reduce flooding because plants can reduce surface runoff when it rains. Fixes the quantity and quality of groundwater will take place in the process that can increase the amount of absorbing water into the soil. Erosion and landslides reduced by the presence of land cover by canopy vegetation, and soil reinforcement by roots of plants.

### 3.5 Mechanical Conservation Needs

Mechanical methods of land conservation are all mechanical physical treatment given to the land and building construction aimed to reduce surface runoff discharge and its effects and to improve land capability class. Mechanical application of conservation techniques will be more effective and efficient when combined with vegetative conservation techniques such as the use of grass or legume crop terraces amplifier, and the use of mulch or planting pattern of arrangement.

The mechanical action is in the form of setting the slope and direction of flow of surface runoff, with terracing and road drainage. Type

patio that is commonly used in Indonesia is bench terraces, line porch, patio gardens, terraces, and patios for individual credit. Making aims to accommodate drainage and surface runoff water flowing safely until it reaches a river or other receiver system.

Bench terrace and Ridge terrace are suitable for use on land with a slope that is slightly sloping, while the individual terraces sideways used on steep land. Legislation in Indonesia restricts land is worth waking up the natural slopes of less than 40 %. Therefore, the type is a relatively much developed on agricultural land in Indonesia is Bench terrace and Ridge terrace.

Based on analysis of the condition of the land, the total land area of critical and very critical in Batu is about 10309.63 ha or 51.8 % of the total area of Batu. The total land area of critical and very critical of the 31.27 % should be made terrace flat bench, incline bench terraces 18.19 % into, 29.62 % contour terraces sloping mounds and mounds 20.92 % terraces sloping towards the contour < 1 % towards the drain.

### 3.6 Constructive Conservation Needs

Constructive methods can be done with two options, namely: the creation of absorption wells, and infiltration ponds. In the area of the flat has topography settlements recharge wells that can be selected, otherwise the upstream region of the hilly catchment ponds suitable if it is used. This alternative is the top choice which is not possible when the vegetative method has been referred to the region which must be maintained, for example as an open area as the area of the farm.

### 3.7 Infiltration wells

Construction of recharge wells is made to accommodate and absorb rainwater into the ground. The dimensions of the well depend on several factors, among others, as follows: 1) Surface Area Closure: the surface area of the land that the closure will be accommodated in the good water catchment, covering roof area, parking lot and other pavement; 2) Characteristics of Rain: characteristics include rainfall intensity rain, long rain, rain interval. The higher the rainfall intensity, the longer the duration rainfall infiltration wells require volume growing; 3) Soil Permeability Coefficient: the coefficient of permeability of the soil is the soil's ability to pass water per unit time. Sandy soil has a higher permeability coefficient than clay soil; and 4) High ground water level: on the ground with the water level in the recharge wells need to be made as much as possible to raise the water table.

### 3.8 Infiltration ponds

Infiltration ponds are the river made building which serves to accommodate the rain water and river flow absorbed into the soil. The building is a small reservoir which was built by damming a river or make a pit soil.

The intercepted water in the reservoir accidentally absorbed into the ground, hoping to be harvested in the river flow downstream during the period of water shortage. Thus, not only accommodate infiltration ponds of water on the surface but also in the subsurface as groundwater reserves.

### 3.9 Evaluation RPJM Des

Evaluation of the program set out in the Development Plan Des from each village was done by comparing the results of the analysis of the conservation needs of the work plan contained in the document RPJM December The process and results of the evaluation are as follows: based RPJMDes evaluation of each village were selected as conservation village, can display summary values as follows:

Table 1 Recapitulation value RPJM Des

No	Village	Aspect	Value *)	Mean
1	Bumiaji	Physical	18	24.5
		Economy	31	
2	Sisir	Infrastructure	24	24
		Sociocultural	24	
3	Sumber Brantas	Physical	10	28
		Economy	18	

In summary tabulation of the values seen that in the preparation of Development Plan in December still have not noticed the need of conservation of water resources, resulting in the guidebook and implementation assistance in December RPJM required special attention from conservation-related activities and community empowerment. Repair RPJM DES 3 villages have been suggested the addition of programs as follows: 1) Planting ornamental plants in pots on the shoulder of the road or next to pedestrian facilities; 2) Making drains system and recharge wells; 3) Making Septic tank communal settlements around the Brantas River, and 4) Cultivation of ornamental plants and vegetables in the yard area.

### 4.CONCLUSION

Based on the analysis of data and discussion related to the development of a model village in the upstream watershed conservation Brantas , which represented Bumiaji Village , Sisir Village , and the Sumber brants Village we can conclude the following: 1) All villages and villages in the area of Batu have had a Medium Term Development Plan, with the format specified by the Batu City. In the preparation of the program was based on the results of self-evaluation by the method of SWOT. However, in the preparation of passage program strategy has not forced of issues related to community empowerment environment in land conservation and environmental sanitation; 2) In this study it has been found criticality analysis model and a model village land conservation, and applied to the three villages which are used for model development; and 3) The results of the development of the model need to be tested by applying the other villages, to have some input into perfecting.

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