

Using Participatory GIS to Identified Local Landuse Zoning for Conservation in Merauke District, Papua, Indonesia¹

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Abstract

GIS application for planning in Indonesia developed based on several legal laws. In every district level in Indonesia, we can find a government body call BAPPEDA, which develop strategic planning and spatial planning for development. In planning issue, one of most interest is develop zoning, which consist two main criteria; developing zone and conservation zone. It is interest to compare between result in zoning system between government planning formal, NGO for conservation planning and community it self.

GIS as tools for planning process already use as most important aspect to develop zoning system. This research using GIS to compare between zoning developed by government planning, high value forest planning and community planning. Government planning in Indonesia written in document named RTRW/Rencana Tata Ruang Wilayah in national, provincial and district level. In my research, I tried to review RTRW from Papua Province and Merauke District. NGO planning for conservation are various in Indonesia, several international NGO such as WWF, Conservation International, TNC and many other develop and applied several approach, in my research I tried to used High Conservation Value Forest approach which develop by WWF and applied in Merauke. For community planning I did my own research under WWF Indonesia assistance, I was using PRA approach combined with GIS tools to develop how community develops their own zoning system. For this research, I was visited 9 villages in 3 major watersheds in Merauke. This area belongs to local community named Marind Tribe. This tribe is biggest tribe in Southern Papua-Indonesia.

This research using GIS Participatory to introduce area for community, also ask community sketch map base on their own mental maps knowledge. As result from this research was develop community zoning based on Marind Tribe community which develop their own important area for conservation: river and riverside area, river swamp, riparian forest, forest at least 20 km from village centre.

This research used overlapping methods to compare between three zoning and found several facts; some area covered as conservation based on 3 planning approach, some area declared as important area for conservation but not include as important area from government point of view, important area for conservation based on community participation approach usually not protected.

Several recommendation come out from this research; first- many area which is important from conservation are missed in government planning system, this area covered forest along river, forest along northern part which important as water supply for 3 main river in Merauke, second- area within community activities need detail zoning, this facts is important because local community activities based on how their river, swamp and forest are protected from degradation and pollution, third- area for conservation and mixed used area should have buffer zone which used sustainability approach to maintain. Important facts from this research

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is GIS Participation which combine participatory and GIS techniques be able to identified this area more accurate to find better zoning for development zone and conservation zone.

Keywords: Indonesia, Papua, Merauke, Marind Tribe, Participatory Planning

Introduction

Reformation era after 1998 Indonesia politics become more open with new approach, which encourage participation for all sector. One of most moving fast is participation approach, this approach specially used for development context whether planning or implementation.

It is interesting to compare how government planning board through Regional Planning Document, conservation planning using HCVF (high conservation value forest) and community defined landuse zoning for conservation. To achieve this goals research was conduct in Merauke District, Papua Province, Indonesia, steps in this research start with reviewing District Merauke Regional Planning Document, HCVF Document that released by WWF Indonesia and combined with Participatory Research Conducted by the author in 9 villages in Merauke.

Using GIS as tools, several gap areas for conservation had identified and the result shown that several area which is important for conservation was miss conserve. Most of the area was belongs to local tribe Marind which spread along tree major watershed Maro river, Bian river and Kumbe river.

Participatory GIS in Indonesia

Participatory approach introduced by several organizations in Indonesia, this approach implemented in early 1990 and since that become more popular by among NGO in Indonesia. This approach used by several organization for example Jaringan Kerja Pemetaan Partisipatif/ Indonesia Participatory Mapping Network (this network have more than 50 member in Indonesia), WWF Indonesia, PPSDAK, Buana Katulistiwa, many other NGO.

Almost all organization in Indonesia using Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA) as based tools for participatory approach in Indonesia. Since mid 1990 era, Geographic Information System (GIS) become popular in Indonesia many application in various sector which connected to spatial data use GIS as tools.

A GIS is mapping software that links information about where things are with information about what things are like. Unlike a paper map, where "what you see is what you get", a GIS map can combine many layers of information (ESRI, 2003). A GIS is a computer system capable of capturing, storing, analyzing, and displaying geographically referenced information; that is, data identified according to location. Practitioners also define a GIS as including the procedures, operating personnel, and spatial data that go into the system (USGS). The development of using GIS in Indonesia seems similar with Goodchild statement about GIS in others country "The GIS community also include specialist in various field; local government officials, urban and regional planner, land records coordinator, oil and gas industry..." Goodchild, et. all (1993).

Term Participatory GIS as an approach, which combine participatory approach, and GIS (www.iapad.org), in Indonesia this approach develop from only using paper-based map for

tools participatory mapping to digitize and used satellite image. In 1996 several NGO in Indonesia use PRA and produce several sketch map, to identified area several NGO staff used handheld GPS (Global Positioning System). In 1998 several NGO tried to using GIS and digitize all community mapping result into GIS. After 2000 several NGO started to using satellite NGO, for example in 2002 local NGO named ptPPMA, WWF, DFID combine sketch map, paper base topographic maps, Landsat 7etm and IKONOS for participatory mapping in Jayapura-Indonesia.

Area of Study

This study covered three major rivers in Merauke District, Papua Province, Indonesia. These rivers Bian , Kumbe and Maro are water supply for all population in Merauke District. Most of this area traditionally belongs to Marind people. Marind is one of Melanesian indigenous people who’s settle in Merauke before Papua founded by Dutch and join Indonesia in 1967. Figure 1 shown area of study and including locality of Merauke in maps of Papua Province, Indonesia.

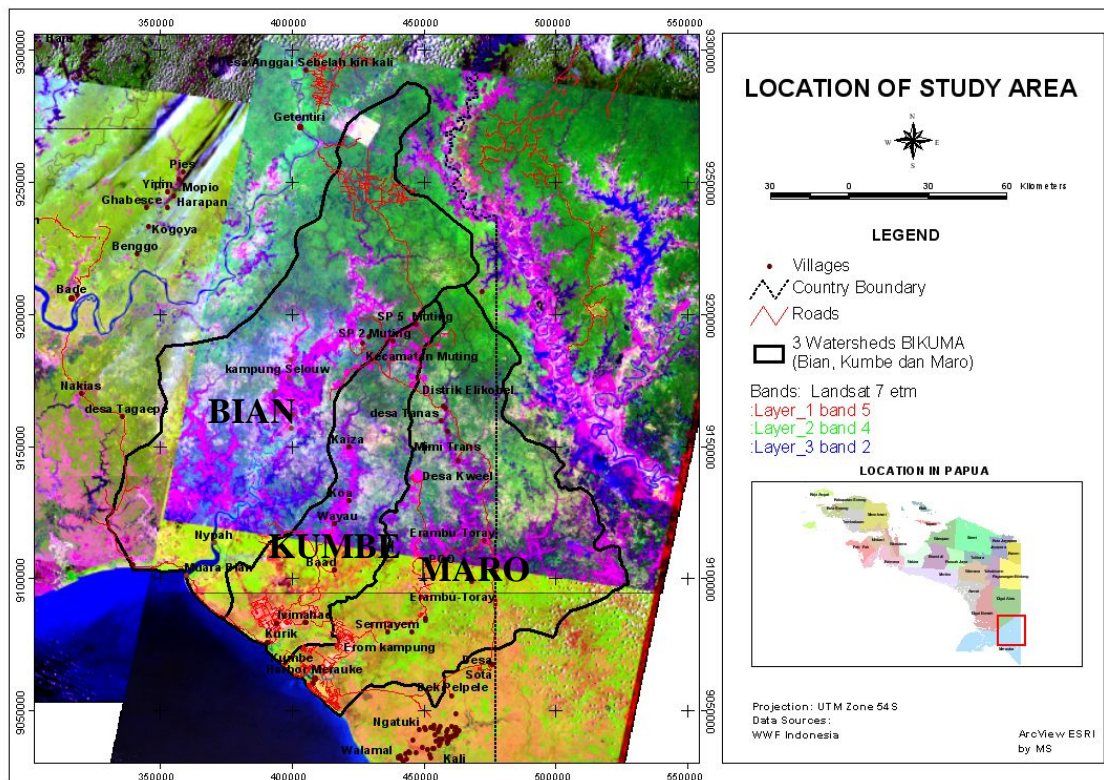


Figure 1: Polygons in black outline shown 3 major watersheds in Merauke

Methodology and Facts

Main goal of this study is find out gaps and difference three models of landuse planning for conservation. This study takes in place five steps as described below:

Step1 : Review Merauke District Regional Planning Document

Merauke is in southern part of Papua Province Indonesia, this area most eastern part of Indonesia and close to Papua New Guinea in east, Arafura Sea in south, Lorentz National Park in west part and Central Range Mountain in north. Merauke District represent southern part of New Guinea island region. This area covered by mangrove, savannah, swamp forest, monsoon forest, lowland forest and river floodplain. Based on District Regional Planning Document (RTRW), several areas already protected such as Wasur national park, Bian wildlife sanctuary, Kimam Island wildlife sanctuary and Bupul nature reserve. Some of important area not yet protected like lowland forest, some part of monsoon forest and riparian forest along 3 major rivers in Merauke.

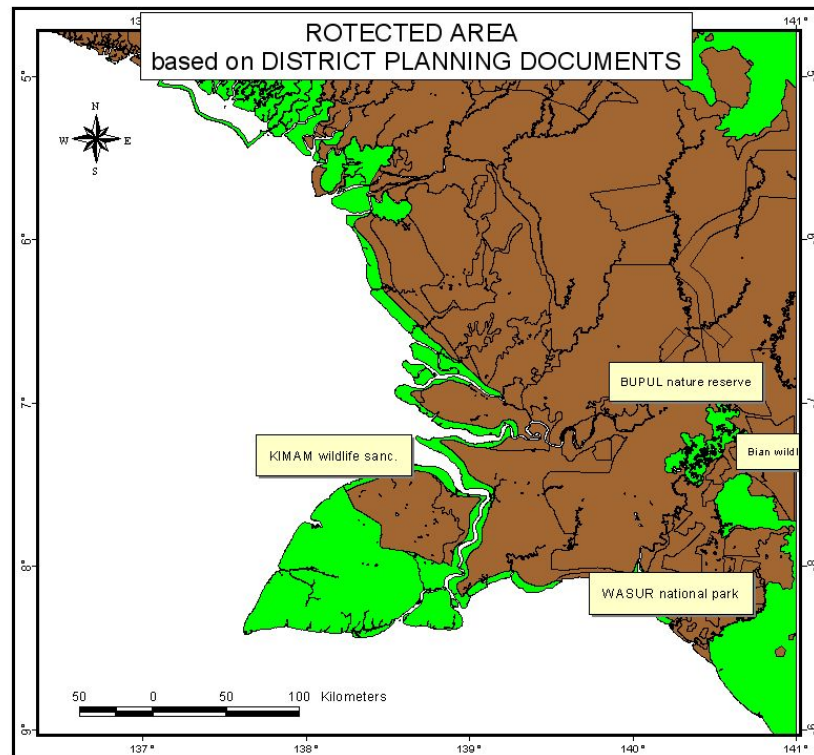


Figure 2: Protected Area based on Merauke Regional Planning Document.

Step2 : Review HCVF documents from WWF and important area for conservation

The Forest Stewardship Council (FSC) developed high Conservation Value Forest (HCVF) (HCVF) concept in 1999. The concept has subsequently received high interest for its use both within the FSC system and more widely. This rapid uptake reflects the elegance of the concept, which moved the debate away from definitions of particular forest types (e.g. primary, old growth) or methods of timber harvesting (e.g. industrial logging) to focus instead on the values that make a forest important.

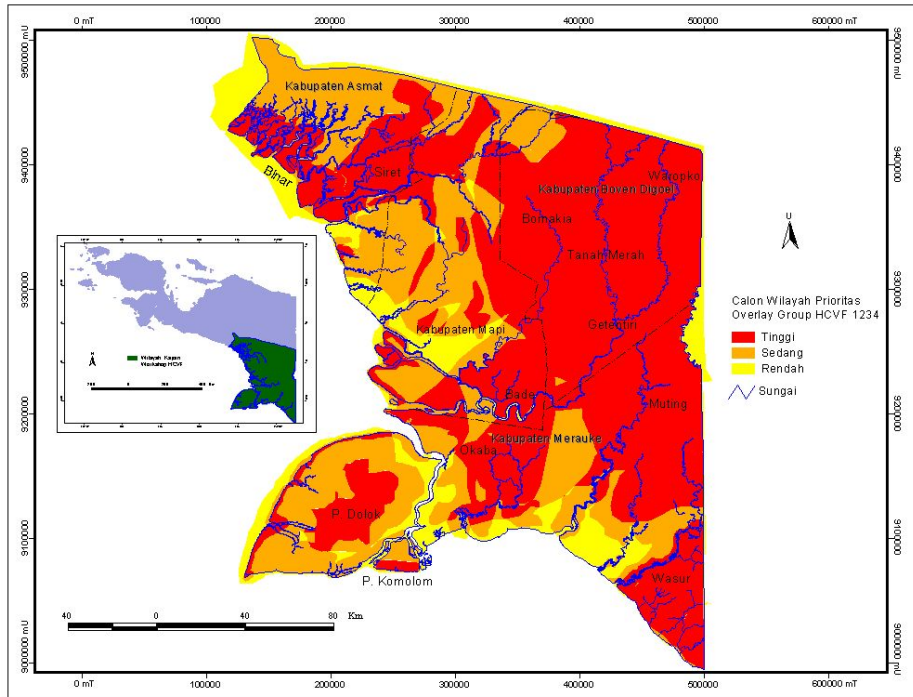


Figure 3: Priority Area based on HCVF approach (red are important areas for conservation)

This area defined by 1-4 categories from 6 categories for full assessment:

HCV1 Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia).

HCV2 Forest areas containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.

HCV3 Forest areas that are in or contain rare, threatened or endangered ecosystems.

HCV4 Forest areas that provide basic services of nature in critical situations (e.g. watershed protection, erosion control).

HCV5 Forest areas fundamental to meeting basic needs of local communities (e.g. subsistence, health).

HCV6 Forest areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in co-operation with such local communities).

Step 3: Conduct community mapping in 3 places

There are two important activities; community mapping and field survey including GPS point gathering. Community mapping conducted in 3 places: Wayau village, Bupul village and Boha village, in every places 2 nearest villages invited to join, all 9 villages covered with this

activity. These 9 villages dominated by Marind people, they all have same language, history and share 3 major river for living. Some of them are farmer, which already knew how to cultivate; some of them still gain resource from nature.

To get landuse zone a community workshop conducted in every places. Landuse zone draw by local community in a sketch map based on local knowledge. During workshop also had discussion, about local importance for each traditional landuse drawn in sketch map.



Figure 4: Community in Boha villages draw sketch map

Based on how community develop their maps by sketch, we could see that their start with river, which is most important part of their liver. After that community, usually draw watershed area, various type of forest and important area highlighted by their own symbols.

Figure 5 will shown one of tree ketch maps, this sketch map drawn all by community and shown their local knowledge connecting to landuse zone and their interaction with nature.



Figure 5: Sketch map all done by community and described traditional landuse

Beside workshop, facilitator and community define important area in topographic maps and Landsat maps which brought by facilitator. This Landsat images printed in A0 paper size, of course facilitator should describe every feature and

Summary of important area for conservation zone from sketch maps and discussion listed below:

1. Traditional Conservation Zone
These areas are important area to conserve by community traditional including river, water resources, swamp, riparian forest and sago forest.
2. Cultural Conservation Zone
Important area for conservation including heritage area, sacred place and sacred forest. This area usually connecting with local community histories or important area for Marind Tribe traditional occasion.

Abeley (1993) described that eye memory are based for important mapping system in Aborigin mapping. This also happen in Marind people, they explore their own area around 20 km from village, with this know ledged they can draw all important area and landuse based on their own needs.

Step 4 : Spatial data development.

After field data collection using participatory approach, next steps develop important area for conservation based on community knowledge. This steps combine participatory approach with GIS process using ArcView™ and Image Analysis™ . All important area for conservation based on community sketch maps, manual plot in paper based into Landsat 7 etm digital format. This process start with identified land cover using band 5,4,2 to shown natural coverage of all area.

Secondary data also collected from government and WWF. Papua Province and Merauke District Planning Document collected from government. HCVF Planning Document collected from WWF Indonesia Merauke office. Some of the data already in ArcView shape file and others data in paper based maps digitized using ArcView.

Step 5 : GAP area for Conservation

GIS analysis conducted to determine areas where not conserve and need further action to develop conservation plan. Analysis conducted by combine into GIS system three zoning system by government, HCVF and community presented several area where not conserved in northern part of area of study.

Beside northern part also several areas like Monsoon forest, riparian forest were not protected by Government Planning Document. Based HCVF approach which really interest to conserve lowland forest in northern part, scattered area like riparian forest are important for community.

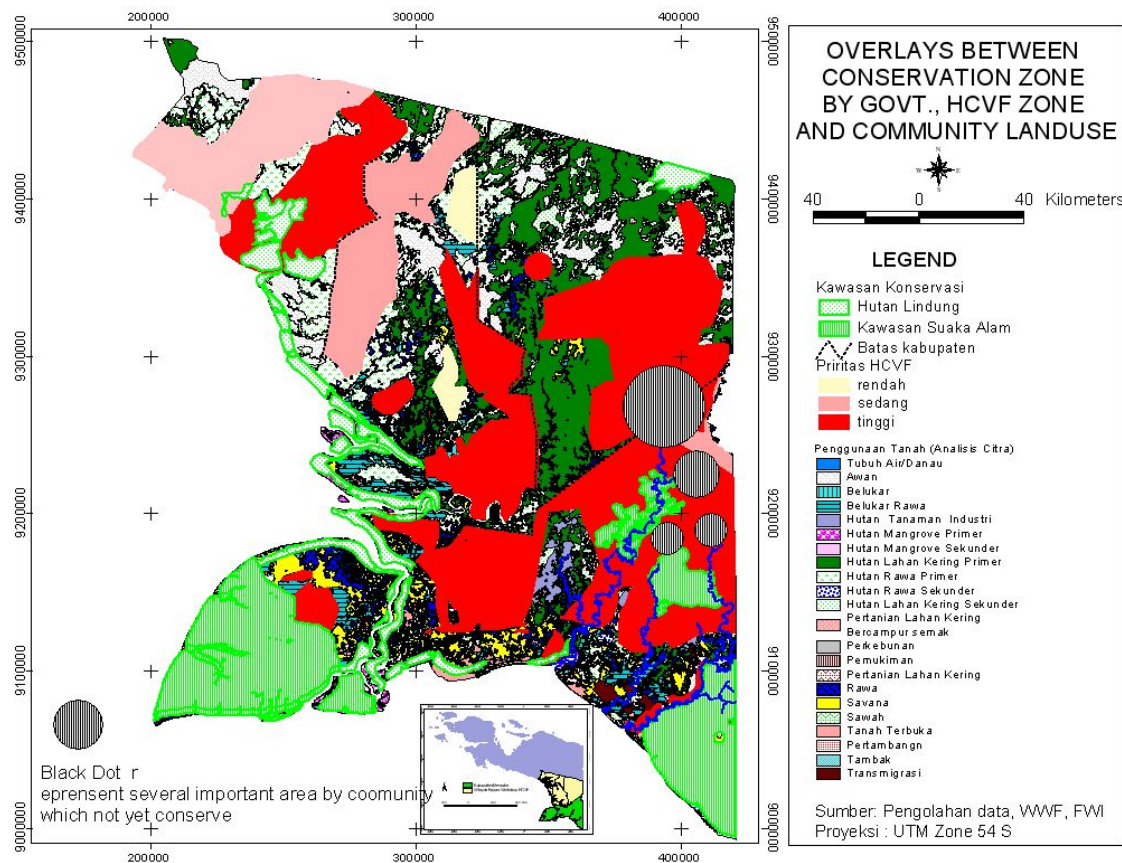


Figure 6: Overlays maps shown several areas not yet conserve in northern area of study

In figure 6 green polygons shown government protected area, red shown important area for conservation based on HCVF approach, but community important area for conservation are scattered along rivers and settlements.