

Participatory Thematic Mapping for Integrated Rural Facilities Improvements (Case Study: Linggar Village, Rancaekek Subdistrict, Bandung Regency, West Java, Indonesia)

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SUMMARY

Participatory thematic mapping is the same as mapping in general. The difference is the people who do mapping. Participatory mapping involves many community members, because they have local knowledge about their location. Another difference is the theme. Theme for participatory mapping is more specific and local. For example: boundary of land/ village, location of clean water sources, sewage networks, electrical networks, communication networks, village roads, sanitation facilities, green open space, and many themes which can be chosen by community themselves. So, participatory thematic mapping can make community aware about spatial condition and capacity of their area. In this research, thematic participatory mapping is done in rural area, precisely in Linggar Village, Rancaekek Subdistrict, Bandung Regency, West Java, Indonesia. The reason behind this location is because Rancaekek Subdistrict is known for being flooded and waste-producing area. Flood and waste can make village facilities damaged and the facilities need inventory and classification for their treatment. Over participatory thematic mapping, the mapping team from university work with community in Linggar Village for collecting data about rural facilities. Community in Linggar Village can show the condition of their facilities to mapping team or some community member in Linggar Village can fill the questionnaire about facilities condition. After collecting data, the mapping team make thematic map that contains roads, general facilities, green open spaces, sewage networks and village boundary. Then, the map is classified based on condition of facilities. If the facility is in good condition, then the color is green, average condition is yellow, and bad condition is red. The final thematic map will be handed to head of village in order to do some integrated facilities improvement based on final map.

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1. BACKGROUND AND OBJECTIVES

When it comes to mapping, people always assume only researcher or geodesy people who make map. But, at the moment, community can make their own map with help by researcher. (Di Gessa, 2008) or called as participatory mapping. Participatory mapping is one of mapping method to encourage community using and making map with their local knowledge (Forrester & Cinderby, 2013). Thus, in participatory mapping, it will be needed local community's knowledge, visual & non-visual data to explore social problems, opportunities and questions (Brodie & Cowling, 2010). Taken from The International Land Coalition, participatory mapping can be used:

- As a tool for advocacy and as a way to enhance community cohesion in the face of land-related challenges;
- As a way to identify rights, a way to make customary tenure relations and rights apparent for outsiders and a way to facilitate the official administrative recognition of these rights;
- As a tool for conflict in disputes related to land, natural resources, and/or territory; and
- As a tool for improved collaborative natural resource management and for cross-sectoral territorial planning.

The key of participatory mapping is participants, in this case, local community, contribute to design the strategy or scheme for mapping with involvement of experts, in this case researcher. Thus, any point of view should be considered and weighed together. It is important to discuss about who take a lead in participatory mapping. It can be the community or the researcher. The meeting between community and researcher will discuss about the problem in local area and what strategy that suitable for mapping local area. In participatory mapping is also important to openly and freely discuss. Thus, the relationship between community and researcher must be in good term for avoiding conflict and lack of freedom in saying their opinion. Finally, community and researcher must decide who owns the output or participatory map (Cinderby and Forrester, 2013).

In this case, participatory mapping taken place in Linggar Village. Linggar Village is located in Rancaekek Subdistrict, Bandung Regency, West Java. Linggar Village is crossed by two small rivers which are creeks of Ci Tarik River and emptied in Ci Tarum River.

Unfortunately, those two rivers condition are very dirty and polluted by trash, even one of those two rivers is happened to be textile and domestic waste that causes black-colored river and bad smelling. Condition of the Linggar Village's river makes paddy field area becoming

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unproductive, because water source from that river has bad quality and condition. In wet season, Linggar Village always gets flooded because unoptimized function of its drainage system. But in dry season, Linggar Village is difficult for getting clean water.

Because of that fact, known that rural facilities has not been managed optimally by local government and society. It is proofed by river function, instead of being clean water source, it becomes place for wasting. Thus, from this condition, it will be needed map for inventoring village facilities. Map must be supported by local knowledge about Linggar Village and local knowledge is got by participating of local society. The objectives of participatory thematic mapping in Linggar Village are:

- Starting dialog about various conflicts in community;
- Facilitating land use planning, area-protecting, and developing local economy;
- Inreasing the awareness of community about natural resources and its surrounding;
- Increasing confident in community due to natural resources management; and
- As a tool to organize the community.

The output of participatory thematic mapping in the village is avaiability of Linggar Village Thematic Map. The main target that will be achieved through participatory thematic mapping is increasing quality of facilities and infrastructures in Linggar Village. Thematic map can also inform area which need new facility or infrastructure to increase area value. Thematic map also helps community to know the potential of village better, both inside or outside Linggar Village. To find out how far the output and main target is reached, it is shown in next part, method.

2. METHOD

2.1 Preparation Step

Participatory thematic mapping method began with coming to Linggar Village and discussing about Linggar Village condition with Linggar Village head, Mr. Ajat Sudrajat. It is important to discuss with village head, because village head is person whose local knowledge can help Bandung Institute of Technology (ITB) mapping team. Then, Mr. Ajat can tell local community, especially neighborhood head and hamlet head for spreading the questionnaire to local people. Figure 2.1 until 2.3 show discussion process with Mr. Ajat.

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Figure 2.1. Office of Linggar Village Head



Figure 2.2. Discussion with Linggar Village Head



Figure 2.3. Asking for Permission to Do Participatory Thematic Mapping

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From discussion, Linggar Village is one of the village in Rancaekek Subdistrict which will get flooded if wet season comes. Thus, there are many facilities which become damage by flood and it will be needed mapping to know the position of damage facilities in Linggar Village. Such as, sewage condition, polluted river, street condition and so on. Figure 2.1 until Figure 2.6. show condition of facilities in Linggar Village.



Figure 2.4. Damage Drainage Condition



Figure 2.5. Empty Land which Becomes Garbage Dump

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Figure 2.6. Street Condition in Linggar Village



Figure 2.7. Cemetery in Linggar Village

From those conditions, ITB mapping team prepare questionnaire to be filled with Linggar Village community. There are two types of questionnaire. First, questionnaire that is given to village house, second, questionnaire is given to neighborhood head. The hamlet head is place for gathering questionnaire.

2.2 Data Processing

Data for participatory thematic mapping is Google Map imagery and village map. Google Map imagery becomes base map then digitizing with data from village map. Such as, neighborhood boundary, hamlet boundary, and village boundary. In Google Map imagery is added layer, such as, street, housing area, factory, green open space, and general facilities. The general facilities consist of mosque, cemetery, village hall, or schools.

First, Google Map imagery is georeferenced with geography coordinate with WGS84 as its datum. After georeferencing, village boundary is digitized in Google Map. Village consists of

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several hamlets. Thus, after digitizing village boundary, hamlet boundary are digitized. Then, neighborhood boundaries are digitized. Because hamlet consists of several neighborhoods. It is shown in Figure 2.8.

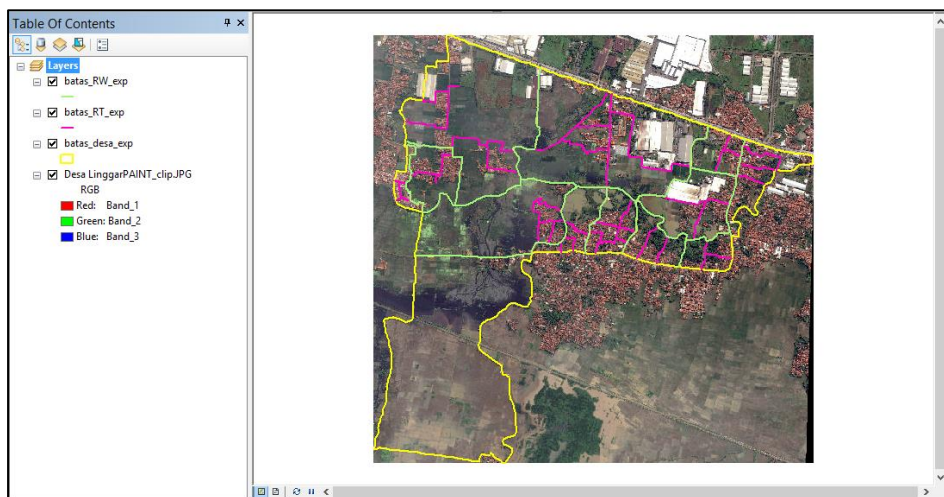


Figure 2.8. Boundaries Digitizing in Linggar Village

After digitizing all boundaries in Linggar Village, then digitizing open green space. Open green space consists of cemetery, garden, park, field, and any area which has plant on it, except yard. Open green space area is shown in Figure 2.9. When all open green space is digitized, then human-made buildings are digitized. Human-made buildings consist of housing, factories, and general facilities. Human-made building is shown in Figure 2.10.

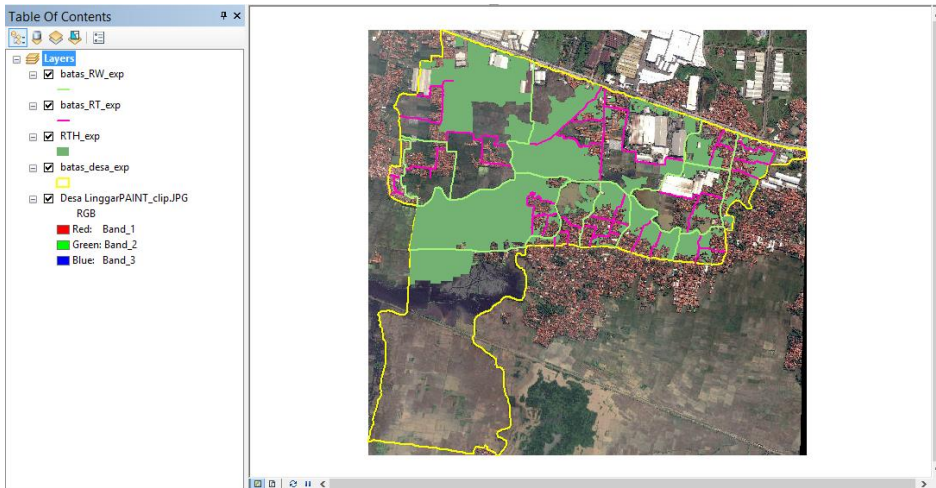


Figure 2.9. Green Open Space Digitizing in Linggar Village

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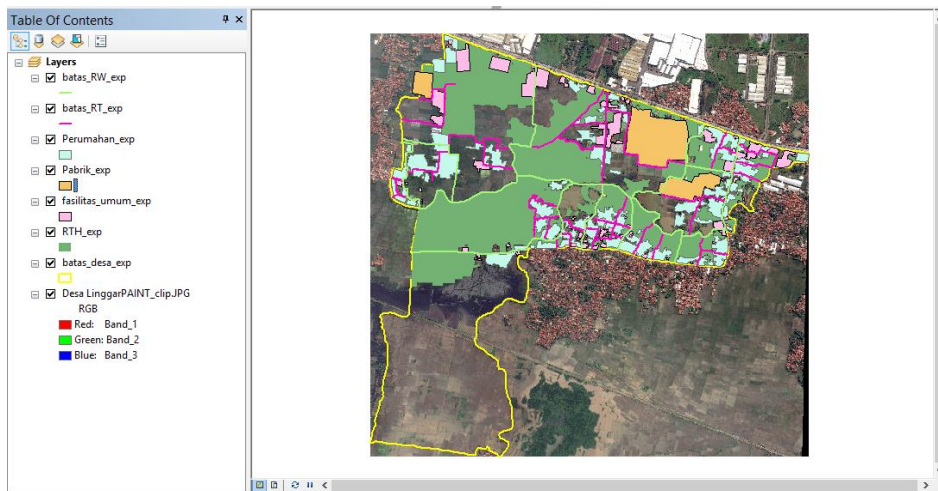


Figure 2.10. Human-Made Buildings Digitizing in Linggar Village

Last is digitizing Linggar Village's streets. In, Linggar Village, there are street which can be passed by car or motorcycle and alley which can be passed only by one or two people. Thus, it is hard to digitize alley, whereas damage condition happens in Linggar Village's alley. In Indonesia, alley is called as *gang*. Street digitizing is shown by Figure 2.11.

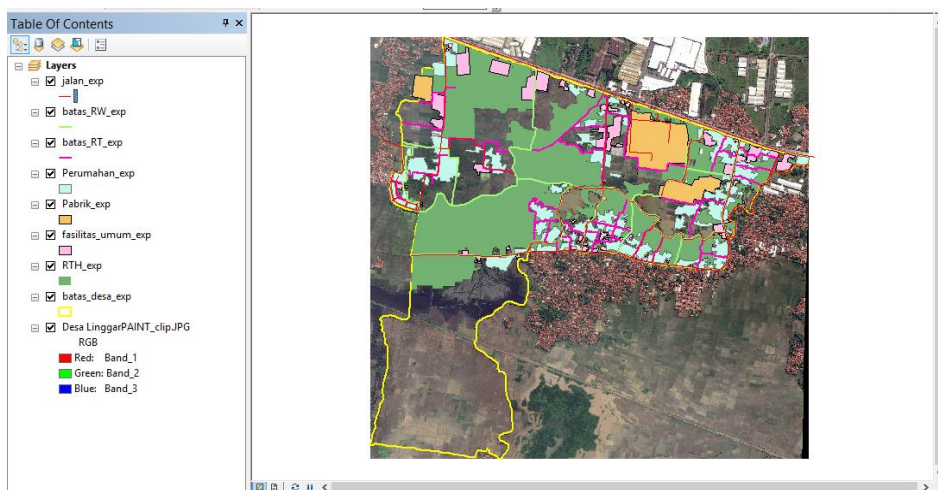


Figure 2.11. Street Digitizing in Linggar Village

Unfortunately, mapping team just has done participatory thematic mapping until digitizing step. There are several obstacles when mapping team was doing this research. The obstacles are explained in next subtitle, along with simulation.

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2.3 Obstacles and Simulation

Participatory thematic mapping has its own obstacles. When starting participatory mapping, communicating with local community is important. It is for explaining to community about the importance of map. Communicating also can awaken community awareness of mapping for village development. Because of those reason, ITB mapping team planned to gather neighborhood heads and hamlet heads in one time for explaining how to do participatory thematic mapping. But, when it came to realization, it was very hard to gather 71 neighborhood heads and 12 hamlet heads at the same time.

The second obstacle is when ITB mapping team came to Linggar Village for field surveying, it was wet season. Thus, Linggar Village was flooding and level of water reached about 5 cm above ankle. It was very hard to data collecting, because the main street of Linggar Village can not be passed. The third obstacle is lack of mapping team member. Because there was very hard to gather neighborhood heads and hamlet heads, thus ITB mapping team spread questionnaire by themselves. Due to college activities in weekday, ITB mapping team could only give questionnaire in weekend and many local people were not in their house. Thus, ITB mapping team only got 30 filled questionnaires and it was not valid for research, because the target is 355 filled questionnaires (taken 5 homes from each neighborhood).

ITB mapping team try to overcome the obstacle with making simulation how categorized bad condition, average condition, and good condition, especially in street. First, open street attribute table in ArcMap and check only street layer (black line). Shown in Figure 2.12.



Figure 2.12. Street Layer in ArcMap

Then open street attribute table and add field named "kondisi". After adding field, enabling editor mode and fill the field with "G", "A", and "B". "G" stands for good condition street, "A" stands for average condition street, and "B" stands for bad condition street. It is shown in Figure 2.13.

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FID	Shape *	Id	kondisi
0	Polyline	0	A
1	Polyline	0	B
2	Polyline	0	A
3	Polyline	0	A
4	Polyline	0	B
5	Polyline	0	G
6	Polyline	0	G
7	Polyline	0	B
8	Polyline	0	A
9	Polyline	0	A
10	Polyline	0	A
11	Polyline	0	B
12	Polyline	0	B
13	Polyline	0	A
14	Polyline	0	A
15	Polyline	0	G
16	Polyline	0	A
17	Polyline	0	A
18	Polyline	0	B
19	Polyline	0	A

Figure 2.13. Street Attribute Table with Street Condition

After giving condition about the street, then giving the color based on condition of street. Green for good condition street, yellow for average condition street, last is red for bad condition street. It is shown in Figure 2.14.

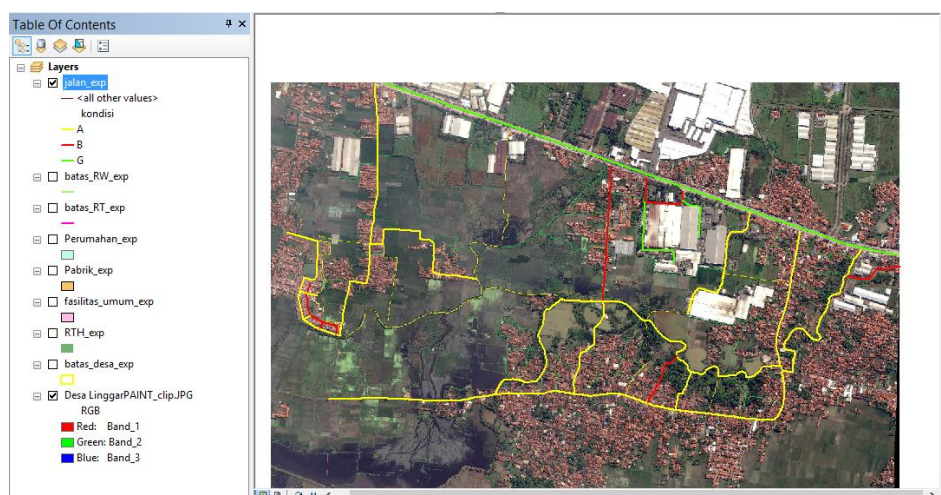


Figure 2.14. Street Layer Based on Street Condition

This simulation does not represent the real street condition of Linggar Village. This simulation is the next plan that ITB mapping team will do, if there are enough data for doing this. This simulation does not only apply in street condition, but also in any layer of map, like housing, general facilities, drainage. Thus, data is important for support participatory thematic mapping, especially data from local community.

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3. CONCLUSION AND SUGGESTION

Participatory thematic mapping is one of mapping method that can be applied with both community and researcher. The advantage of participatory mapping is involvement of local community when it comes to data. Local community help researcher collecting data and giving information about characteristic of their region. In this research, ITB mapping team were having difficult experience, because lack of team member, hard to gather local community at the same time, and lack of data. Thus, ITB mapping team must give questionnaire to hamlet heads or neighborhood heads directly, without gathering them at the same time. Also ITB mapping team must build databases structure for village data in order to improve the participatory thematic map.

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