Compeleted Participatory Mapping of Village Based on WebGIS

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Abstract. In order to make the land registration, it’s required the land database information in the form of a basic map that contain information about the land, that has subjects, objects and other information. The development of land database can create the Government Policy that be a National Map as known as One Map Policy. The development of based online Geographic Land Information System Application (WEBGIS) is done by establishing the land database, starting with the preparation of data that be the land that has been given identification number and the collecting the textual data, then combined and forming the land database within the scope of one village. The development of WEBGIS focuses on the development of better spatial data by involving the active role of the village / offices by optimizing the empowerment of youth organization of the village. The community acts as a land data taker or land data information giver using Geojot+ Geotagging based on android and Ios- application. Spatial data and textual data are integrated using the application. The processing Spatial data is using AutoCAD applications, textual data using Geojot Core., and then will be integrated with ARCGIS with the addition of attributes based on Geojot Core data. The Using of WEBGIS Applications for village offices and their usefulness for land and village government offices. The goal is to create better land administration between agencies so will be formed one map policy. And as a consideration in the proposal draft of Village Bill, in order to make transition of land have report to the village officers.

1. Introduction
Land administration is the government's effort in carrying out land policy. In land administration, there are 4 (four) main elements that is land tenure, land value, land use and land development. Each element of land is managed by several government agencies that working together. Within the scope of regencies / municipalities, the management of each element of land administration is managed, such as:

a. Land tenure that related to authorization and ownership of land and ownership, managed by the Land Office under the Ministry of Agrarian Affairs and the Landform / National Land Agency.

b. Land Value that related to land value, managed by Land Office, Income Board, Financial and Regional Asset Management (BPPKAD), Tax Sevice Office (KPP Pratama) in the form of Zonation of Land Value, Selling Value of Tax Object (NJOP) or Transaction Value Data of Land.

c. Land Use that related to controlling the using of land through policy and regulation of the using of land /spatial arrangement managed by Development Planning Agency, Research and
Development Area (BAPPEDA) in the form of Spatial Plan (RTRW) and Detailed Urban Spatial Plan (RDTRK).

d. Land Development that related to the using and utilization of land is managed by the Investment and Licensing Agency (BPMP) in the form of licensing that related to investment and development. [1]

Figure 1. Global perspective of land administration (Enemark, 2014)

The four elements of land administration, managed by each agency with data base that owned by each agency where there are some differences in data. If the data are interconnected between Agencies, so in this case, needed a database that become the reference or basis for Management of the four elements of that land administration.

This database must contain the informations that can be used in managing the four elements of land administration. This database contains spatial data in the form of map based by percil, where this map can be used by all agencies that manages land elements using 1 (one) reference/the same coordinate. In addition, this database should also include textual data in the form of informations about the plot of land that related to the informations that required by each agency that manages every element of the land administration.

This database is embodied in Land Record or Completed Thematic Map of Land Base Database of Village (PTBT Lengkap). Which contains completed data of subject and object of the land in one unit of village administration. This database is placed in a WebGIS Application. WebGIS application is developed by an online internet system that can be accessed by any agency that requires data about the plot. [2]

WebGIS is built with land mapping through community participation. Communities participate in spatial data and textual data collecting. In spatial data collecting, the community provides information about the boundaries of the land plot. While in textual data collecting, the community, especially the youth organization of the village participates in the collecting of data in the form of information of each plot of land using applications on mobile phones that has been trained before. [3]

2. Method
The materials that used to build a land database for Land Geographic Information System Applications. That based on Web Online (WEBGIS) are:

- Data from the land that has given identification number, as well as textual data,
- Spatial Data by involving the active role of the village office using based on Android and iOS Geotagging Geojot+ Application.
- Data from land tenure, land use, land value, and land development.

![Figure 2. Completed Village Map Creation Flow](image)

**Figure 2. Completed Village Map Creation Flow**

Basically, the development of Land Geographic Information Systems that based web Online (WEBGIS) cooperates with local government and involves the active role of village office by optimizing the empowerment of youth organization of the village. The community acts as a land data taker or land data information giver that using Geojot + Geotagging based on android and IOS Application.

The main factor for building Land Geographic information systems that based Web Online (WEBGIS) is village land records that consist of spatial data and textual data of land tenure and ownership, land valuation, using and licensing. Spatial data and existing textual data are then integrated using some AutoCAD applications. While taking of textual data is using Geotagging Geojot + based android and iOS applications is processed using Geojot Core. After each data has processed, then the two data are integrated using ArcGIS with the addition of Attributes based on Geojot Core data. For form filling, coordinate determination as well as taking photos on Geojot+ Geotagging based on android and Ios Application, the form has been adjusted to the Land Office. The provision of land records is made by drawing a work map that derived from the land registration map that obtained from the Land Agency Local District.

A Work Map that used by the community as a guide to collect attribute data. If there is the difficulty in knowing the owner of the field, the data collection team may request the assistance from neighbor. For the development of Spatial Information System, it uses the GeoServer framework, HTML, CSS, JavaScript and PHP. For GeoServer Installation Packages, it can use OpenGeo Suite 4.8 (latest version) that consists of:

- **GeoServer 28** = For processing spatial data
- Pg Admin = For database management
- PostgreSQL 9.3 = spatial database
- PostGIS 2.1.7 = Plug in for managing spatial data (data that have position/information/coordinate)
- OpenLayers 3.7.0 = to invoke spatial data and display on the application of users

Development of Spatial Information System at this time, can already show spatial data and attribute data in it. And finally it can be developed further in accordance with the needs of each user, for example: to update the spatial data and attributes.

3. Result and Discussion

3.1. The Development of Land Database

Participatory mapping is one of the mapping methods that involve community participation in carrying out mapping in a region. In this case, the authors use the Geojot+ application which is a mapping application that helps in data collection of land parcels. This Geojot+ application uses the same concept as the toponim model that created using the ArcGIS application, but the Geojot+ user is enabled for easier retrieval and processing. By using this application, people who have been trained (youth organization of the village) can do their own mapping using this application.

In the development of WEBGIS database, it required two types of database, namely spatial and textual. In this case, spatial data can be made using a block map or village map or other map source that can be used as a spatial database. For the development of textual database can be used GeoJot+ Application where the application has been referenced or coordinated so that can be integrated with spatial database. Two Databases that have been integrated in the WEBGIS.

3.2. WebGIS in Village Land Management

The existence of the village block map has been a reference in determining the party entitled to the land in a village. However, unconstructed blocks of maps may lead to potential land tenure disputes. In addition, the management of land manually in the village may result in miscommunication in the event of a change of village head or the expansion of the region. Therefore it takes an application in managing the land in a village. Database management in the form of Web GIS is done by the villagers as the smallest unit is one of the solutions to better managing village land. With the Web GIS the village can determine the policy direction of the land in the village.

WEBGIS as one of the GIS application is able to manage the data field of land in a village so that information can be obtained related to the land. With the WEBGIS, village officials can do controlling over land rights in the village, especially in the case of land rights transition. In this case, any transition of rights to be implemented must include the village party, as well as in other activities that involve land, so that the village party becomes a central figure in the management of land in the village. With land management in such a way that the potential for land disputes in the future can be minimized.

3.3. Potential of WEBGIS Development

The use of WEBGIS in an area is believed to be helpful in the management of areas of land in an area. With the WEBGIS, policy-making on the land can be done better. The village side can calculate the amount of land in its territory, type of use, type of utilization and ownership status of a land. In addition, WebGIS also assist other agencies such as the National Land Agency, the Land Agency, the Bureau of Central Statistics, as well as other agencies that requiring data of the land area in a region.
As is the completeness of the data of land parcels in such a way, the Web GIS can also assist in the reconstruction of land parcels that lost due to disasters. The existence of temporally performed data backups can help determine the development that occurred in a village. Similarly, when a disaster occurs, temporal data can be a reference in the reconstruction of the boundary that will be done. Therefore, the existence of Web GIS as a database of land parcels in a village is very important, giving the positive benefits provided by the application.

In carrying out the process of making WebGIS application activities with the help of data retrieval using geojot + application in Gresik District. The things that can be done are:

a. Conducting agreement between Gresik land office and local government for cooperation in the case of making WebGIS in one of the villages.

b. Appointing one of village as a pilot in implementing WebGIS application. This is an agreement from the gresik regency government to appoint one of the villages to be piloted to form one map policy, so that the village will have a complete map that can be utilized by village apparatus, gresik regency government, as well as the gresik district land office.

c. Conducting the discussions with the village head to gather the community to learn geojot + applications in data retrieval. This purpose is so the work that carried out in the form of participatory, so the community is active and understand about the data retrieval using geojot + application and also its processing.

d. Development of textual database using GeoJot + Application that has been referenced or coordinated so it can be integrated with spatial database and its attributes are adjusted to standardization of gresik regency government.

e. Data retrieval via geojot + will automatically be transferred to geojot core so data processing be done on core geojot. The data that has been stored in the geojot core will be printed so it can be a requirement in the first registration and also the data in the geojot core is transformed into WebGIS.

f. WebGIS is a map of various data fields of land that includes information about the land plot. WebGIS can also be utilized by gresik district government to provide location permits and so on.

4. Conclusions

Complete Web Participatory Village Mapping is one of the solutions that offered by us to address various Spatial problems in Indonesia. The mapping demands an active role for the village community because the village community is more aware of the ins and outs of the village location, in addition to the participation of local government and agencies That Related as a facilitator to support the success of the participatory mapping. Facts and problems that occur at this time, such as the number of
villages that do not have a map that covers all Area of the village, the different of maps that are owned by each agency, for example not being a single reference system (Coordinates), thus making sectoral ego who believes that One of the map products that generated by their agency is the right one. And the difficulty of building the infrastructure due to administrative spatial constraints such as Land Tenure, land value, land use and Land Development not in a Single Map. The motto "One Map One Policy" can be created as long as it is shared awareness and overriding Sectoral Ego between agencies.

The easy procedure of work begins with selecting a village object that will be in the map, data retrieval by the village community which was previously given Training mapping by local government and related institutions, supported by the IOS and Android-based Application and where field coordinates, textual data and Image Field Integrated into GeoJot + Application. After that as if into web Arcgis and give the description / attribute about object and subject of field of land that exist in Geojot + Application, Output that resulted in the form of:

a. Map of Field Based Village and Satellite Image Map.
b. Tabulation of Data of Ownership, Ownership, Use and Utilization.
c. WEBGIS Online Application (contains various thematic maps such as: NOP, Inventory of Local Government Assets, Important Places, Administration Limits, Land Disputes, Land Value, State Land Inventory, Building Information, Land Information RTRW, LP2B Road Network and PDAM Map, PLN)
d. Data format in order to facilitate other agencies

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