

Irrigation network information system for irrigation area management (Case study in Tapango Polewali District, West Sulawesi)

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Abstract. Success in implement irrigation area management activities is highly dependent on data availability. The existence of a realtime, fast, and accurate information is very important. The data and information needed must be easily accessible to interested parties. Development of an irrigation network information system is carried out by converting data into coordinate form using ArcGIS software. Visual studio software is used to display all data that has been processed. Spatial-based irrigation network information systems built using ArcGIS and Visual Studio software can easily obtain information about channel conditions, rating curves, channel profiles and channel photos. the availability of spatial-based irrigation network information systems facilitates the management of irrigation networks.

1. Introduction

The area of rice fields in Indonesia in 2016 reached 8.19 million ha, consisting of 4.78 million ha of irrigated rice fields and 3.4 million ha of non-irrigated rice fields [1]. In an effort to increase the productivity of land to achieve optimal agricultural yields, Indonesia developed an irrigation of 7.2 million ha, covering approximately 17,500 irrigation areas [2]. Irrigation area succeeded management activities, starting from the pre-planning, planning, implementation, monitoring and control stages, is highly dependent on data availability. The more complete and accurate data available, the activity will obtain optimal results.

Irrigation area authority, debit data, irrigation network conditions, etc. are sometimes not sufficient enough, which has an impact on irrigation water management systems. the unavailability data condition of irrigation networks in spatial form has resulted in difficulties in monitoring irrigation area management. Technology in the era of globalization is currently developing very rapidly. Information technology has become an important thing and a necessity in all aspects of life. Information technology has even become the backbone of human life in the provision and given of information. The existence of a realtime, fast, and accurate information becomes very important for human survival. The data and information needed must certainly be effectivety and efficiently accessed by various interested parties.



The development of information systems requires the support of accurate data, information systems and data services, and good information. With a good information system, information can be monitored and disseminated quickly, accurately and cheaply. Development of information systems is also needed in developing coordination and synchronization activities of policies, programs and development activities, especially in agriculture [3].

Microsoft Visual Studio is a complete software (suite) that can be used to develop applications, be it business applications, personal applications, or application components, in the form of console applications, windows applications, or web applications. Microsoft Visual Studio can be used to develop applications in native code (in the form of machine language running on Windows) or managed code (in the form of Microsoft Intermediate Language on the .NET Framework). In addition, Visual Studio can also be used to develop Silverlight applications, Windows Mobile applications (which run on the .NET compact framework) [4].

Desktop GIS is a geographic information system application that is standalone, or can only be run on a PC (personal computer). Its standalone nature makes GIS desktops inaccessible to others without the application installation process on the PC. The advantage of GIS desktops is its ability to do data analysis and processing, applications that are used are more compatible with spatial databases and can store vector data into databases, not filebase [5].

2. Methodology

This study uses Visual Studio 2010 software, ArcGIS software, GPS and image data, data on irrigation services and irrigation channel schemes. The development of information systems is done by converting data into coordinate form using ArcGIS software, so as to produce a shp output and map irrigation service areas for each channel and add the results of field measurement data to the data shp.

Visual Studio software is used to display all data that has been processed using ArcGIS software. In the Visual Studio application the steps are as follows:

- a. Design irrigation information systems.
- b. Making a project and determining the attributes and functions that are in accordance with the system that will be created.
- c. Database creation is done using Microsoft Excel so that it makes it easier to input and change data.
- d. Design items that will be displayed on the information system.
- e. Testing of projects that have been made

3. Results and Discussion

3.1. Map of Irrigation Networks

Maps of irrigation networks made using ArcGIS software can be seen in figure 1. On the map there are nine measurement points or segments, where each point is measured; flow velocity, water level and cross-sectional area of the channel.

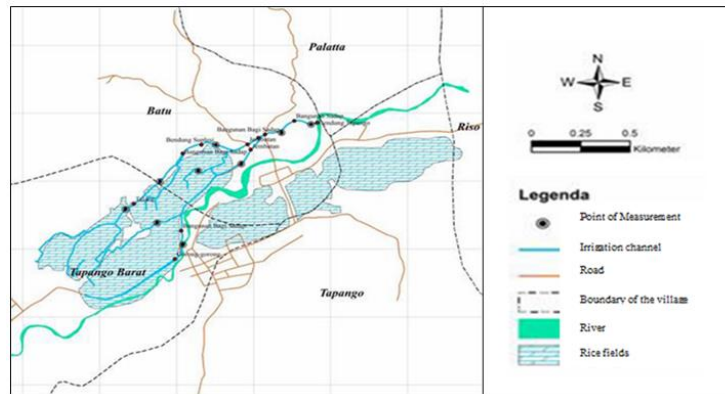


Figure 1. Map of Irrigation Networks.

On the map, it can be seen that DI Tapango is located in Batu Village, Tapango Barat and Tapango with a basic area of irrigation 275 ha and irrigated rice fields of 175 ha. Data from this irrigation network map are tracking data along the irrigation canal. On the irrigation map there are nine measurement points and ten building points on the irrigation network.

3.2. Information Systems

The irrigation network information system waked using visual studio 2010 software that displays spatial based information maps that have been processed in ArcGIS software. With the existence of a partial-based irrigation network information system can easily be obtained information contained in irrigation channels and buildings.

Geographical information systems are waked by connecting map elements with their attributes in one layer such as roads, village boundaries, rivers, and other layers that will form a database. This database is inputted into visual studio software. This is in accordance with the statement of [6], who said that GIS connects a set of map elements with their attributes in units called layers. In this system the layer consists of buildings, rivers, roads, administrative, plantation, and forest boundaries.

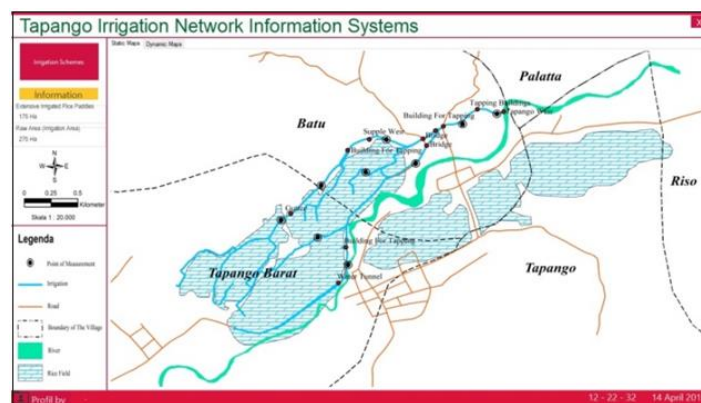


Figure 2. Display of Irrigation Information System

In figure 2 there are two types of display of information systems that are static and dynamic. In the static view, the information system is more than the dynamic. In the main menu view shows information of area irrigated and basic area of irrigation. On the button of the irrigation channel scheme can be seen the picture of the irrigation channel scheme in DI Tapango.

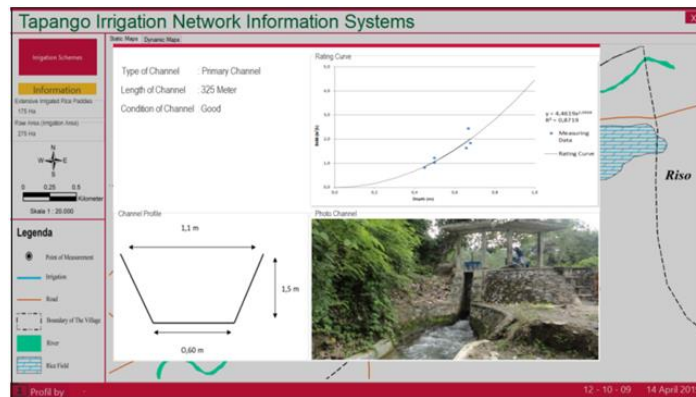


Figure 3. Static display of Information Systems.

Static display can be obtained information: channel or building name, channel or building conditions, channel length, rating curve, channel or building image, channel profile and building scheme, as shown in figure 3.

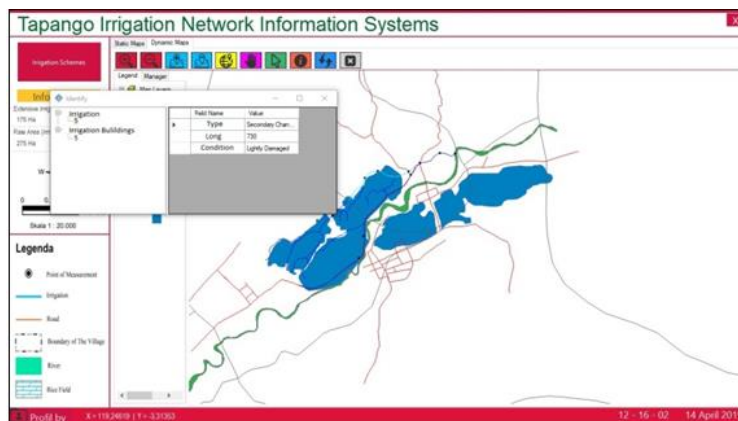


Figure 4. Dinamic display of Information Systems.

While the dynamic display of this system displays information: text and coordinates of the map, as shown in figure 4.

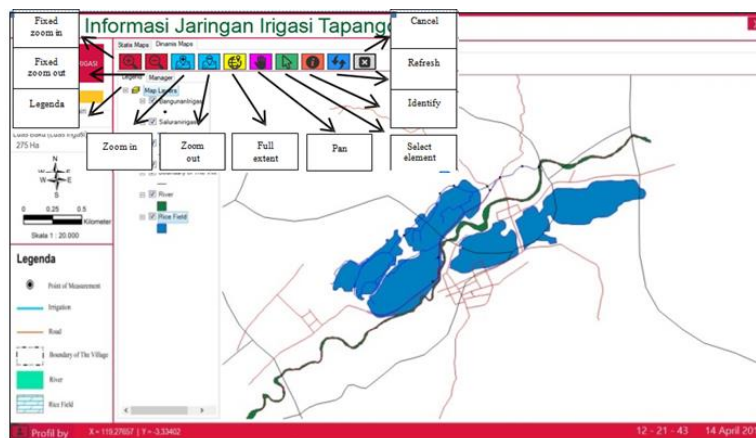


Figure 5. The main display of the Dynamic system.

In a dynamic information system there are several buttons that can be clicked if doing several activities that have their respective functions, as in table 1.

Table 1. Function button on the dynamic display of information systems.

No.	Button Name	Function
1.	<i>Fixed zoom in</i>	to enlarge the image automatically with the center point of first view.
2.	<i>Fixed zoom out</i>	to minimize the image automatically with the first center point of view.
3.	<i>Zoom in</i>	to enlarge the image at the desired place.
4.	<i>Zoom Out</i>	to minimize the image at the desired place
5.	<i>Full extent</i>	to display full images.
6.	<i>Pan</i>	to shift the view by holding down the click and drag.
7.	<i>Select element</i>	to return the cursor to form the arrow
8.	<i>Identify</i>	to identify a data, in a desired area, so that information will appear in that area
9.	<i>Cancel</i>	to cancel all activities on the application.
10.	<i>Legenda</i>	to explain symbols and lines on the map.
11.	<i>Refresh</i>	to update the screen display or return to the initial display.

4. Conclusion

The desktop irrigation network information system built using ArcGIS and Visual Studio software can easily get information about: channel conditions, rating curves, channel profiles and channel photos. With the existence of a GIS desktop irrigation network information system makes it easy to manage irrigation networks.

5. References

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