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Application Geographic Information Systems for Determination Suitability Urban and Local Planning City of Solo

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Abstract

Solo is one of the major cities in Indonesia who are in process growth and development. The core of the growth and development Solo city is mainly characterized by urban development and physical activities. The implications of the growing urban demand for land is increasing as a result of increased activity. This evident from increasing demand for land is utilized for benefit economy and housing/building. Public plan of city landscaping (RUTRK) is a regulation and direction development of the city. But in a way, within a period of 13 years Solo City has experienced a deviation RUTRK by 30% of the actual allotment of land. This is because of the difficulty determining who experienced irregularities. This study aims to build geographic information systems (GIS) that can help determine the suitability of urban and local planning. The method of research is done by collection of data, system requirements analysis, system design, implementation and testing. To determine the suitability of land use overlay or overlap stacking method on the spatial data and required two maps, namely maps RUTRK and land use maps. The software used was ArcView software 3.2. The results of the study is an application of geographic information systems to determine the suitability of urban and local planning in the city of Solo.

Keywords: Land Use, RUTRK Solo, Geographical Information Systems

1. Introduction

A city is a place where the people in them identified themselves with the site. The city becomes a collection of memory because it is a container of the basic functions of human life cycle and record the human life cycle. A city that is equipped with a variety of services further enhance the attractiveness of the city, and will grow the city. The implications of the growing urban demand for land is increasing as a result of increased activity, is evident from the increasing demand for land is utilized for the benefit of the economy and housing / building. The greater the volume and development activities, the greater the potential for spatial conflict. It required an effort to organize and direct the development of the city, one with the preparation of Public plan of city landscaping (RUTRK). Expected with the formulation of RUTRK evaluation of urban development can be implemented, so that the spatial control of the city can run consistently and effectively.

Solo is one of the major cities in Indonesia who are in process growth and development. Solo has broad area of 44 040 km² and is inhabited by 552.542 peoples (year 2005) are spread in five districts (*Kecamatan*). In a way, within a period of 13 years the city has experienced a deviation RUTRK Solo at 30% deviation from the actual allotment of land [6]. Layout of the existing city needs in terms of land suitability evaluation. Land evaluation is intended to determine the distribution of land use or land conflict that had irregularities designation. That requires an information system that can determine the suitability of urban and local planning and can present the information in the form of suitable land and land in defiance of its designation.

Application of information systems that can address the above problems by impenattion application of Geographical Information Systems (GIS), because GIS can be used as tool to obtain an interactive engage and enhance the understanding and information related to the concept of location, space (spatial) and elements geographically located in the Earth's surface following the attribute data attached to them. Geographic information system also has an important role in the management cycle conditions. Map is one of the best ways to visualize the spatial suitability of research results. The process of acquisition spatial compatibility by comparing the spatial map of the city general plan and land use maps. The results of this comparison gives deviate absence of land use information.

2. Literature Review

2.1 Land Suitability

Evaluation and monitoring of planning is essential in urban spatial structure. Land evaluation is intended to estimate the potential of land in accordance with the existing plan designation. Public plan of city landscaping (RUTRK) have an intention to provide direction for spatial planning at the macro level. Basis and the use of space above the city of Solo consider the physical reality, social, economic and cultural city, in order to achieve an efficient usage considerations, harmonious and reasonable. Compliance is obtained by comparing the spatial utilization of the land if it is in accordance with the land use plan. If applied in the geographic information system suitability urban spatial maps can be obtained by comparing the general plan of urban spatial and land use maps. The results of these comparisons provide information relevant to whether the use of urban spatial

On the map RUTRK grouped into several activities, namely: tourism, culture, sport and open space, commercial, office and central administration, education and social facilities, industrial, residential, transportation facilities, as well as floating point. Floating point is an area or areas where the frequency of development / change of use space by an activity is very fast. At a certain period or year used by a particular activity, but in the next period has been changed. Location of this region and around Jalan Gajah Mada Bhayangkara. Destining be for activities that support the educational facilities or other social facilities, such as housing, multipurpose buildings, sports centers and so on adolescents.

Utilization of spatial planning activities of the city of Solo, to acquire land suitability is done by comparing the means of utilization of urban spatial structure which is the use of urban spatial structure is in accordance with the general plan of city layout.

3. Methodology

Subjects to be discussed in this study is the use of geographic information systems applications to determine the suitability of urban spatial Solo with Public plan of city landscaping (RUTRK), so it can help in the effort to evaluate the spatial structure of the city. Methods of data collection conducted to obtain information needed to facilitate research, among others: literature study, namely the method of data collection by way of reading the book (eq: General Spatial Plan City of Surakarta Municipality Dati II years 1992-2013, ArcView) and the articles of internet-related research, as well as by comparing the previous research literature, Advanced Research. In addition the data obtained in the form of a map of Public plan of city landscaping (RUTRK), land use map, the map unit area of development (SWP), which contains the administrative map-of the data sub-district, village, road maps and city maps of the river solo. Another method used in this study were interviews and direct observation by the agency or institution that is Solo government and Regional Development Planning Agency (Bappeda) and National Land Agency (BPN).).

The next step is analyze the need to allow for the manufacture and development system. In this case need to do create a system requirements specification. In the process described on the specification of requirements specification of data needs to be used by system. Such as requirements specifications, requirements which the map data input general urban spatial plans, land use map data. Then from the data input performed overlay or overlap stacking process, resulting in the output data of land suitability map, layout map, data tables the results of land suitability.

In designing this system there are two stages : design data and design menu. At design stage of data, prior to designing the shaped table in advance will be some modeling so that it will be easier in draft form database tables that are interrelated and complementary. This is to formulate and explain the process of Entity Relationship funtion. Each table has its own in accordance with the needs of the system to be created. Modeling system includes the manufacture of: Diagram Context and Data Flow Diagram (DFD). Relationships or relationships of any entity described in a relationship Entity Relationship Diagram (ERD) which is a model of the information needs of an organization that will be used as a framework. While the menu will be designed in the design of menus used in software applications.

4. Result and Discussion

From research conducted at Regional Development Planning Agency (Bappeda) and other government agencies in the city of Solo, that there is a need to determine the suitability of the system layout in the city of Solo. The data obtained consists of two types of data, namely spatial data and data aspatial.

Spatial data is data that consists of a geographical location explicit set in the form of coordinates. Forms of spatial data that was obtained from. Data aspatial (data alpha numeric attributes or data) is the assimilation of data consisting of information that relevans to a location such as the name of the district, area districts, street names, land use, and land use and other things that can be linked to specific locations in order to give identification. Data aspatial in the can from the research is the data associated with the district name, district name, name of the village, population and others.

Specification of user needs, in the process of geographic information system software to determine the suitability of urban spatial structure in the city of Solo include :

- Software designed to display both the city spatial plan in graphic form (map) or in the form of attribute data (tabular data).
- Software designed to display either in the form of land-use graphical (map) or in the form of attribute data (tabular data).
- Software designed to store the data of the district, subdistrict, and road infrastructure.
- The software is made to determine the suitability of the land map and urban spatial planning of land use and can display it either in the form of graphics (maps) or in the form of attribute data (tabular data).
- Software designed to perform data updates urban spatial planning and land use
- The software is able to create and print reports of land suitability and layout of tables per unit area of development (SWP).

Context diagram serves to facilitate the modeling and functions that draw relationships between input and output systems with external unity. In the context diagram made given the assumption that Bappeda is the party receiving the report distorted land and land that does not deviate. Context diagram for the system created like Figure 1 below:

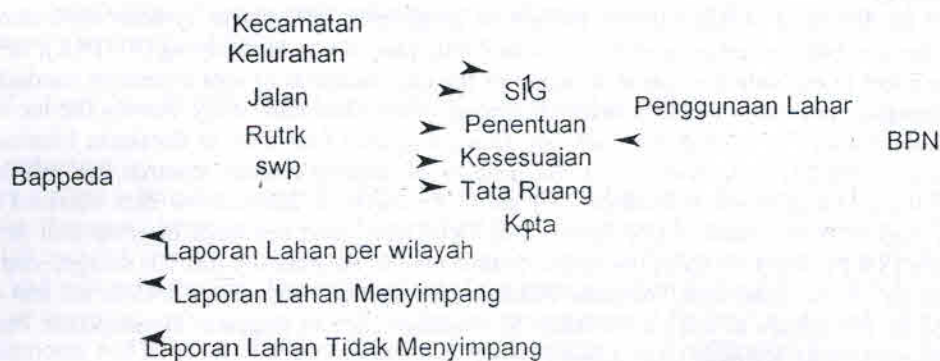


Figure 1. Context Diagram

The first process is classification of input data, consisting of data sub-district (kecamatan), village of data (kelurahan), data path (jalan), RUTRK data and land use (penggunaan lahan). The second process is process by which RUTRK data analysis and data on land use will merge by overlapping stacking or overlaying the data and the results of the suitability of urban spatial structure. The third process, namely the suitability of spatial data processing for managing the city map to attribute data can be represented very well and can be read through the map. The fifth process is a process of discovery in this process the user will find information about the land in accordance with RUTRK or seek Lahn experiencing irregularities. The last process or processes is the fifth report of map or layout of tables : report of land per region (laoran lahan per wilayah), report of deviate land-use (laporan lahan menyimpang) and report of non-deviate land-use (laporan lahan tidak menyimpang).

4.2 Result Land Suitability

In Figure 2 are shown a map of the suitability of the overall layout is done with ArcView software.

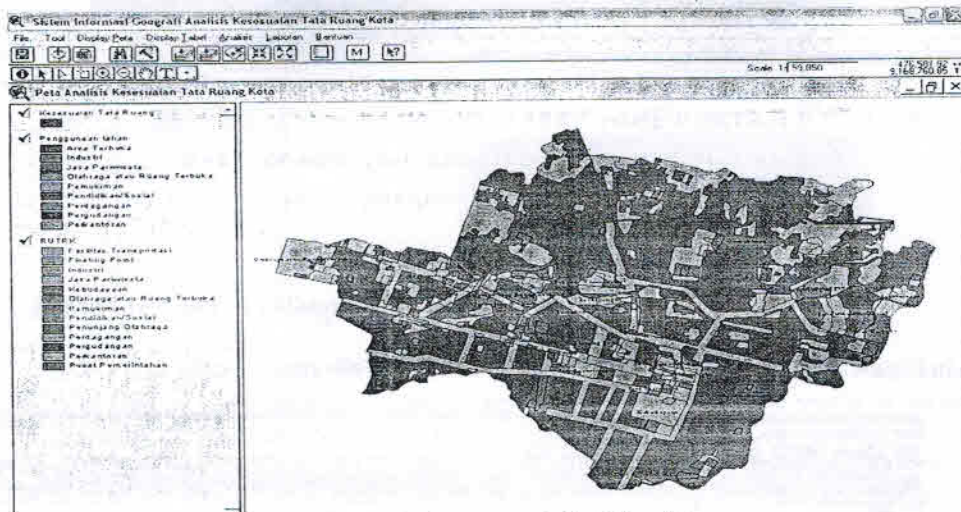


Figure 2. Land-use Suitability Map

While the display area of land to deviate from the results of the suitability of urban spatial analysis can be generated by a user must activate the theme map the results of the analysis. Statistical to save the land shown in a text file. As seen in Figure 3 which shows the statistical data deviate land in the city of Solo.



Figure 3. Statistic of Deviate Land-use Suitability in File text Format

Whereas in Figure 4 are shown in a distorted map of land in the city of Solo as a whole.

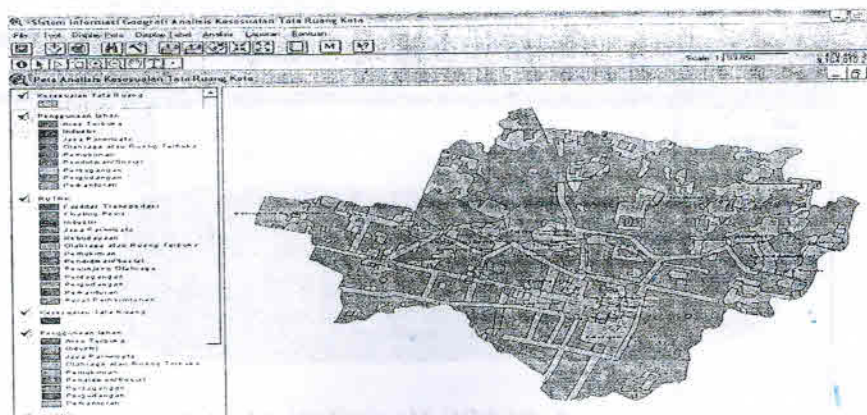


Figure 4. Distorted map of land in the city of Solo

While the display does not stray to areas of land that does not deviate from the results of the suitability of urban spatial analysis can be generated by a user must activate the theme map the results of the analysis. Data statistik to save the land not be displayed in a text file. As seen in Figure 5 which

shows the statistical data deviate land in the city of Solo.

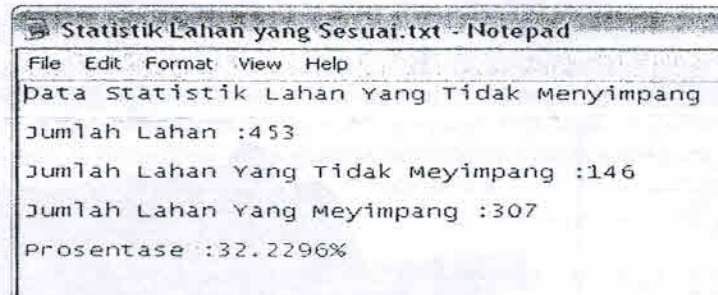


Figure 5. Statistic of non-deviate Land-use Suitability in File text Format

In Figure 6 we can see all of not suitable land map in Solo city.

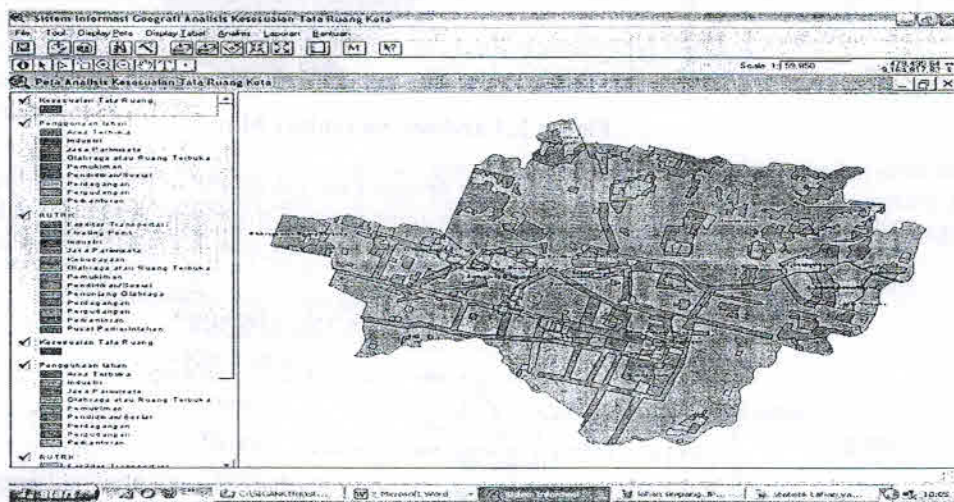


Figure 6. Preview Not Suitability Land Map in Solo City

To prove that the analysis goes well, then do the testing of systems with land use maps and map RUTRK the user create his own. Once the new view is created the user can add a theme map RUTRK and user can start by doing a digitized map by using tools that are available for the digitization process. on the theme. Rutrk map can be seen in Figure 7 below.

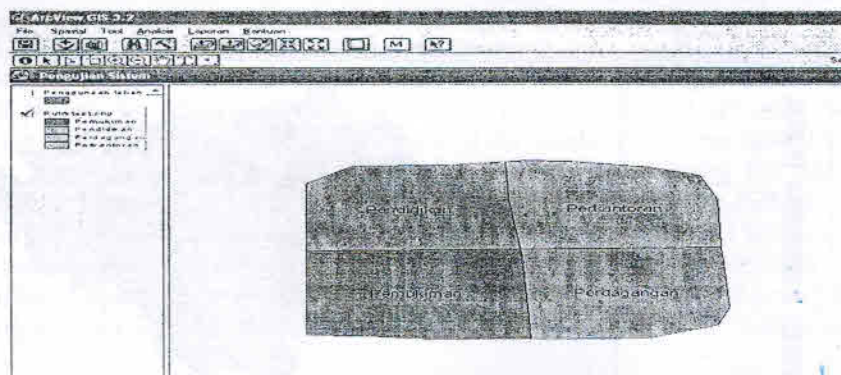


Figure 7. RUTRK Map in Testing System

In addition RUTRK map, the user also makes land use maps that will be in the land suitability analysis. Land use map images can be seen in Figure 8 below.

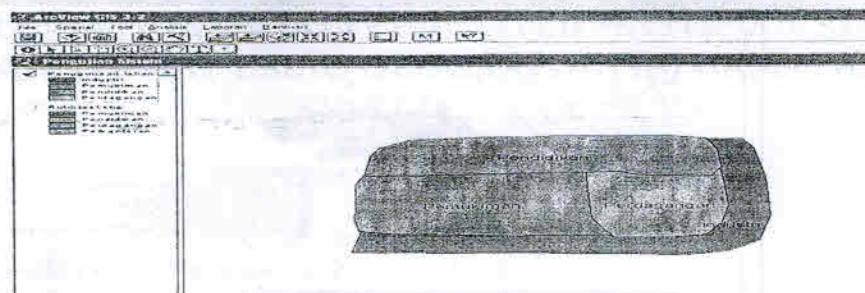


Figure 8. Land-use Map in Testing System

Once the user has a map RUTRK and new land use map, at a later stage the user can analyze the suitability of land by using the menu "Spatial Analysis of Conformity". The results of the analysis process in the form of statistical tables and maps of land suitability and conformity with spatial, whereby if a land use incompatible with the land was categorized RUTRK distorted, and vice versa if the land in accordance with RUTRK then categorized according to their function. The analysis can be seen in Figure 9 below. While Figure 10 shows the map suitability on testing system.

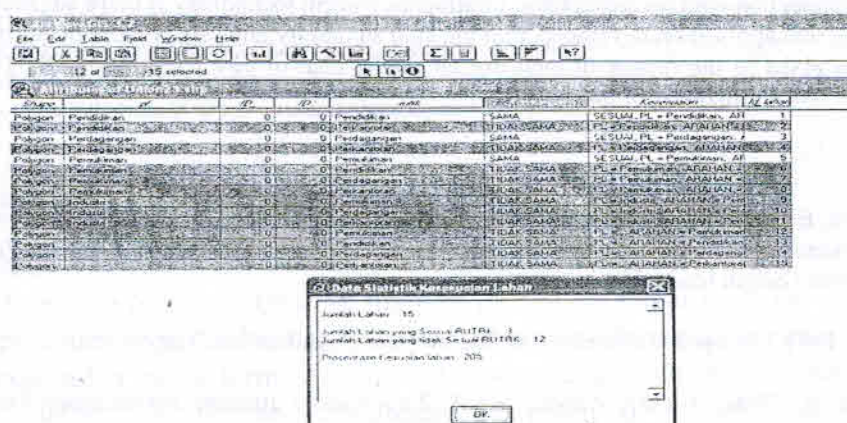


Figure 9. Table and Statistic of Result on Analysis and Testing System

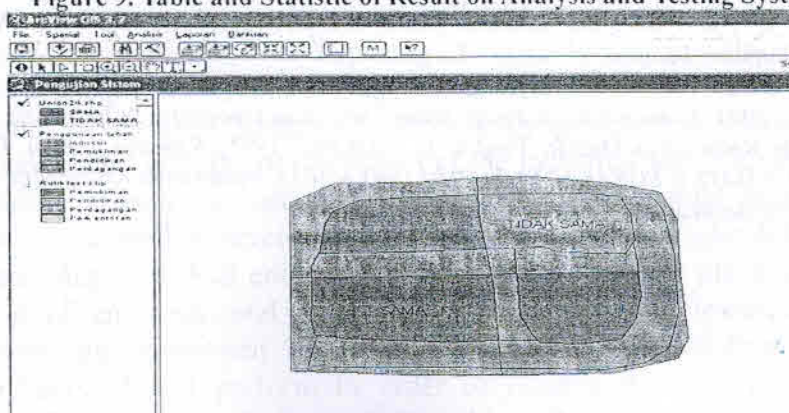


Figure 10. Suitability urban and Planning in Testing System

By obtaining the results of the analysis above, it can be stated that the process of urban spatial analysis of the suitability of the system is running well. Figure 11 is example report of the sub menu layout map of the suitability of urban spatial map in one unit area of the development of the city of Solo.

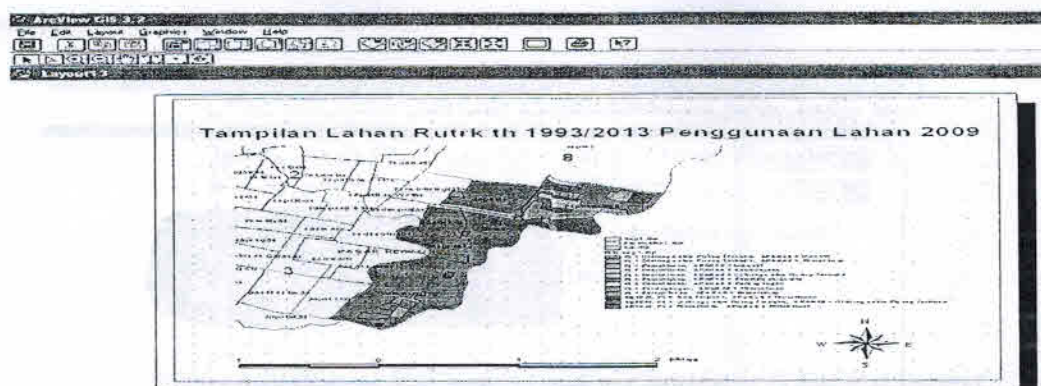


Figure 11. *Layout Suitability Urban and Local Planning in the City of Solo*

5. Conclusion

Based on the results of research that has been implemented at the Head of Regional Development Planning Agency (Bappeda) and Head of National Land Agency (BPN) has produced the utilization of geographic information systems to analyze the spatial suitability of Solo, it can be concluded that the geographic information system to analyze the suitability of urban spatial Solo was able to run well and can assist in analyzing spatial conformity.

In connection with the geographic information system technology is more advanced then ever that has made this application developed with the land suitability analysis in more detail in an area of land so as to assist in the review of land use on Public plan of city landscaping (RUTRK) in the control of the space utilization of Solo.

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