

Land Boundary Map and Land Contour Map for Tourism Accommodation Development using QGIS Software Application in Kalisada Village, Bali

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Abstract: Land boundary map and land contour map for large scale areas are very difficult to obtain, because these maps in a certain area have not been made or are not owned, while the initial planning can be done without having to wait for all these requirements to be available, such as time constraints, cost, weather and ground measurement equipment. To quickly get a map for planning the development of tourism accommodation at the Tukad Banyuraras estuary in Kalisada Village, Seririt District, Buleleng Regency, Bali, a map of land boundaries and land contours was made from processing satellite image data using the Quantum Geographic Information System (QGIS) software application and ground control point using the Global Positioning System (GPS). Certain objects such as beaches, rivers, roads, houses, rice fields, gardens and others that were previously in raster format in a satellite image are converted into digital format, the suitability of the name of the element according to the object/element being plotted, drawing lines according to image appearance. The land boundary before deducting the coastal and river borders obtained an area of 194,666.8496 m² or 19.46668496 hectares. While the land boundary after deducting the coastal and river borders obtained an area of 144,819.7910 m² or 14.48197910 hectares.

1 INTRODUCTION

Indonesia is an archipelagic country consisting of a land area of 1,922,570 km² and a water area of 3,257,483 km², thus requiring the government to continuously carry out development for the benefit of the population in Indonesia. This development activity cannot be separated from a form of spatial use at the district, city, sub-district and village levels. Of course, the use of space in the vast territory of Indonesia must be supported by good spatial planning. One of the planning steps is to prepare geospatial information in the form of maps of land boundaries and land contours needed for an activity in space utilization (Rumampuk, 2013).

In the current era of development, to direct development by utilizing regional space in an efficient, effective, harmonious, harmonious, balanced and sustainable manner in order to improve community welfare and security and defense in accordance with the mandate of the law, it is necessary to prepare a Regional Spatial Plan. One of the components of the Regional Spatial Plan is the

development of residential areas. As a proper development planning effort, especially the need for spatial data to support settlement planning, it can be obtained quickly, cheaply but accurately, using high-resolution satellite imagery (Parmadi, 2016).

Utilization of remotely sensed satellite images for mapping activities is a common activity nowadays. Spatial information presented in satellite image maps is raster data sourced from the continuous recording of satellite images. The stages in mapping using the results of this sense are by making a pattern using the sensed data which begins with satellite processing with reference to ground control points to limit the area to be mapped. One example of the use of sensing technology for activities in the field of mapping is for mapping the coastal area at the Tukad Banyuraras estuary which supports tourism accommodation planning activities. Some of the advantages of mapping using remote sensing technology include: results can be used to map very large areas quickly, whereas manual mapping is usually only used to map very narrow areas, remote sensing technology is cheaper and can

map various thematic maps. at the same time, the manufacturing process is faster.

2 RESEARCH METHODS

The research implementation is generally carried out in the form of information collection (secondary and primary data collection), field surveys, problem analysis, and inventory formulation and performance evaluation of digital data processing. The research work steps are outlined in the form of a research diagram that describes the complete stages from beginning to end sequentially to the end with a duration of one year of research. More research flowchart can be seen in the figure 1:

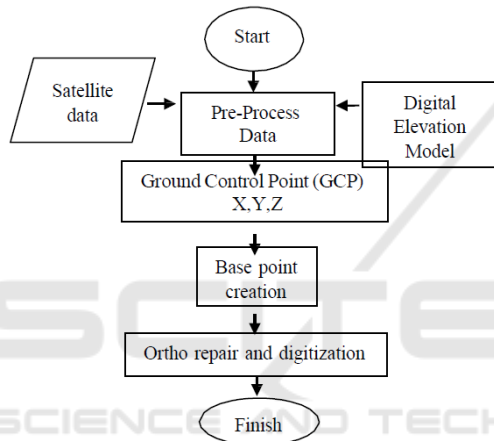


Figure 1: Research flow diagram for Land Boundary Map and Land Contour Map for Tourism Accommodation Development Using QGIS Software Application (Case study at Tukad Banyuraras estuary in Kalisada Village, Seririt District, Buleleng Regency, Bali).

Conducting field surveys, including among others:

- a. Initial survey data collection
- b. Data collection by measuring ground control points in the field using the Global Positioning System (GPS) tool
- c. Data calculation and satellite image processing

2.1 Measurement of Ground Control Points

- a) Prepare the Garmin GPS 60 (Global Positioning System) GPS device, including the completeness of the battery to be used
- b) Set GPS coordinates to UTM (Universal Transverse Mercator) coordinates
- c) Prepare an existing initial base map to make it

- easier to find points in the field
- d) Measure coordinates in the field so that UTM coordinates are obtained (x, y and z)

The analytical work carried out includes analysis as a whole. The analysis carried out includes:

- a. Analysis of the tools used
- b. Measurement analysis of ground control points
- c. Analysis of the accuracy obtained in the digitization of the map

2.2 Research Sites

This research is located in Kalisada Village, Seririt District, Buleleng Regency, Bali.

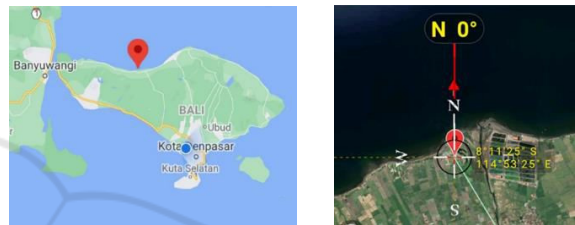


Figure 2: Research location in Kalisada Village, Seririt District, Buleleng Regency, Bali.

3 RESULTS AND DISCUSSION

3.1 The Result of Ground Control Points

As for the results of the measurement of coordinates with a GPS device, the ground control point data is generated as shown in table 1:

Table 1: Table of Ground Control Point (GCP) at the Research Site.

POINT	EAST	NORTH	ELEVASI
P	E	N	Z
1	267813	9094267	1
2	267778	9094151	1
3	267771	9094055	2
4	267838	9093858	4
5	267878	9093687	5
6	267949	9093433	7
7	267900	9093419	8
8	267821	9093391	10
9	267803	9093385	11
10	267790	9093441	10
11	267784	9093473	10
12	267721	9093453	10
13	267713	9093480	9
14	267696	9093547	8
15	267678	9093541	8
16	267665	9093597	8
17	267653	9093642	8
18	267638	9093704	8
19	267622	9093781	7
20	267608	9093833	6
21	267598	9093876	6
22	267593	9093889	6
23	267569	9093994	6
24	267543	9093990	6
25	267537	9094011	5
26	267525	9094056	4
27	267523	9094058	4
28	267480	9094041	4
29	267474	9094054	3
30	267463	9094077	1
31	267503	9094099	1
32	267545	9094119	1
33	267587	9094222	1
34	267503	9094063	3
35	267510	9094061	3
36	267530	9094064	3
37	267528	9094000	6
38	267536	9093997	6
39	267540	9093952	6
40	267488	9093938	6
41	267475	9093984	6

3.2 Data Input and Map Digitization

Before importing into QGIS, it is necessary to make arrangements first so that the coordinate data from the GPS as the Ground Control Point can be read by the QGIS software. Coordinate data stored in excel is saved to a CSV (Comma delimited) file type. The

satellite image used is ESRI Satellite and the next step is digitizing the land boundary map.

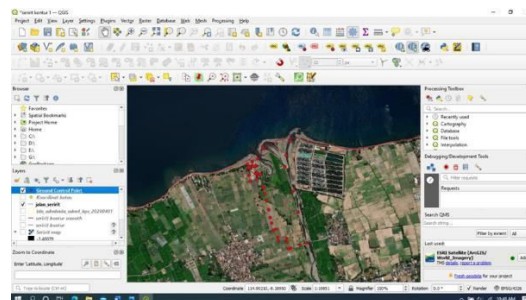


Figure 3: Data input and map digitization.

3.3 Delineation and Calculation of Land Boundaries

Based on the Bali Provincial Regulation No. 3 of 2020 concerning Amendments to Regional Regulation No. 16 of 2009 concerning the Bali Provincial Spatial Plan for 2009-2029, it is regulated regarding the existence of a coastal border for the estuary of the Banyuraras estuary, which is 100 meters from the high highest water level and embankment river border for rural areas which is 5 meters from the edge of the river embankment (Peraturan Daerah Provinsi Bali No 3 Tahun 2020, 2020). Elevation of high highest water level in this area is 0.668 m (Wicaksono, 2020) From this regulation, it is obtained that the land limit is allowed to be built for tourism accommodation purposes. The boundaries and land area in question are:

3.4 The Land Boundary before Deducting the Coastal and River Boundaries

The land boundary before deducting the coastal and river boundaries is 194,666.8496 m² or 19.46668496 hectares. The shape of the land boundary is as shown in figure 4 :



Figure 4: Land boundaries before deducting the boundaries of beaches and rivers.

3.5 The Land Boundary after Deducting the Coastal and River Boundaries

The land boundary after deducting the coastal and river boundaries is found to be 144,819.7910 m² or 14.48197910 hectares. The shape of the land boundary is as shown in figure 5:



Figure 5: The land boundary after deducting the coastal and river boundaries.

3.6 Land Contour Drawing

From the DEM (Digital Elevation Model) data, then adjusted to the coordinates of the research location, the contours of the land are obtained with contour intervals of 1 meter. Soil contour drawings will be needed for cut and fill soil and for other planning purposes. The resulting land contour images are as shown in figure 6:

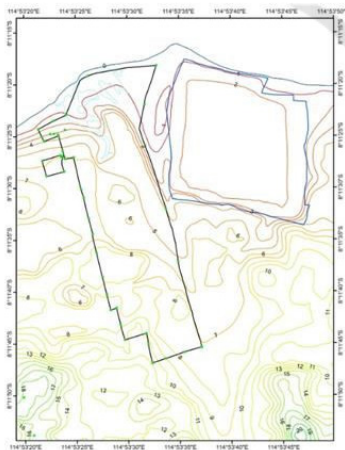


Figure 6: The land of the contour.

4 CONCLUSION

The conclusions of this research are:

1. The land boundary that can be used to build

tourism accommodation buildings is the land boundary that has been cut off by the beach and river borders. The land boundary after deducting the coastal and river boundaries, we get an area of 144,819.7910 m² or 14.48197910 hectares

2. The resulting land contour map is with a contour interval of 1 meter, where the contour map can be used for spatial planning purposes and cut and fill the land

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