

# Prosiding Seminar Nasional Geomatika 2019

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## *Geomatics Scientific Meeting on Planning and Disaster "Coastal Management to Support SDGs"*

Bandung, 18 September 2019



**PROSIDING SEMINAR NASIONAL GEOMATIKA 2019:  
GEOMATICS SCIENTIFIC MEETING ON PLANNING &  
DISASTER**

*"GEOMATICS SCIENTIFIC MEETING COASTAL MANAGEMENT  
TO SUPPORT SDG'S"*

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## KATA PENGANTAR

Segala puji dan syukur dipanjatkan ke hadirat Tuhan Yang Maha Esa atas segala rahmat dan karunia-Nya sehingga Prosiding Seminar Nasional Geomatika 2019 yang bertemakan *Geomatics Scientific Meeting Coastal Management to Support SDGs* dapat terbit online sesuai waktu yang direncanakan. Tema seminar ini dipilih untuk mendorong pemanfaatan data-data spasial dalam pengelolaan wilayah pesisir yang berorientasi pada pencapaian target-target SDGs. Melalui pemanfaatan informasi geospasial diharapkan wilayah pesisir yang menjadi wilayah konsentrasi peradaban dapat menghadapi tantangan pembangunan ke depan yang semakin kompleks. Melalui perencanaan yang baik dan komprehensif diharapkan pencapaian target SDGs dapat segera terealisasi.

Prosiding ini diterbitkan setelah melalui proses review terhadap makalah dan dilakukan perbaikan oleh penulis. Beberapa makalah tidak diikutsertakan pada Prosiding ini karena beberapa alasan, diantaranya karena beberapa tulisan terbaik, dengan seizin penulis, akan dimuat pada Jurnal Ilmiah Geomatika dan Majalah Ilmiah Globe. Alasan yang kedua adalah karena beberapa makalah lainnya yang telah melalui proses review tidak dikirimkan kembali ke panitia.

Atas nama panitia saya ucapkan terima kasih kepada seluruh peserta seminar yang telah meramaikan acara seminar ini, khususnya kepada penulis yang telah memperbaiki makalahnya untuk Prosiding ini. Terima kasih juga kepada seluruh panitia dan reviewer yang telah bekerjasama dalam mempersiapkan, mengawasi jalannya acara hingga menyelesaikan Prosiding Seminar Nasional Geomatika ini. Semoga Prosiding ini dapat bermanfaat untuk Penggunaan, Pengembangan produk dan Penyebarluasan hasil riset informasi geospasial.

Akhir kata, mohon maaf atas kekurangan dalam penyelenggaraan Seminar Nasional Geomatika 2019. Kami akan terus berusaha menyelenggarakan Seminar Nasional Geomatika yang lebih baik setiap tahunnya. Semoga Allah Subhanahu wa Ta'ala meridhoi segala niat dan usaha baik kita. Amin.

Cibinong, Desember 2020

Ketua Panitia,



Yosef Prihanto

## KATA SAMBUTAN

Puji syukur atas rahmat Tuhan Yang Maha Kuasa kegiatan Seminar Nasional Geomatika 2019: "Geomatics Scientific Meeting On Planning & Disaster yang bertemakan Geomatics Scientific Meeting Coastal Management to Support SDG'S" telah terlaksana dengan baik pada 17-18 September 2019 yang lalu. Seminar Nasional Geomatika ini merupakan kegiatan tahunan yang dilaksanakan oleh Bidang Penelitian, Pusat Penelitian, Promosi dan Kerja Sama.

Selaku Kepala Pusat Penelitian, Promosi dan Kerja Sama, saya menyambut baik terbitnya prosiding ilmiah Seminar Nasional Geomatika ini. Tentunya prosiding ini telah ditunggu-tunggu kehadirannya oleh para peserta Seminar maupun pemerhati kegiatan geomatika lainnya yang tidak sempat hadir pada acara Seminar Nasional tersebut.

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Cibinong, Desember 2020

Kepala Pusat Penelitian, Promosi dan  
Kerja Sama



Wiwin Ambarwulan

# DAFTAR ISI

Halaman Sampul .....	i
Halaman Katalog dalam Terbitan.....	ii
Halaman Anggota <i>Reviewer</i> .....	iii
Kata Sambutan .....	iv
Kata Pengantar .....	v
Daftar Isi .....	vi
1 TINGKAT KERENTANAN GERAKAN TANAH PALING LUAS PADA ZONA PENGENDALIAN KBU KABUPATEN BANDUNG BARAT Aprilana, Reynaldi Perdana T	1-10
2 UPDATING OF ATLAS FOR HOMECOMING MAPS Case Study: Sumatera Island Nurul Huda, Soni Darmawan	11-22
3 POSITION PRECISION ANALYSIS OF THE DUAL FREQUENCY LOW COST GPS MODULE MEASUREMENT WITH STATIC DIFFERENTIAL METHOD IN VARIOUS BASELINE LENGTH VARIATIONS Muhammad Haris Jonas, Henri Kuncoro	23-34
4 ANALYSIS OF SUBDUCTION ZONE DEFORMATION IN SOUTH EAST JAVA BASED ON CONTINUOUS GPS OBSERVATION DATA FOR 2009- 2014 Rizki Ahmad Faturochman, Hary Nugroho, Henri Kuncoro	35-42
5 CORRELATION ANALYSIS OF PM10 AIR POLLUTION WITH NDVI (NORMALIZED DIFFERENCE VEGETATION INDEX) BASED ON LANDSAT-8 AND SENTINEL-2A SATELLITE IMAGES Case Study: Bandung City, West Java Muhammad Reza Chandra Kusuma, Rika Hernawati <sup>1</sup> , Soni Darmawan	43-54
6 COMPARISON OF CHANGES IN URBAN HEAT ISLAND (UHI) IN 2013 AND 2018 USING SATELLITE IMAGERY DATA LANDSAT 8 (Case Study: Central Jakarta City) Masyita, Rika Hernawati, dan Soni Darmawan	55-60
7 IDENTIFICATION OF PM10 AIR POLLUTION DISTRIBUTION USING SATELLITE LANDSAT IMAGES IN BANDUNG, INDONESIA Novita Dewi, Rika Hernawati, Soni Darmawan	61-68
8 A CORRELATION ANALYSIS OF THE RELATIONSHIP BETWEEN AIR POLLUTION PARAMETERS PM10 WITH LAND SURFACE TEMPERATURE (LST) BASED ON LANDSAT 7ETM+ AND LANDSAT 8OLI/TIRS SATELLITE IMAGES IN BANDUNG CITY Aab R. Abdullah, Rika Hernawati, Soni Darmawan	69-78
9 IDENTIFIKASI PERUBAHAN LAHAN SAWAH KOTA SURAKARTA MENGGUNAKAN METODE NDVI Nattaya Mlatti Lakshita, Dwiki Muharrama, Muhammad Zeyd Arhan Juan Ramadhan, Muhammad Farhan Ahsani, Yosef Prihanto	79-84
10 AS-BUILT DRAWING GENERATION OF LFM BUILDING ITB USING TERRESTRIAL LASER SCANNER Irwan Gumilar, T. Hawaari, T.P Sidiq, A. Lukmanulhakim	85-106
11 ANDROID APPLICATION DEVELOPMENT FOR UNLIVABLE HOUSES DATA COLLECTION BASED ON PARTICIPATORY MAPPING Alfadila Anas, dan Dewi Kania Sari	107-116
12 PREDIKSI TUTUPAN LAHAN DAERAH TERDAMPAK TSUNAMI DAN PERUBAHAN MUKA PANTAI DENGAN GIS DI AREA TERDAMPAK TSUNAMI PALU, SULAWESI, INDONESIA Muhammad Zeyd Arhan Juan Ramadhana, Nattaya Mlatti Lakshita <sup>a</sup> , Dwiki Muharrama <sup>a</sup> , Muhammad Farhan Ahsania, Yosef Prihantob	117-122
13 ANALISIS KUALITAS PERMUKIMAN MELALUI PENGAMATAN GOOGLE IMAGERY DI KECAMATAN BANYUMANIK, KOTA SEMARANG Dwiki Muharrama, Nattaya Mlatti Lakshita, Muhammad Zeyd Arhan Juan Ramadhan, Muhammad Farhan Ahsani, Yosef Prihanto	123-132

14	STUDI PENENTUAN NILAI UNDULASI DARI EGM 2008 DENGAN DERAJAT HARMONIK 360, 720 DAN 2190 Di PULAU JAWA Nico Marcelino, Rustandi Poerawiardi , Diah Kirana Kresnawati , Dadan Ramdani, & Dessy Apriyanti	134-142
15	DEVELOPMENT OF HIGHWAY (TOLL ROAD) GEODATABASE IN JAVA ISLAND REGION Leonardo William Bela' Matasik & Soni Darmawan	143-152
16	UPDATING HOMECOMING ROUTE MAP (Case Study: Java and Bali Islands) Arief Rahman Hakim & Soni Darmawan	153-166
17	UPDATING GEODATABASE MAP HOMECOMING BASED ON INDONESIA GEOGRAPHY ELEMENT CATALOG (Case Study: Jawa-Bali) SISCA AYU PURWANTI & SONI DARMAWAN	167-178
18	INVESTIGASION OF PALM OIL PLANTATION USING MULTIALGORITHM AND MULTIRESOLUTION-SPECTRAL OF OPTICAL IMAGERY (Case Study: Asahan Regency, North Sumatra Province) Apriandi Kaban, Soni Darmawan	179-192
19	UPDATING HOMECOMING ROUTE MAP (Case Study: Sulawesi Islands) Nadila Dwiyantri, Soni Darmawan	193-204
20	PERAN TEKNOLOGI PENGINDERAAN JAUH DALAM MENDUKUNG PENDARATAN KENDARAAN AMFIBI DALAM MISI TANGGAP DARURAT BENCANA (The Use of Remote Sensing Technology in Supporting Amfibi Vehicle Landing in Disaster Emergency Mission) Abdurahman, Yosef Prihanto, Gentio Harsono	205-210
21	PREDIKSI LAHAN TERBANGUN DI KAWASAN PERKOTAAN PURWOKERTO TAHUN 2023 Nattaya Mlatti Lakshita, Dwiki Muharrama, Muhammad Zeyd Arhan Juan Ramadhan, Muhammad Farhan Ahsani, & Yosef Prihanto	211-214
22	DENSIFIKASI INACORS DI SUMATERA UNTUK MENDUKUNG KEBIJAKAN SATU PETA Isnaini Annuriah Mundakir & Febrylian Fahmi Chabibi	215- 222

## **UPDATING HOMECOMING ROUTE MAP (Case Study: Sulawesi Islands)**

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### **ABSTRACT**

Homecoming in Indonesia is identical with annual traditions that occur before religious holidays such as before Eid. That's when the opportunity to gather with relatives who are in his hometown. The number of enthusiasts going home, the density of vehicles in a number of sections will be a barrier for travelers to their hometown. To help travelers and other road users in planning or considering the route to be traveled, then media is needed that can provide information that can help in traveling back and forth. Geospatial Information Agency as the organizer and provider of spatial information, made a homecoming map together with Itenas in 2017 and 2018 for major islands in Indonesia including Sulawesi Island. This homecoming map was created by updating the homecoming map for 2018 by adding geographical elements and facilities that were not previously mapped to the homecoming map atlas in 2018 to match the actual conditions on the ground. The purpose of this research is to identify the elements that need to be updated on the homecoming atlas map, examine aspects of cartography that need to be updated in making homecoming maps, and evaluate the results of updating the Homecoming Atlas through a digital questionnaire. The method were qualitative analysis by identifying the elements needed in updating, with data processing gradually starting from classification, editing and generalization, adding supplementary information, to collecting questionnaires as evaluation material for the 2019 homecoming map atlas. The results of this study are Atlas of Mudik Maps 2019 Sulawesi Island region which has been updated with elements and aspects of the cartography, the results of the evaluation of the suitability and usefulness of homecoming maps, and the 2019 Homecoming Atlas Map of the Sulawesi Island region which is distributed digitally through the official website of Itenas Bandung. With this homecoming map, it is expected that users can be helped in choosing the best route when planning a travel route to be taken by considering information about the homecoming activities on the map.

**Keywords:** Homecoming, Homecoming Route Map, Identification, Geographic Elements, Cartographic Aspects

### **INTRODUCTION**

Homecoming has become a tradition that cannot be separated from Indonesian society ahead of major religious holidays such as Eid. That's when the opportunity to gather with relatives in his hometown. Homecoming people usually use public and private transportation, including: airplanes, trains, ships, buses, cars, motorbikes, even trucks that can be used to go home. This shows that homecoming can be done by land, water or air (Kuntadi, 2019). According to the Minister of Transportation Budi Karya Sumadi (2019) it is estimated that the number of people returning to their hometowns this year will reach 20.3 million. Of that number dominated by air transportation as many as 5.9 million people, followed by train as many as 4.9 million people, as well as private vehicles and buses as much as 4.3 million people. Homecoming activities that pass the land route using private vehicles and buses are usually carried out by travelers who migrate between provinces and cities / districts, while going home via water or air routes are carried out by travelers who migrate outside the island.

According to the Head of Road Transportation, Safety, and Railways of the Transportation Agency of Sulteng Sumarno (2018), homecoming flows between provinces and cities / regencies in Sulawesi are more crowded than inter-island homecoming flows. Homeways lane is crowded with private vehicles to big cities like Makassar, Gorontalo, and places that have tourist attractions. Aside from homecoming activities in Sulawesi, a number of non-Muslim community activities are also carried out on Eid. Vacation to an attractive tourist attraction, the main object sought by the public. The number of people who choose private vehicles over public transportation, is believed to be more efficient for a vacation to several tourist objects in Sulawesi and going home to his hometown (Irawan, 2018). To help travelers and other road users in planning or considering the route to be



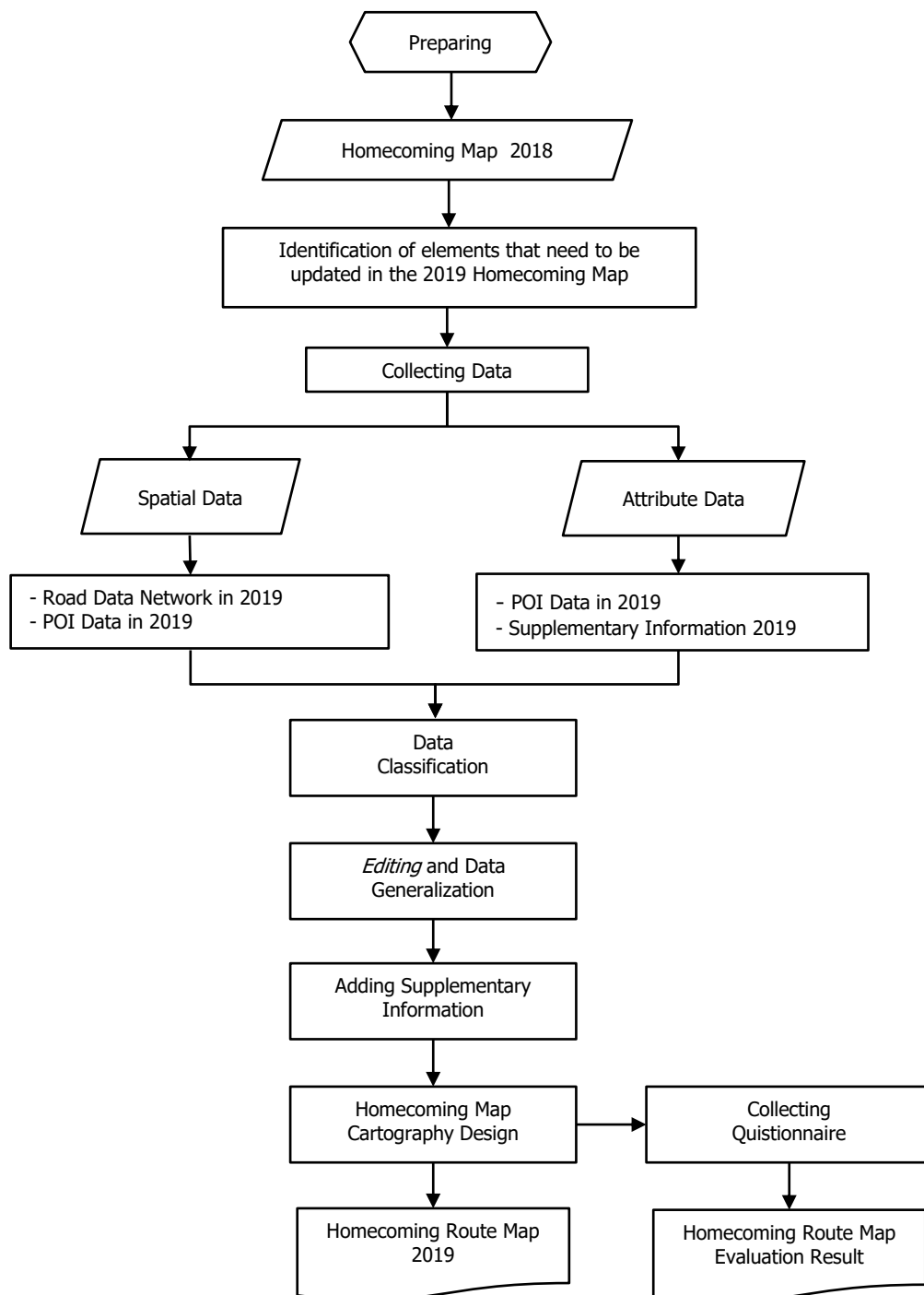
traversed, then media is needed to provide information about alternative routes, shortest path information, and other information that can help in traveling back and forth such as information on attractions, airports, ports, congestion-prone paths, and good paths for travelers. So that it can help travelers who travel by road with private vehicles to optimize time and cost.

Geospatial Information Agency as the organizer and provider of spatial information, made a homecoming map together with Itenas in 2017 and 2018 for major islands in Indonesia including Sulawesi Island. This homecoming map provides information needed by travelers (BIG, 2017). Updates to the homecoming map are carried out every year, by adding geographic elements and uncharted infrastructure. As contained in the 2018 Homecoming Map of Sulawesi Island, the lack of elements and other information such as disaster prone pathways, congestion-prone pathways, tourist attraction information, and other additional information, it is necessary to update or update the 2018 Homecoming Map on the Sulawesi Island region, so that information which is on the 2019 Homecoming Map according to user needs in helping homecoming trips.

Updating the Homecoming Atlas is a process of renewing geographical elements, cartographic aspects, and the addition of other information that can meet the needs of users while on the road. Atlas of Homecoming 2019 will be presented more interesting and easy to understand by containing the rules of cartography on each object. This updating will use the 2018 homecoming map as a base map in the process of adding and repairing the data contained therein, including the updating of cartographic elements and aspects such as road network elements, Point of Interest (POI) elements, coloring aspects, legends, and the addition of other information that will make the 2019 homecoming map display more interesting and informative. With this homecoming map, it is expected that users can be helped in choosing the best route when planning a travel route to be taken by considering information about the homecoming activities on the map. In addition, the homecoming map is expected to provide information to meet the needs of users while on the road, so they can get to their destination safely.

## **METHOD**

The method used in this study is a qualitative analysis research method by identifying geographical elements and cartographic aspects that need to be updated from the homecoming map previously made by the Geospatial Information Agency with reference to the 2018 Homecoming Map of Java-Bali Island. The methodology in this research was carried out in several stages, namely preparation including preparation of tools and materials and collection of literature studies, Stage identification of elements and aspects of cartography on homecoming maps including the activities of searching, finding, and researching what needed to be updated in making the 2019 Homecoming Atlas Map, spatial data collection and attribute data, data classification, editing and generalization of data, addition of supplementary information, to the design of cartographic homecoming maps, the results of homecoming maps and homecoming map evaluation in the form of questionnaires. The research methodology can be seen in **Figure 1**.



**Figure 1.** Flowchart Method

### Identification Of Elements That Need To Be Updated In The 2019 Homecoming Map

This identification makes the 2018 homecoming map of the Java-Bali region as a reference for adding elements and adjusting the cartographic aspects that will be used in the 2019 homecoming cartographic map of the Sulawesi Island region. The elements that need to be updated in the 2019 Homecoming Atlas Map include road network elements, POI (Point of Interest) elements, elements of coastal and sea boundary administration, and supplementary information that supports homecoming maps. While the cartographic aspects to be updated are related to coloring, generalization, and map layout.

*Collecting Data*

The data used in this study include spatial data and attribute data. Where spatial data is road network data obtained from the Ministry of PUPR, POI (Point of Interest) data is obtained from BIG, Attribute Data is complementary information data obtained from the Ministry of PUPR. Source of spatial data and attribute data obtained from various stakeholders in accordance with the capacity and authority in providing data related to making homecoming maps as presented in **Table 1**.

**Table 1.** Research data

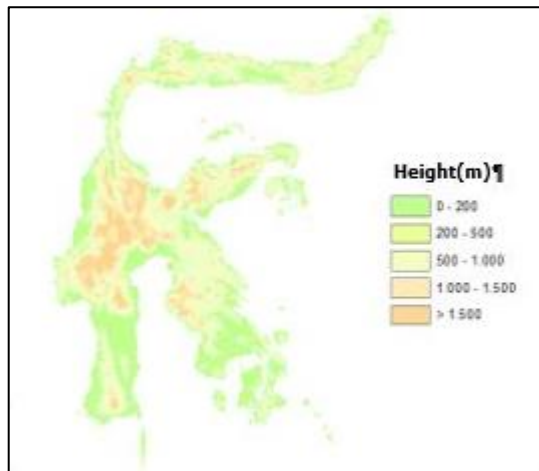
No	Data	Data Form	Data Source
1.	Road Data Network in 2019 : Toll Road Artery Road Collector Road Local Road Railway Road	Spatial Data	Ministry of Public of Works and Housing
2.	Point of Interest (POI) Data in 2019: Airport Port Tour Objects	Spatial and Attribute Data	Homecoming Map Team
3.	Topography Data	SRTM Res 90 m	<a href="http://srtm.csi.cgiar.org/">http://srtm.csi.cgiar.org/</a>
3.	District Administration Data in 2019 Lakes, Coastline, and Sea	Spatial and Attribute Data	Information Agency Geospatial
4.	Supplementary Information in 2019 Toll Information Price Toll Information	Attribute Data	Ministry of Public of Works and Housing

*Data Classification*

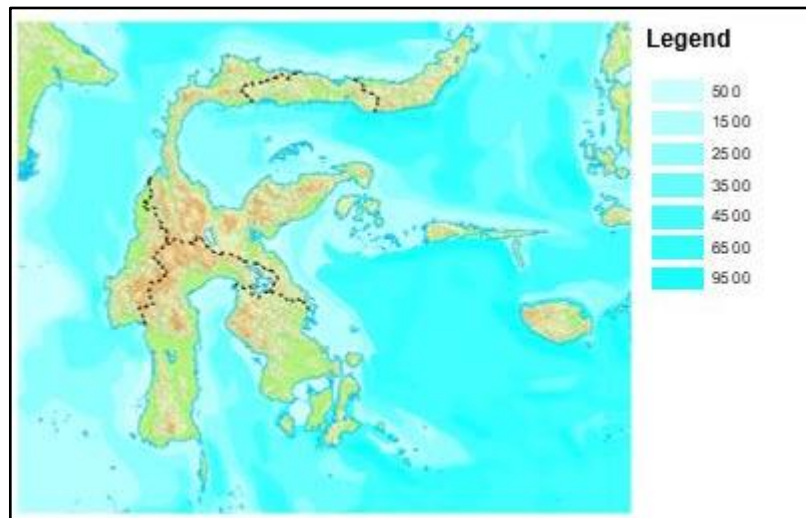
Data classification aims to display data in the form of certain classes according to its type. Data classification activities are very necessary to display data in accordance with certain categories or classes so that the data collected becomes arranged in a table according to statistical rules, so that in later mapping it becomes easier and faster to do so and can minimize the possibility of errors caused by not regular data. Data classification is carried out on road, topographic and marine network data.



**Figure 2.** Classification of Road Network Data.



**Figure 3.** Classification of Topography Data.



**Gambar 4.** Classification of Sea Boundary Data

The road network data classification is grouped into 3 (three) classes of roads, namely, operational toll roads, main lanes, and alternative lanes. While the classification on topographic data is grouped into 5 (five) classes based on their height. In the sea depth data are classified into 7 (seven) classes based on their depth level.

## 2.4 Editing and Generalization

Data editing includes checking and repairing activities by shifting or moving points that are deemed necessary by considering the density of data that is on the face of the map. Data generalization includes selection/selection, simplification, combination and enlargement. Data editing and generalization is very necessary to obtain simple data so that it can be displayed well looking at the size of the face of the map which is very dependent on limited paper media. Data generalization is done on road network data, POI (Point of Interest), and other additional information.

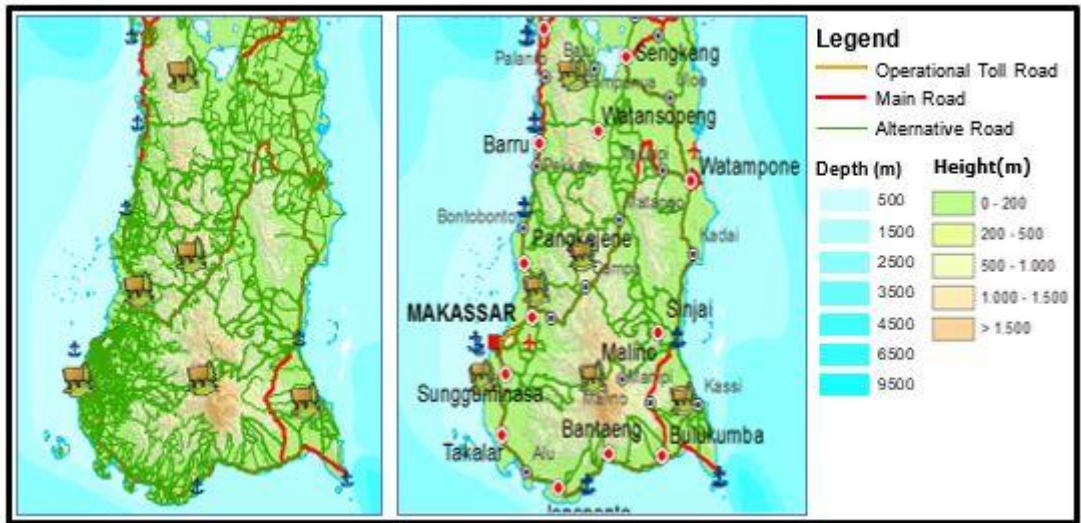


Figure 5. Editing and Generalization Road Networks.

The process of generalization by enlarging the road network is also carried out to clarify the homecoming lane in certain areas, such as North Sulawesi, South Sulawesi, and the Toll Road Network. This generalization is done to reduce the accumulation of data on the map back and forth.

**Supplementary Information Addition**

Complementary information consists of details of toll roads and alternative routes, as well as descriptive information relating to homecoming activities. Details of toll roads and alternative lanes are made to clarify to the user the information available on toll roads and alternative routes that require special space so that the information is presented in full. Descriptive information is created with the aim of displaying supplementary information about going home, as well as clarifying and adding information on the face of the map. Descriptive information consists of toll road tariff information from the Ministry of PUPR, Call Center information from BPJT, and tourist information.

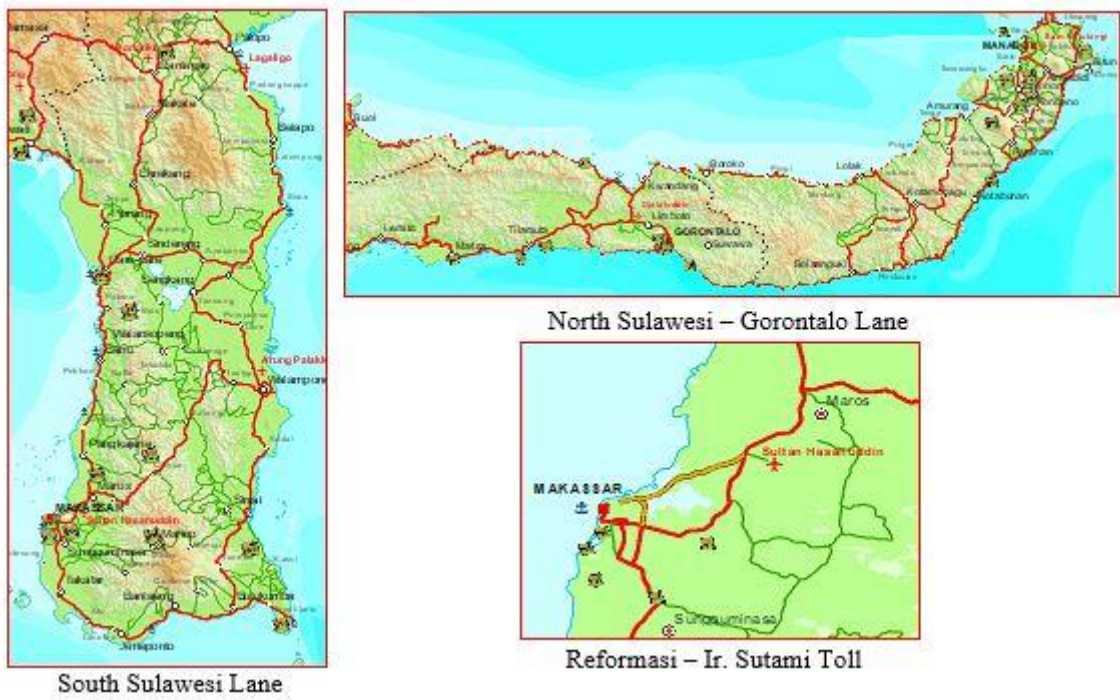


Figure 6. Details of Alternative Lines and Toll Roads

## Cartography Homecoming Map Design

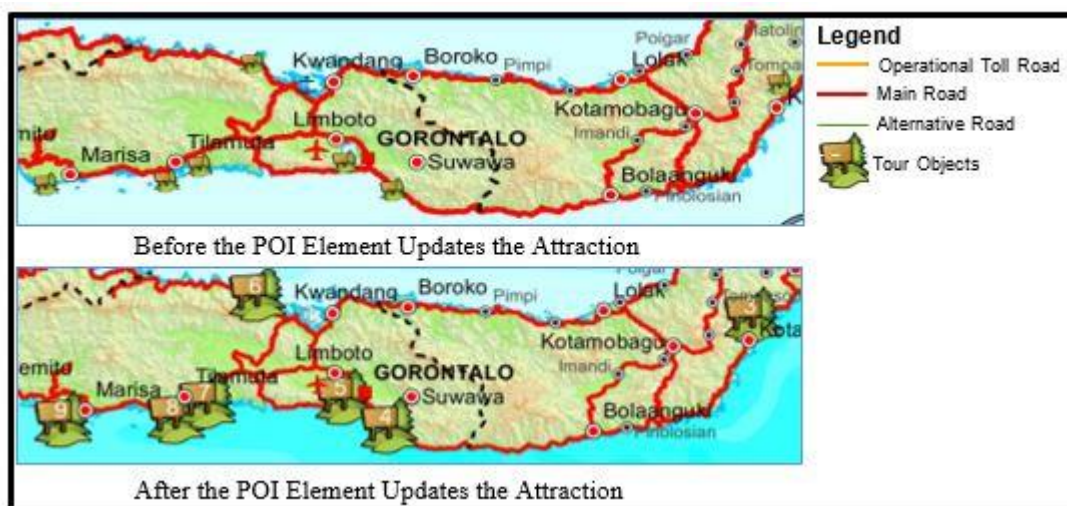
Cartography homecoming map design in the implementation of this study is the determination of the design of symbols for each data, the selection of colors for each symbol, as well as the layout on the map to be presented. The design of symbols is one of the processes that play an important role in the design of a map. Symbols are images, shapes, or objects that represent an idea, object, or amount of something. The map symbol is a communication tool between the map maker and the map user regarding the mapped object. In order for maps to be well communicated to their users, the map symbol design must be designed as well as possible. Soendjojo and Riqqi (2012) in their book entitled "Cartography" said that there is one part of the map sheet that can be distinguished on the map face, map boundary information, and map edge information. The face of the map is part of the map that presents the mapped area, bounded by the edge of the map which can be in the form of grid lines or free lines. Map boundary information provides data relating to the face of the map, generally the data presented on the map boundary information are numbers from the coordinate data whose area is on the face of the map. Map edge information is part of a map sheet that provides information about matters relating to the contents of the map, so that map users can evaluate and interpret the map concerned.

## RESULTS AND DISCUSSION

The results of updating Homecoming Route Map 2019 of the Sulawesi Island region consist of updated elements, cartographic aspects updated on the 2019 Homecoming Map to suit user needs. In addition, this study evaluates the usefulness and suitability of homecoming maps for users in order to find out the user's response to homecoming maps that have been made, and making the homecoming map can then be adjusted to user needs.

### Analysis of Updating Elements on the 2019 Homecoming Map

The results of updating the elements that go through the processing stage on the 2019 Homecoming Map occur on POI (Point of Interest) elements, which are attractions and elements of the sea administration boundary. POI elements in the form of attractions are added in the form of attribute data along with tourist information that is placed on the homecoming map. The POI element of the tourist object on the previous homecoming map contained no attributes regarding the name of the object, then added the attraction and its attributes as shown in **Figure 8**. Furthermore, the results of updating the elements of the Atlas Homecoming Map in the form of additional sea administrative boundaries that were not previously included in the 2018 homecoming map of Sulawesi Island. The addition of the sea administrative boundary refers to the 2018 homecoming map of Java-Bali. These changes are shown in **Figure 9**.



**Figure 7.** Updating POI Elements of Attraction.

OBJEK WISATA PULAU SULAWESI			
1. Pulau Bunaken	11. Pantai Talise	21. Danau Biru	31. Benteng Sumba Opu
2. Taman Nasional Tangkoko	12. Taman Nasiona Lore Lindu	22. Pulau Labengke	32. Hutan Pinus Malino
3. Pantai Lakban Ratatok	13. Air Terjun Saluopa	23. Pemandian Air Panas Waolesea	33. Kawasan Adat Ammatoa
4. Taman Laut Olele	14. Danau Poso	24. Pulau Bakori	34. Pulau Muna
5. Benteng Otanaha	15. Air Terjun Salodik	25. Air Terjun Tumburano	35. Pantai Nirwana
6. Pantai Dunu	16. Pantai Manakarra	26. Air Terjun Moramo	36. Taman Laut Taka Bonerate
7. Air Terjun Tenilo	17. Pulau Bulupoloe	27. Taman Nasional Rawa Aopa Watumoh	
8. Pulau Cinta	18. Lolai Negeri Di Atas Awan	28. Pemandian Air Panas Lejja	
9. Pantai Pohon Cinta	19. Air Terjun Limbong Kamandang	29. Taman Nasional Bantimurung Bulusara	
10. Pantai Tanjung Karang	20. Pantai Palippis	30. Karst Rammang-Rammang	

Figure 8. Element Object POI Attributes

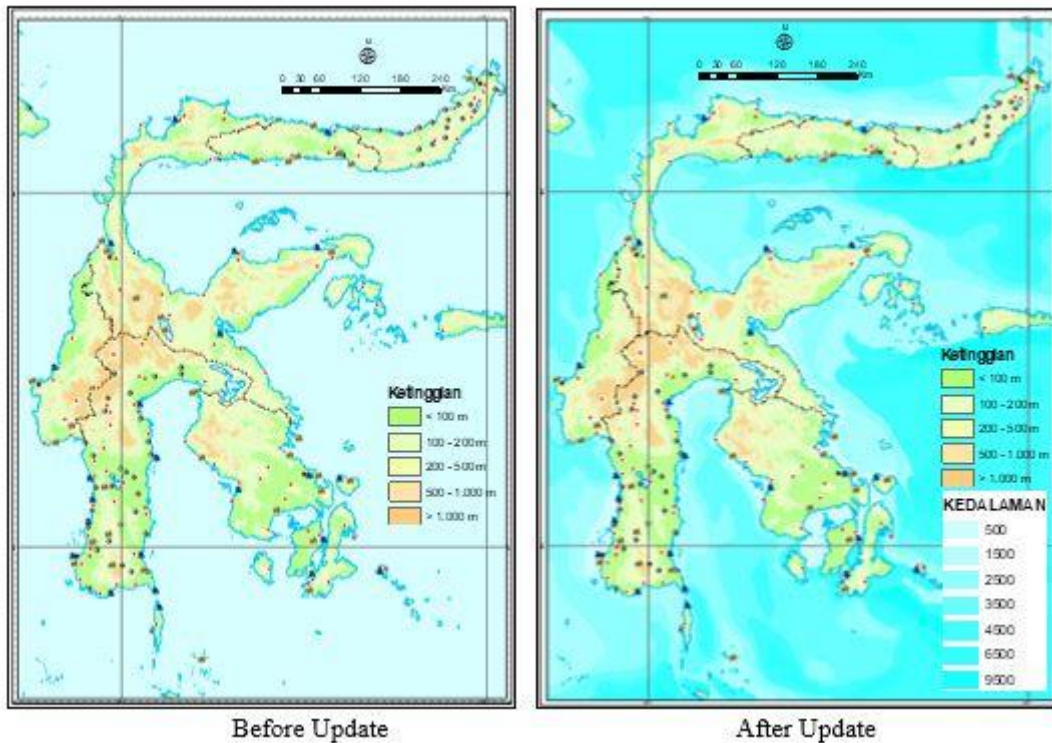


Figure 9. Results of Updates Sea Boundary Elements

### Analysis of Updated Cartographic Aspects

Updating the cartographic aspects carried out in the 2019 Homecoming Map, namely in the map layout section, such as in the legend section and other supplementary information. Aspects that need to be considered in making homecoming maps to fit the cartographic rules include generalization, determination of symbols and colors, as well as the layout of the map. Generalization includes the selection process and the process of eliminating (smoothing) the elements of the road network. From the data provided by the Ministry of Public Works and Housing, the road network that is displayed is less informative when used in the homecoming map, so the selection of the road network is used as an alternative route and the main route back and forth, while other paths that do not enter the election are eliminated.

The symbol used in the 2019 Homecoming Atlas Map uses the same symbol on the Java-Bali Homecoming Map that was created by BIG and Itenas previously. Color selection is used in the process of data classification so that differences are seen in each class. This color selection is done in the Sea and Topography classification using subtractive colors, where the color is obtained from mixing colors based on ink media on paper. This model is also referred to as CMYK (Cyan, Magenta, Yellow, Black) Color System. The map layout for thematic maps does not have rules to be used, but thematic maps are made interesting and informative to suit the needs of homecoming users and can be used as a medium in determining the best route for going back and forth.

## Analysis Homecoming Route Map

The results of the 2019 Homecoming Atlas Map of the Sulawesi Island region are presented in softcopy and in the form of a digital map. The Atlas Map of Mudik 2019 softcopy is available in .pdf format, and in the form of a digital map issued by Itenas before the Eid homecoming on May 29, 2019 and can be accessed online on the official Itenas website (<https://www.itenas.ac.id/>). The homecoming map is divided into 3 parts, namely the face of the map, map boundary information, and map edge information. Obtained the face scale of the map is 1: 3,000,000. Home map of the homecoming presents Sulawesi Island along with information about homecoming activities. Front map on the 2019 Homecoming Atlas Map of Sulawesi Island was made with a size of 42cm x 60cm (paper size A2) so that it can cover all information in detail and clearly. Map boundary information displays coordinate data in degrees (°), minutes (') and seconds (") at 5 degree intervals. The front edge map information displays complementary and descriptive information. The results of the "Updating Homecoming Route Map of the Sulawesi Island region" which were designed in accordance with the rules of cartography are presented in **Figure 10**.

**Table 2.** Result of Homecoming Route Map 2019

No.	Map Advance Information	Map Edge Information
1	Sulawesi Road Network: - Highway - Main Road Going Home - Alternative road	Supplementary Information: - Reformasi-Ir. Sutami, - Alternative routes North Sulawesi-Gorontalo, and South Sulawesi,
2	Administrative Border of Sulawesi Region: - provincial capital and name, - regency/city capital along with name, - district and name, - provincial boundary - regent and name, - regency and name, - coastline,	Descriptive Information - fare information, - Toll call center information, - action information, - web address information, - Itenas web address information and social media contact list.
3	Point of Interest): - locations and names, - district and name, - Airport and name,	





Figure 10. Result of Homecoming Route Map of the Sulawesi Island region.

### Questionnaire Analysis

The results of the evaluation of the "Updating Homecoming Route Map of the Sulawesi Island region " through the creation of a questionnaire "Survey of Use of the Homecoming 2019 Map" in digital form and distributed online to several Itenas students with a total of 38 questions and 59 respondents. The results of this evaluation are categorized into 4 (four) question categories, where the questionnaire questions cover the elements of the 2019 Homecoming Route Map, cartographic aspects and visualization design displayed on the homecoming map, cartographic elements that need to be present on the 2019 Homecoming Route Map, and questions regarding the use and suitability of the 2019 Homecoming Atlas Map with user needs.

In terms of the elements contained in the homecoming map, some information is very helpful for users in carrying out homecoming activities, such as the main lane, alternative lanes, toll roads, toll tariff information, airports, and tourist attractions. The elements that do not match the information on the map with the actual situation, such as alternative routes. In making the next homecoming map, other elements need to be added, because seen from the elements that exist in the 2019 Homecoming Route Map of the Sulawesi Island region there are only elements of the main homecoming lane, alternative lanes, toll roads, attractions, ports, and airports only. According to

respondents, it is necessary to add elements such as gas stations, hazard-prone points and disaster-prone points.

The cartographic aspects of the 2019 homecoming map are made according to the cartographic rules. The aspects in it are legend, symbolization, color, text, scale, and map layout. The results of the questionnaire showed that, the cartographic aspect of the symbol was less informative to the user because of the relatively small size of the symbol on the digital map display so that the symbols on the map were less visible. Overall the appearance of cartographic aspects on the 2019 Homecoming Route Map in Sulawesi Island received a fairly good response from users in terms of presentation and visualization.

In addition to the cartographic aspects, cartographic elements need to be present on the homecoming map so that the visualization design of the homecoming map is in accordance with the cartographic rules. The main elements consisting of title, subtitle, legend, map, wind direction, map making date, map maker, and scale of the bar are not listed in its entirety on the 2019 homecoming map that has been made. Thus, the results of the questionnaire survey stated that all major elements need to be in the 2019 Homecoming Atlas Map of the Sulawesi Island region. The survey results of the use of homecoming maps with a total of 59 respondents, found that the homecoming map in digital form is in demand by users because it is easier and more effective, with an attractive display and information on homecoming routes that can be used by Eid travelers. kesimpulan dan saran

## **CONCLUSION**

This research produced the 2019 Homecoming Route Map of the Sulawesi Island region in the form of a digital map format. Pdf and distributed online on the official website of Itenas (<https://www.itenas.ac.id/>) on May 29, 2019. Based on the results obtained, can be concluded: The elements that have been updated on the homecoming map according to the identification results by referring to the elements that exist on the Java-Bali Homecoming Map include the POI (Point of Interest) element, in the form of a tourist attraction along with its name; administrative boundaries, in the form of sea; detailed information on the Reformasi-Ir. toll road Sutami; information on alternative routes from North Sulawesi to Gorontalo, and South Sulawesi; toll tariff information; BPJT call center information; attraction information; Itenas address information; web address information and Itenas social media contact list. Updated aspects of cartographic Atlas 2015 Mudik 2019 cartographic design visualization, namely color, used in classification of topographic elements and sea administrative boundaries, map layout made on the face of the map, map boundary information, and map edge information, the main elements on the map such as title, legend, map, north direction, map ownership, bar scale, page divider, grid system, and map source. Evaluation of the results of the 2019 Homecoming Atlas Update based on the questionnaire provides critics and suggestions from homecoming map users regarding the elements and aspects of cartography contained on the homecoming map, visualization of cartographic design, as well as the usefulness of the homecoming map 2019. According to the results of the questionnaire, the elements which is lacking, cartographic aspects that are not informative, need to be updated in making the next homecoming map.

From the discussion of this research, the author has several suggestions to be considered and carried out for further research in order to be better and get maximum results. The suggestions from the authors as the next research: Need to add data on other geographical elements such as hazard data (prone to traffic jams and disaster-prone), information on gas stations, hospitals, which can support the presentation of homecoming maps so that maps can be more informative and interesting for future homecoming users. Making the homecoming map then it is necessary to hold field validation, in order to avoid any discrepancies between the map with the actual conditions. To be more attractive and much sought after by travelers, there is a need to create a digital homecoming map application on a smartphone so that it is easily accessed by travelers. Based on the survey results of the use of homecoming maps through questionnaires, the Atlas Island Homecoming Map is rarely used by homecomers, then this Homecoming Atlas can be developed back into other thematic maps such as the Atlas Island Road Network or the Sulawesi Island Tourist Map.

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