

Determination and Confirmation of Boundaries for Dhawe Village, Aesesa District, Nagekeo Region Using Cartometric Point Methods and High Resolution Satellite Images Acquisition in 2013

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ABSTRACT

Boundaries are one of the elements that must be depicted in a base map. The focus of this research is on boundaries or adjudication. Regional boundaries experience problems, including boundaries between villages that overlap between one village and another. Minister of Home Affairs Regulation Number 1 of 2017 concerning Village Structuring is the initiator in village structuring, however, there are still minimal regions structuring village authority through regional head regulations. Images are cropped to create indicative administrative map boundaries, a very important first step in regional boundaries. This research aims to determine and confirm the boundaries of Dhawe Village, Aesesa subdistrict, Nagekeo Regency in the context of implementing Permendagri Number 76 of 2012 in determining and confirming village boundaries, and aims to provide geospatial data in the form of village boundary coordinates. The method used in this research uses a cartometric method. After determining the boundary segment cartometry points, it produces 26 points which also contain the coordinates of Dhawe Village and produces agreed segment boundaries. Not only that, the researcher carried out a field approach test to test the correctness of the cartometry position so that the results could properly represent the expected village boundary area

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1. INTRODUCTION

Each region has village boundaries which serve as boundaries between one region and another. Therefore, as time progressed, the Government made regulations in of Minister of Home Affairs Regulation Number 45 of 2016 which contained guidelines for confirming regional boundaries (Wijaya et al., 2023). Regional boundaries are very important in order to optimize regional authority. Regional expansion is one of the interesting things in regional autonomy. The aim of regional expansion is of course to make the region resulting from expansion more advanced and prosperous for its people. As more and more regions experience expansion, the existence of boundaries between adjacent regions becomes quite important to resolve (Budisusanto et al., 2020).

Limit region experiencing problems with boundaries between villages overlapping between one village and another. Well-defined village boundaries will make things easier for the government village in carrying out village authority in carrying out village planning (Alfitra et al., 2022). Minister of Home Affairs Regulation Number 1 of 2017 concerning Village Structuring is the initiator in village structuring, however, there are still minimal regions structuring village authority through regional head regulations. Village authority is related to territorial boundaries which are the basis for managing space in the village as well as enforcing village authority which has implications for the development and empowerment model in the village. Villages must have territorial boundaries and village authority so that having authority without territorial boundaries will cause many problems (Bashit et al., 2019).

Confirmation of regional boundaries can be carried out based on the Regional Establishment Law in the Minister of Home Affairs Regulation Number 76 of 2012. This regulation explains that the confirmation of territorial boundaries can be determined using the cartometric method. The cartometric method produces negotiations between two regions that border each other which are outlined into points (Adikresna et al., 2014).

Determining regional boundaries needs to be done by tracing and drawing boundaries as well as measuring and calculating the position (coordinates), distance and area coverage using a Geographic Information System (GIS) (Prahasta, 2006). A Geographic Information System (GIS) is an organized collection of computer hardware, software, geographic data and personnel designed to efficiently acquire, store, update, manipulate, analyze and display all forms of geographically referenced information (Masykur, 2014).

This research aims to determine and confirm the boundaries of Dhawe Village, Aesesa subdistrict, Nagekeo Regency in the context of implementing Permendagri No.76 of 2012 in determining and confirming village boundaries, and aims to provide geospatial data in the form of village boundary coordinates point and delineate sub-district and village boundaries cartometrically and display them on the map.

Another aim of this research is to carry out boundary tracing and drawing as well as analysis of the spatial quality of the Dhawe Village boundary delineation that has been determined. Delineation of regional boundaries that have been determined through the Minister of Home Affairs Regulation (Sukoco et al., 2021).

2. METHODS

2.1 Research Location

This research area is in Dhawe Village, Aesesa District, Nagekeo Regency, which is between 8° 35' 25.44" South Latitude and 121° 14' 2.4" East Longitude, with visualizations contained in high resolution satellite image data as well as administrative area boundary maps

and delineated village/subdistrict boundary data resulting from delineation cartometric 2019 Geospatial Information Agency Regional Mapping Center

2.2 Data and Equipment

The required data can be seen at. **Table 1** is research data used to conduct research both as primary and secondary data.

Table 1. Research Data

No	Data	Years
1	Basemap Image Data	-
2	Indicative Boundary Segment of Dhawe Village	-
3	Village/Regency Boundary Data Results from the Center for Cartometry Delineation for Geospatial Information Agency Regional Mapping	2023

Software

- Microsoft Office 2010, used for writing reports, data recapitulation (area, percentage distribution, potential), creating diagrams, graphs and presentation slides.
- Image data processing software.
- ArcGIS 10.8 is used for mapping and determining regional boundaries. This software is also used to create map attributes.

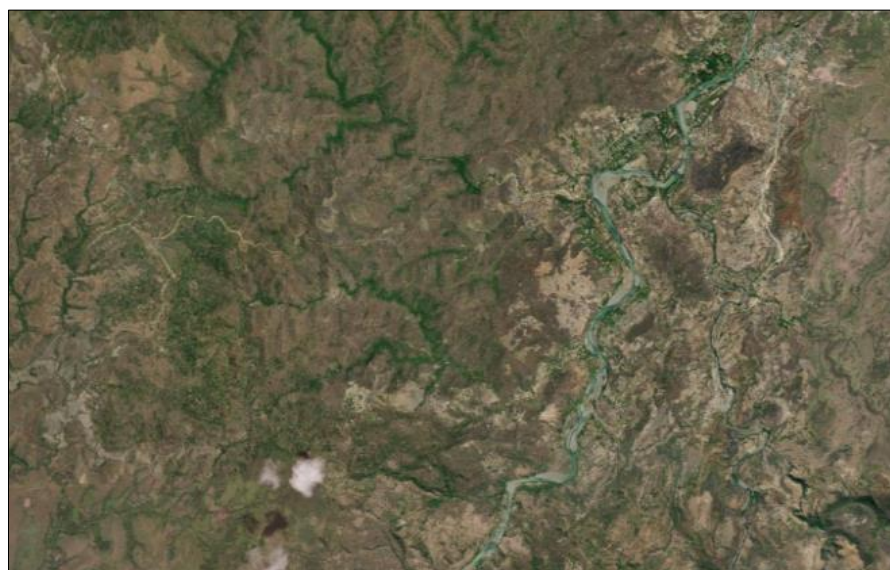


Figure 1 .Basemap Image

The image above is a basemap image from ArcGIS software. Basemap is a permanent mapping that is the basis and is usually built-in in GPS receivers (Nugraha et al., 2022). The map information displayed includes coverage of oceans, rivers, lakes, main cities, small towns, capitals, highways, local roads, railways, airports, and political boundaries (Saily et al., 2021). It is hoped that it can help in completing the determination and confirmation of the boundaries of Dhawe Village, Nagekeo Regency. Regions that do not yet have clear territorial boundaries require assistance regarding the clarity of their territorial boundaries (Arsana, 2007).

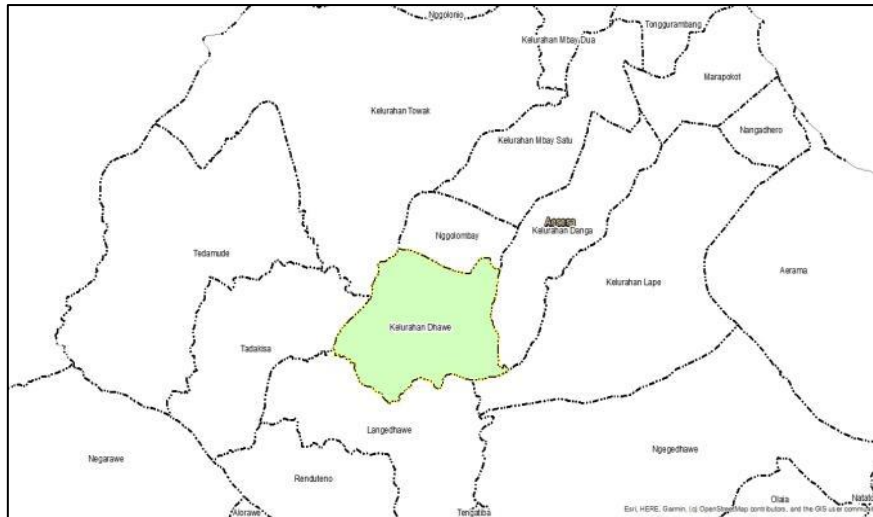


Figure 2. Indicative Boundary Segment of Dhawe Village

The image above is an indicative boundary segment map of Dhawe Village, Nagekeo Regency which was sourced from the official website of the Geospatial Information Agency (BIG) as a reference for research data needs to help create a map of the Dhawe Village area boundaries which will later be agreed in accordance with the Ministry of Home Affairs Number 45 of 2016 concerning determination and confirmation of village boundaries.

The map scale used to depict the indicative boundary segment of Dhawe Village is a scale of 1:75,000 sourced from the 2020 Geospatial Information Agency Regional Boundaries database.

2.3. Methodology

The method used in this research uses a cartometric method which has the advantage of not conducting a direct survey in the field because boundary determination is only the result of negotiations on indicative boundary segments (Bashit et al., 2022).

Arranging regional boundaries using the cartometric method using basemap images from ArcGIS is expected to be able to provide good boundary determination results. The cartometric method by observing the coordinates of the outermost villages/villages is highly recommended to determine administrative boundary lines between regions (Riadi and Sudarmadji, 2012).

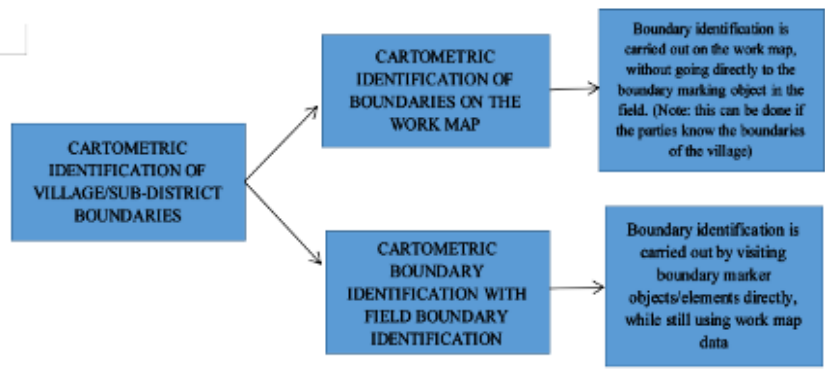


Figure 3. Identification of Cartometric Boundaries

The image above shows the stages of cartometric boundary identification where there are two cartometric identification methods, the first is boundary identification carried out on a work map, the second is cartometric boundary identification by identifying field boundaries (Sudaryatno et al., 2019).

Referring to the Geospatial Information Agency, the cartometric method is tracing or drawing boundary lines on work maps and measuring or calculating the position of points, lines, distances and area coverage using base maps and other geospatial information as support (Fatkhawati et al., 2017)

The initial stage of image processing begins with geometric correction. This geometric correction process aims to provide coordinates to the image by positioning the image according to the indicative boundary segment map of Dhawe Village which has a map projection system to reduce errors (distortion) due to the influence of the curvature of the earth or by superimposing the corrected image with another (Lukiawan et al., 2019).

The second stage processes all boundary segment data using the overlay method. The data used is indicative village boundary segment data and regional boundary segment data which will later become a reference for determining agreed cartometric points and Dhawe Village segments (Riadi and Soleman, 2011). Determining differences in boundary segment positions refers to the horizontal accuracy as stated in SNI 6502.2:2010 concerning Presentation of 1:25.000 Scale Earth Maps (Nasional, Badan Standardisasi, 2009).

Confirming regional boundaries cartometrically is expected to be a solution in confirming areas which are realized in village maps that have coordinates. Boundary segment analysis using the cartometry method begins with tracing/drawing boundaries on a work map and measuring/calculating point positions, distances and area coverage (Himawan et al., 2019) using administrative maps and remote sensing data as support (Mukaddas, 2022)

From this research, cartometric points and segment boundaries of Dhawe Village were produced which were agreed to be presented in geospatial data in the form of village boundary coordinates, as well as cartometric points and displayed on a map.

3. RESULTS AND DISCUSSION

In this section, the results of the research carried out regarding the determination and confirmation of village boundaries using the cartometric method are presented. The results of the research produced Dhawe Village segment boundaries and cartometric points that have been agreed upon and are expected to be input into the implementation of further village boundary determination and confirmation activities.

The determination of the cartometric points for Dhawe Village is the result of an agreement between the community and village officials which resulted in the determination of regional boundaries which can be seen in **Table 2**.

Table 2. Dhawe Village Cartometric Point

Cartometric Point Name	Latitude Coordinates in DMS	Longitude Coordinates in DMS	Y coordinate in UTM projection	X coordinate in UTM projection
TK 53.16.01.1001-01.1005-001	8° 34' 28.871" S	121° 13' 15.682" E	9051715.474	304212.2312
TK 53.16.01.1001-01.1005-01.2016-000	8° 35' 1.131" S	121° 13' 1.103" E	9050722.265	303770.9876
TK 53.16.01.1001-01.1005-01.2017-000	8° 34' 17.062" S	121° 13' 28.620" E	9052080.13	304606.2101
TK 53.16.01.1001-01.1009-001	8° 35' 58.430" S	121° 15' 18.366" E	9048981.132	307976.4691
TK 53.16.01.1001-01.1009-01.1011-000	8° 36' 4.985" S	121° 15' 18.921" E	9048779.826	307994.3383
TK 53.16.01.1001-01.1009-01.2017-000	8° 34' 39.234" S	121° 15' 21.456" E	9051414.726	308059.8977
TK 53.16.01.1001-01.1011-07.2003-000	8° 36' 37.015" S	121° 14' 47.002" E	9047791.274	307022.8327
TK 53.16.01.1001-01.2016-001	8° 35' 45.084" S	121° 12' 22.553" E	9049366.339	302598.4348
TK 53.16.01.1001-01.2016-002	8° 35' 28.515" S	121° 12' 30.749" E	9049876.576	302846.6913
TK 53.16.01.1001-01.2016-07.2004-000	8° 36' 49.592" S	121° 11' 9.519" E	9047373.844	300374.4987
TK 53.16.01.1001-01.2017-001	8° 34' 37,000" S	121° 14' 24.094" E	9051475.362	306305.4526
TK 53.16.01.1001-01.2017-002	8° 34' 37.821" S	121° 14' 27.219" E	9051450.59	306401.1187
TK 53.16.01.1001-01.2017-003	8° 34' 29.977" S	121° 14' 39.331" E	9051693.28	306770.4073

TK 53.16.01.1001-01.2017-004	8° 34' 32.697" S	121° 14' 47.086" E	9051610.785	307007.9274
TK 53.16.01.1001-01.2017-005	8° 34' 30.455" S	121° 14' 49.432" E	9051679.999	307079.3496
TK 53.16.01.1001-01.2017-006	8° 34' 32.470" S	121° 15' 2.016" E	9051619.843	307464.4759
TK 53.16.01.1001-01.2017-007	8° 34' 37.269" S	121° 15' 10.077" E	9051473.519	307711.6543
TK 53.16.01.1001-01.2017-008	8° 34' 35.643" S	121° 15' 12.447" E	9051523.812	307783.8797
TK 53.16.01.1001-07.2003-001	8° 36' 33.058" S	121° 13' 19.152" E	9047900.471	304336.0476
TK 53.16.01.1001-07.2003-002	8° 36' 9.436" S	121° 13' 49.731" E	9048630.546	305267.703
TK 53.16.01.1001-07.2003-003	8° 36' 11.829" S	121° 13' 54.864" E	9048557.762	305425.0199
TK 53.16.01.1001-07.2003-004	8° 36' 12.383" S	121° 13' 57.906" E	9048541.165	305518.1031
TK 53.16.01.1001-07.2003-005	8° 36' 12.116" S	121° 14' 41.639" E	9048555.512	306855.3505
TK 53.16.01.1001-07.2003-07.2004-000	8° 37' 0.133" S	121° 12' 31.289" E	9047061.777	302876.364
TK 53.16.01.1001-07.2004-001	8° 37' 0.583" S	121° 12' 16.799" E	9047045.865	302433.3736
TK 53.16.01.1001-07.2004-002	8° 37' 6.936" S	121° 12' 3.241" E	9046848.752	302019.7299

From the research results, it was possible to produce 26 agreed catrometric points Dhawe Village. A field approach test was carried out to test the correctness of the cartometry position so that the results could properly represent the village boundary area. Therefore the determination and confirmation of the Dhawe Village boundaries were as expected.



Figure 3. Dhawe Village Segment Boundaries

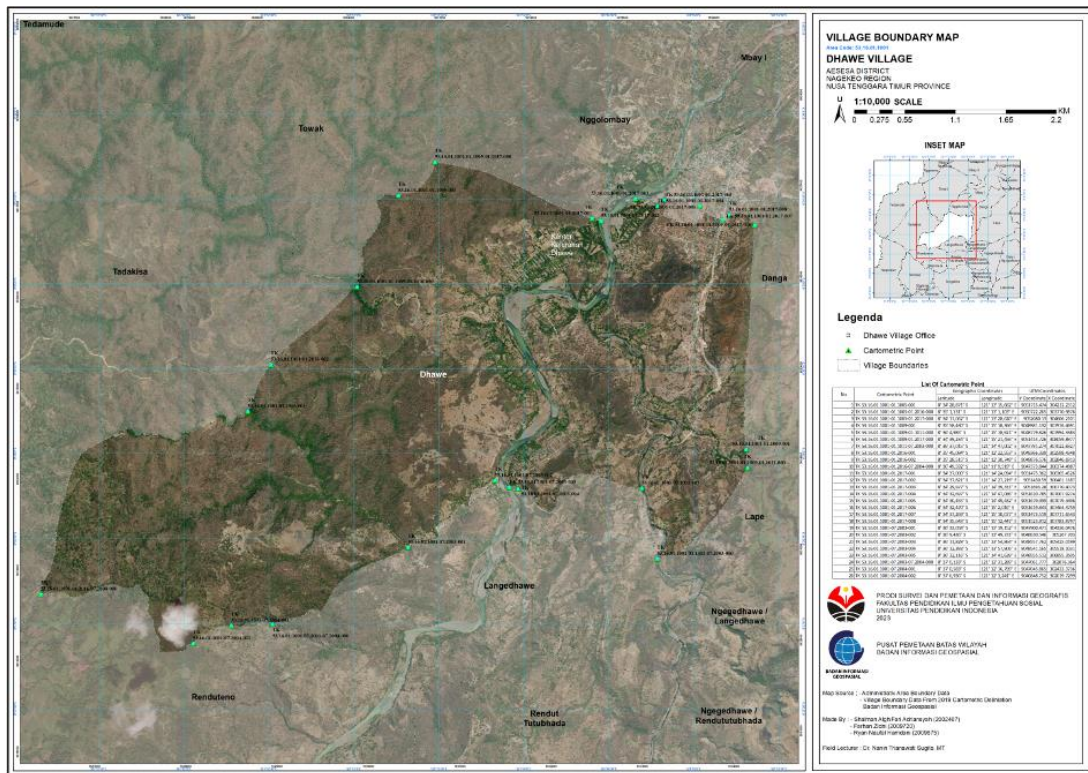


Figure 4. Map of Dhawe Village Boundaries, Aesesa District, Nagekeo Regency

4. CONCLUSION

From the activities of determining and confirming the boundaries of Dhawe Village, Aesesa District, Nagekeo Regency, it can be concluded that the cartometric method is tracing or drawing boundary lines and measuring or calculating the position of points, lines, distances

and area coverage using base maps or other geospatial information. The cartometric method by utilizing high image resolution is effective enough to be applied in the context of determining and establishing regional boundaries and confirmation of sub-district and village boundaries.

This research aims to determine and confirm the boundaries of Dhawe Village, Aesesa subdistrict, Nagekeo Regency in the context of implementing Minister of Home Affairs Regulation Number 76 of 2012 in determining and confirming village boundaries. This research aims to provide geospatial data in the form of village boundary coordinates, point and boundary delineation sub-districts and villages cartometrically and display them on the map as well.

The method used in this research is cartometric method. This method has the advantage to eliminate the need for direct surveys in the field, as the boundaries can be determined through negotiations on a working map or on indicative boundary segments.

After determining the cartometry points, the boundary segments produced 26 points which also contained the coordinates of Dhawe Village and produced agreed segment boundaries. Not only that, the researcher carried out a field approach test to test the correctness of the cartometry position so that the results could properly represent the expected village boundary area.

5. RECOMMENDATIONS

Based on the research results, it was found that the cartometric method can be used in determining and confirming sub-district/village boundaries. Therefore, the use of the cartometric method is easier to use as an activity to determine the boundaries of the village area concerned, and with existing research data it can help the government to create definite and precise village boundaries and create village maps. border in Indonesia

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