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COMPARISON OF ASTER *GDEM* IMAGES AND *SRTM* IMAGES FOR RIVER WATERSHED AND GEOMORPHOLOGY STUDY

*Naf'an Arifian[1], Kemal Rahman Denis[2] and Sri Kandi Putri[3]

[1]Nautical Technology Study, Merchant Marine Polytechnic of West Sumatera
[2]Remote Sensing Technology Study Program, Faculty of Social Sciences, Universitas Negeri Padang.
email: nafan@poltekpelsumbar.ac.id

ABSTRACT: This study uses two DEM images, namely ASTER GDEM and DEM SRTM to map the distribution of rivers and geomorphology located in The District of Pesisir Selatan. In this study a comparison of the two images was carried out with the same level of resolution of 30 meters to see the accuracy of the images used in the study of watersheds and geomorphology.
The method used in this research is processing image data then identifying the river for each image used. Further carrying out a *confusion matrix* which is used to check or improve data from a quantitative approach.
The results of the study in terms of comparison of ASTER and SRTM images for watershed identification show that SRTM imagery is more accurate in identifying watersheds compared to ASTER imagery. After taking samples with the number of sample points taken, namely 36 samples on each, and then testing for spatial accuracy, the results show that the SRTM imagery had an accuracy rate of 88% where out of 36 sample points only 5 were wrong or not on the river. Whereas in the ASTER image of 36 sample points, there were only 6 which were right on the river, show that the level of image accuracy is only 14% for river identification. The study also shows that after the research process and accuracy test, for geomorphologic identification on the two DEM images, namely DEM SRTM and ASTER GDEM, it found that both images have the same level of accuracy, therefore both images are equally good at identifying geomorphology.

Keywords: Mapping, ASTER GDEM, SRTM, Remote Sensing

1. INTRODUCTION

Many studies have been conducted to estimate and compare the accuracy of the ASTER GDEM and SRTM elevation models. In the previous study, Meriam Lahsaini and Hassan Tabyaoui (2018) conducted a study on the Inaouene River using two Shuttle Radar Topography Mission (SRTM) datasets at a spatial resolution of 90 meters and ASTER (Advanced Spaceborn Thermal Emission and Reflection Radiometer) GDEM version 2 on 30 meters spatial resolution, using the ArcHydro model. The final results of the ArcHydro model are compared to each other with the reality on the ground. Results of that study can be used in hydrology and geomorphology research. That research is published in article journal of *Comparison of SRTM and ASTER Derived Digital Elevation Models of Inaoune Rivers Watershed North, Morocco. Arc Hydro Modeling* (2018:21).

Therefore from the researcher's point of view, it is necessary to carry out similar research, namely a comparison of the accuracy levels of ASTER and SRTM images for geomorphologic and river studies related to the validity and accuracy of DEM data as in previous studies which have also conducted by Bambang Trisaksi and Ita Carolta (2007).

This study uses two images of DEM, namely ASTER GDEM and DEM SRTM to map the distribution of rivers and geomorphology located in the District of Pesisir Selatan. The comparison made between the two images with the same level of resolution, namely with a resolution of 30 meters , in order to see the accuracy of the image used in the regional study river flow and its geomorphology

2. THE METHOD

2.1 Time and Location

This research conducted in 2021 with the Tarusan watershed analysis unit. The Tarusan Watershed is one of the watersheds in the District of Pesisir Selatan with an area of 425.63 km2 or 7.4% of the total area of Pesisir Selatan Regency. Geographically, the Tarusan watershed is located in 100019,00' – 100034,70' EL and 0059,00' – 1017,30'

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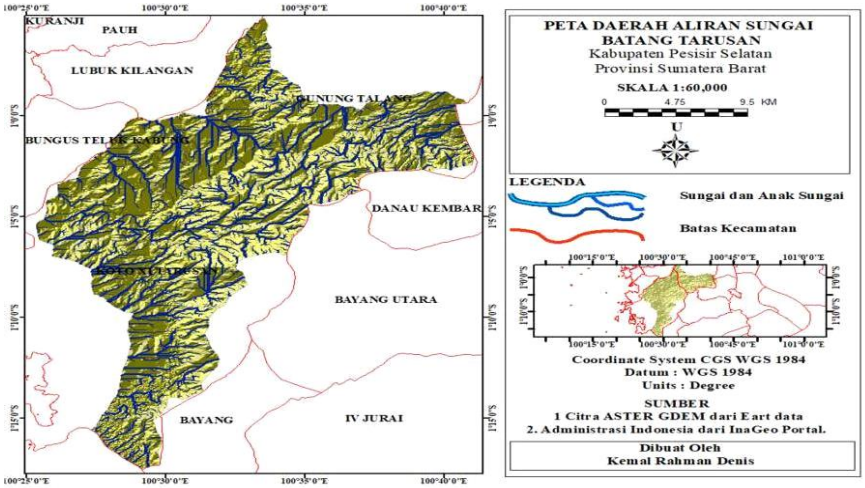

Figure 1. Location Map of the Tarusan River Basin

2.2 Research Material

The materials used in this study are as follows:

Table 1 Research Materials

NUM	DATA	SOURCES
1.	ASTER GDEM Images of Sub-district of Koto XI Tarusan	USGS Earth Explorer
2.	DEM SRTM Images Sub-district of Koto XI Tarusan	USGS Earth Explorer
3.	*Shapefile* of Administrative Boundary	Ina GeoPortal
4.	Regional Coordinate Point River flows	Arcgis
5.	Geomorphologic Coordinate Points	Arcgis

2.3 Flow Diagram

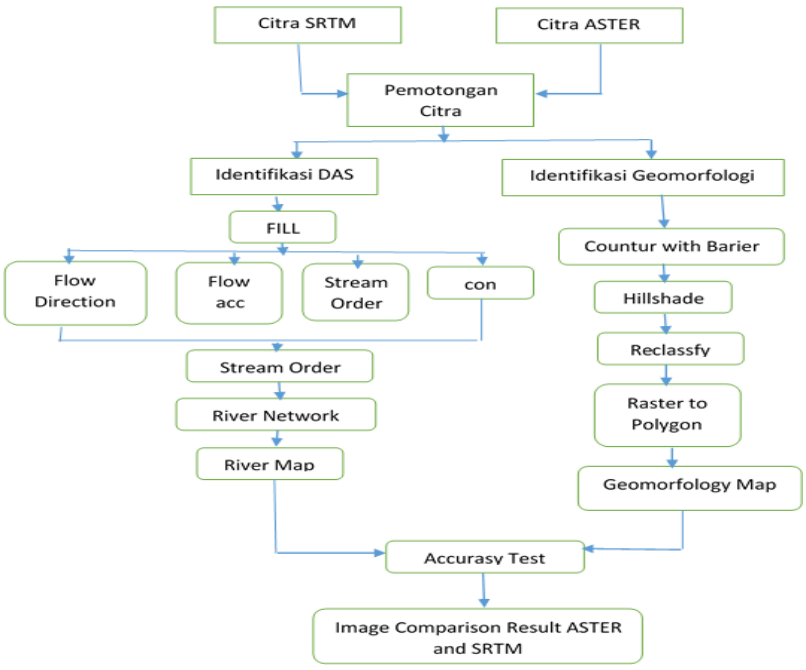

Fig.2 Flow Diagram

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3. RESULT

3.1 Tarusan Watershed Distribution

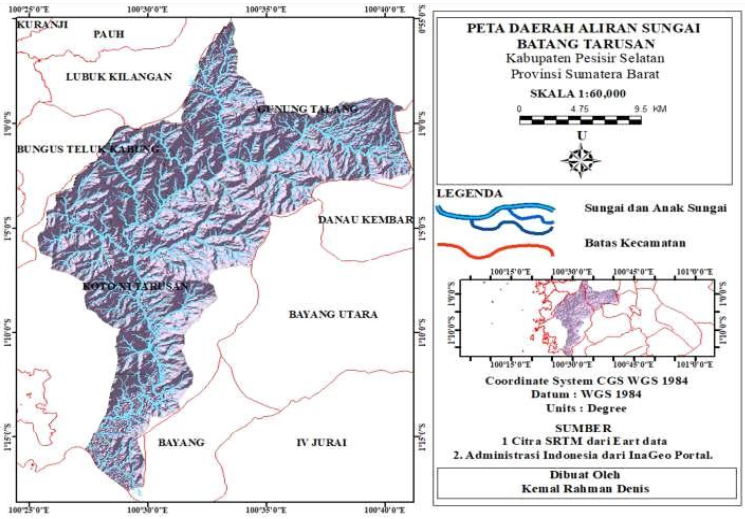

Figure 2. Map of Tarusan Watershed

The Batang Tarusan flow covers an area of 388.7 km2 with a river length of 62.96 km and empties into the Indian Ocean. The Tarusan watershed is a watershed that is mostly located in the Sub-District of Koto IX Tarusan

3.2. The Results of The Comparison of SRTM And ASTER Images In Terms of The Level of Accuracy

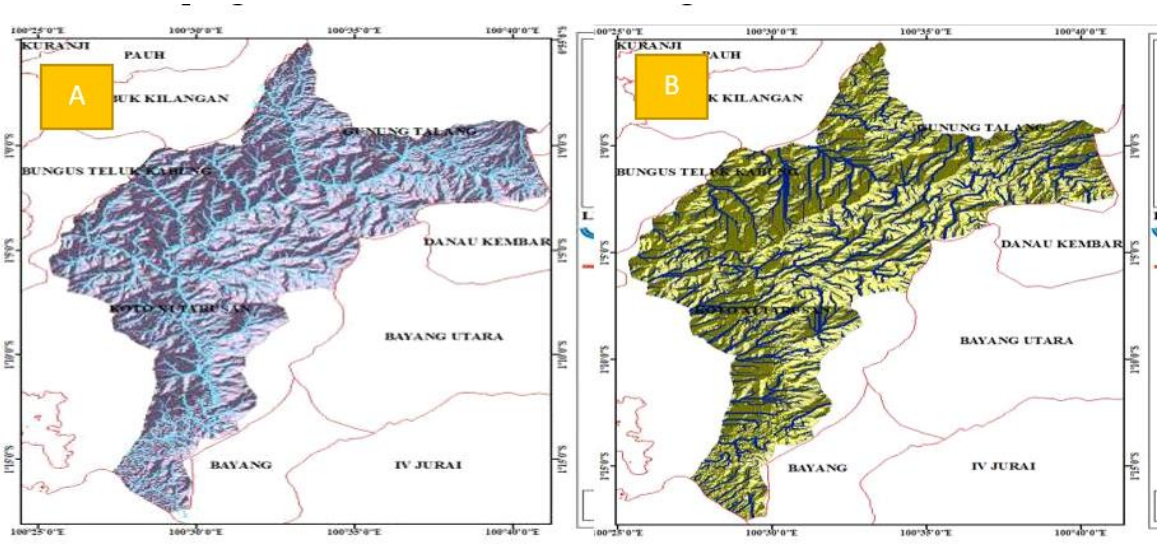

Figure 3. a). Flow Pattern Results from SRTM Imagery b). Flow Pattern Results from ASTER Imagery

From the SRTM image data, it can be seen that the flow of the Tarusan river is in hilly valleys, and from the flow pattern in the image, it can be identified that the Tarusan river flow pattern is dendritic. While using ASTER GDEM image data it can be identified that the Tarusan river flow is in a hilly area and does not have a main river flow, using ASTER image data it can be identified that river flow only consists of river branches and a flow pattern like this a picture of a radial.

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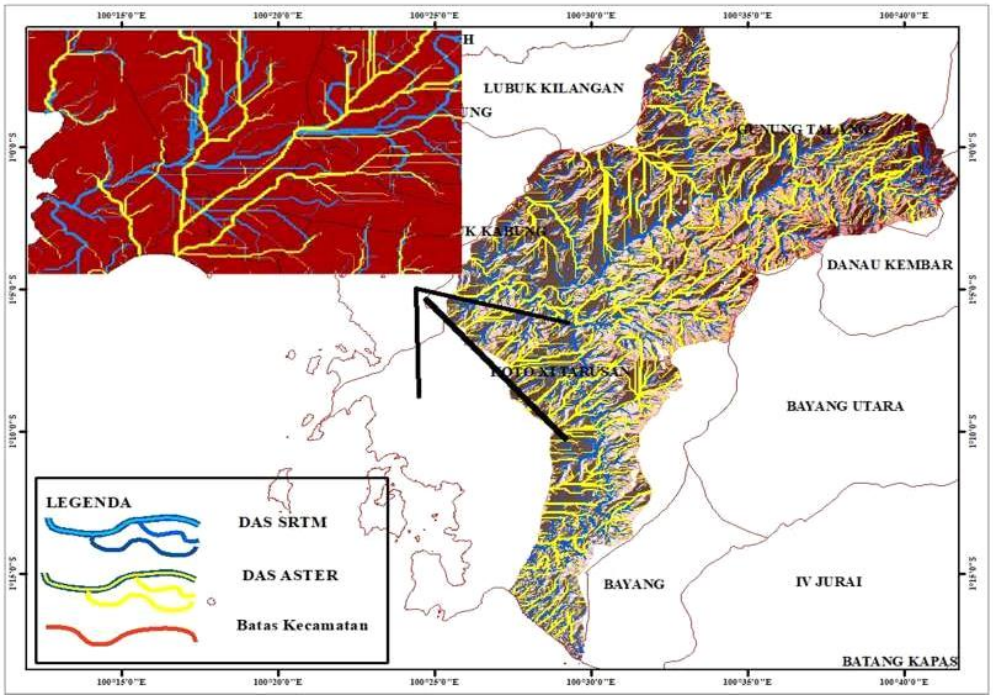

Figure 4. The Overlapping of ASTER GDEM and SRTM Images

The difference in flow patterns in the Tarusan watershed in the two images overlaps very clearly, the cause of the difference may be due to differences in sensors in the two images, ASTER imagery uses visible and near-infrared radiometer (VNIR) sensors, SWIR and TIR but in this study, the sensors used is VNIR with a resolution of 30 m where the VNIR sensor is used to identify hydrology or rivers and waters while the SRTM imagery uses the RADAR sensor.

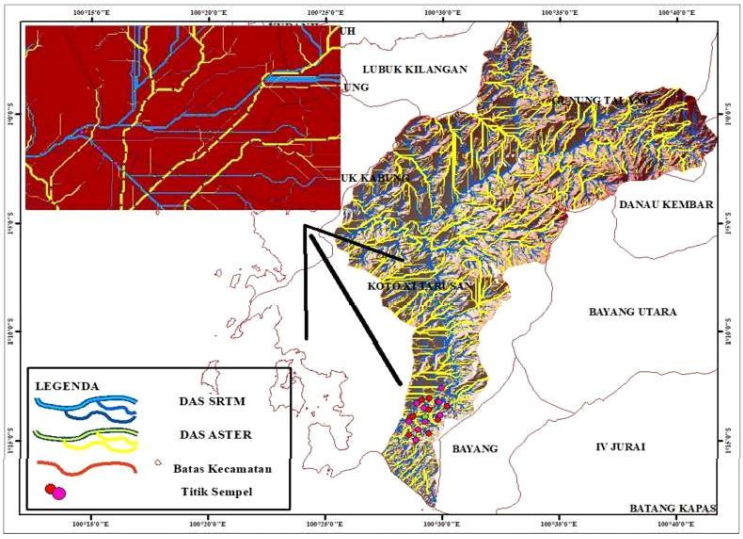

Figure 5. ASTER and SRTM Images with Sample Points

Only 4 of the SRTM images are wrong or not right on the river and the other 30 sample points are accurate or right on the watershed with an accuracy rate in this accuracy test of 88%, whereas in the ASTER image of 34 sample points taken on the image ASTER only 5 sample points are right in the watershed and 29 other sample points are not in the watershed, which means that the level of accuracy in identifying watersheds is only 14%. So from the results of the study in terms of comparison of ASTER and SRTM images for watershed identification, it was found that SRTM imagery is more accurate in identifying watersheds compared to ASTER imagery.

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3.3 Comparison of ASTER GDEM and DEM SRTM Image Results in terms of Levels

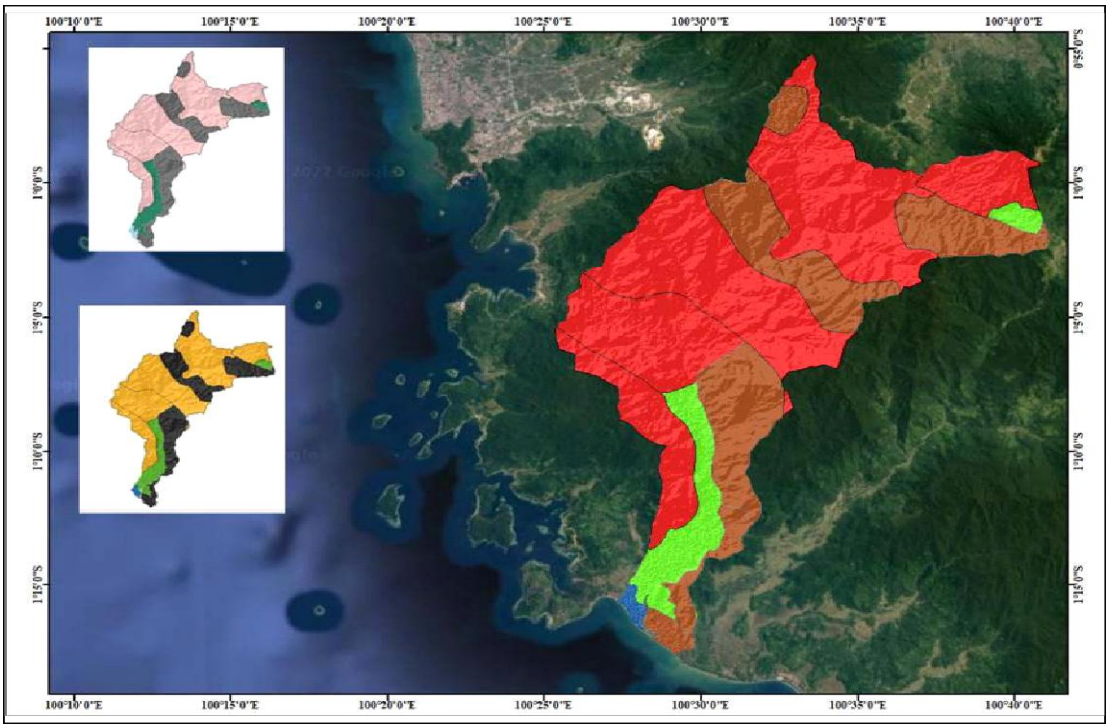

Figure 6. The Map of Overlapping Geomorphological

The figure above shows that there is no difference in the size of the area and height values for each qualification of the landform in the Tarusan watershed, the results of mapping on geomorphology in the Tarusan watershed found no difference in height values or wide coverage, therefore it can be said that both images have the same accuracy in geomorphological identification.

4. CONCLUSSION

1) The application of Remote Sensing Technology in mapping watersheds using ASTER GDEM and DEM SRTM imagery shows that SRTM imagery is more accurate in identifying watersheds. The research results show that the level of accuracy of SRTM imagery data in identifying watersheds is valued at 88 % accuracy while ASTER GDEM imagery has an accuracy value of only 14% in identifying river basins

2) The application of Remote Sensing Technology in geomorphological mapping using ASTER GDEM and SRTM imagery shows that the two images have the same level of accuracy in identifying where there is no difference in area and height values in the two images in identifying geomorphology in the Tarusan watershed

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