Mapping of Land Cover Using Remote Sensing in Papela Village, Rote Timur District in 2021

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A R T I C L E   I N F O

A B S T R A C T

Land cover mapping with remote sensing has never been done in Papela Village. This land cover mapping can provide information to the Papela village government regarding land cover in Papela village. Since 2021, Papela village has experienced regional expansion. Therefore, in this study, it aims to map the land cover on Rote Island, precisely in Papela village, Rote Ndao Regency before the expansion of the area using remote sensing. The remote sensing data used is a Landsat 8 image recorded in March 2021 which was downloaded from the USGS website. Landsat 8 imagery is classified in a guided manner according to the land cover training area data taken by GPS. The results of this study are in the form of land cover maps in Papela village. From this map, 6 classes of land cover were obtained, namely settlements (22.73 ha), shrubs (56.52 ha), forests and mangroves (39.76 ha), rice fields (31.39 ha), ponds (1.46 ha), and gardens (6.48 ha).

Keywords: Mapping; Remote Sensing; Papela Village

A B S T R A K

Pemetaan tutupan lahan dengan penginderaan jauh belum pernah dilakukan di Desa Papela. Pemetaan tutupan lahan ini dapat memberikan informasi kepada pemerintah desa Papela mengenai tutupan lahan di desa Papela. Sejak tahun 2021, desa Papela mengalami pemekaran wilayah. Oleh karena itu, pada penelitian ini, bertujuan untuk memetakan tutupan lahan di pulau Rote tepatnya di desa Papela, Kabupaten Rote Ndao sebelum pemekaran wilayah dengan menggunakan penginderaan jauh. Data penginderaan jauh yang digunakan adalah citra Landsat 8 perekaman Maret 2021 yang didownload dari website USGS. Citra Landsat 8 diklasifikasikan secara terbimbing sesuai data training area tutupan lahan yang diambil dengan GPS. Hasil penelitian ini berupa peta tutupan lahan di desa Papela. Dari peta ini diperoleh 6 kelas tutupan lahan yaitu pemukiman (22,73 ha), semak belukar (56,52 ha), hutan dan bakau (39,76 ha), sawah (31,39 ha), tambak (1,46 ha), dan kebun (6,48 ha).

Kata kunci: Pemetaan; Penginderan Jauh; Desa Papela

1. INTRODUCTION

In 2021 the Rote Ndao Regency Government has carried out the expansion of 30 villages in 10 sub-districts spread across Rote Ndao Regency, including Southwest Rote, West Rote, Northwest Rote, Lobalain, East Rote, Landu Leko, Central Rote and Pantai Baru. In East Rote Sub-district there are several villages that were expanded including Papela Village, Matanae Village and Serubeba Village where the three villages were expanded from the main village of Londalusi. Papela Village is located in Rote Ndao Regency, East Rote Sub-District. Papela Village consists of 4 hamlets namely: Tanjung Hamlet, Manulalulean Hamlet, Tasisu Hamlet and Anlaso Hamlet. Land cover is a term used to describe the physical characteristics of the earth's surface, including vegetation, soil, water and infrastructure of an area. Changes that occur from a certain period of time need to be known so that SSM helps provide additional information in determining management in a better direction.

Remote sensing has many benefits including being able to analyse areas that are difficult to reach by humans, being able to monitor the boundaries of certain regions, can classify parts of the earth's surface in an area with a wide range, besides that with remote sensing we can not only analyse what changes occur in an area in the present

but also can analyse changes in the earth's surface that occurred in the past, with so many benefits remote sensing so that the use of remote sensing is very important to be used, both for research and so on.

Some previous studies that have conducted research on land cover are land cover mapping of Kupang City, East Nusa Tenggara (Case Study in Kelapa Lima, Oebobo and Kota Lama Districts (Ignasius Suban 2021). Analysis of land cover change using landsat imagery in the muara tabir sub-district (Rommy Pratama 2023). From previous studies, it shows that no research has been conducted on land cover in Papela Village. By Therefore the authors conducted research with the title Land Cover Mapping Using Remote Sensing in Papela Village East Rote District in 2021.

2. METHOD

Research Location and Time This research was conducted in Papela village, East Rote sub-district, Rote Ndao Regency and was conducted for 2 months, from October to November 2024. The tools used were hardware, software, GPS and camera. Materials used were Landsat 8 satellite images, administrative maps, location coordinates. Data collection includes shapefile (shp) data, GPS data collection using direct data collection techniques, namely taking coordinate points for several land cover samples. Data analysis uses the guided classification method in remote sensing techniques. In this research, there are several stages in processing data with remote sensing techniques. The stages of the process that will be carried out in this research are described in the following flowchart:

3. RESULT AND DISCUSSION

The land cover map of Papela Village was created using the guided classification method. This method is carried out by taking coordinate points of land cover samples directly in the field, in order to facilitate the process of classifying the type of land cover of an area. The greater the number of coordinate points of land cover samples taken, the better the classification of the land cover map. The following is the result of making a land cover map of Papela Village in the following figure.
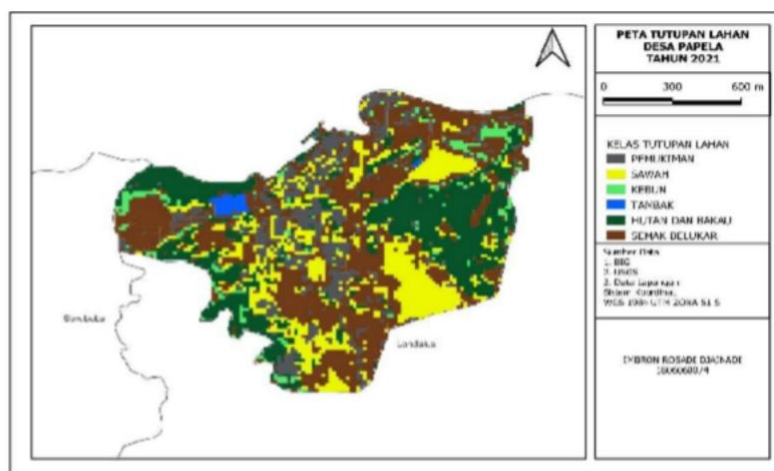

The data in the table below was obtained by conducting a site survey in the research area, where the data obtained in the form of coordinate point data, land cover classes and research samples where data collection was carried out at several location points identified as land cover including forests, mangroves, gardens, settlements, rice fields and ponds.

NO	Land Cover	Wide (Ha)	Percentage (%)
1	shurbs	56,52	35,70
2	Tree	39,76	25,11
3	Rice field	31,39	19,82
4	Settlement	22,73	14,35
5	Garden	6,48	4,09
6	Pond	1,46	0,92
	Total	**158,33**	**100**

From the results of the analysis that has been carried out, it can be seen that Papela Village has a dominance of land cover in the form of shrubs with an area of 59.52 Ha; forests and mangroves with an area of 39.76 Ha; rice

fields with an area of 31.39 Ha; settlements with an area of 22.73 Ha; gardens with an area of 6.48 Ha; and ponds with an area of 1.46 Ha.
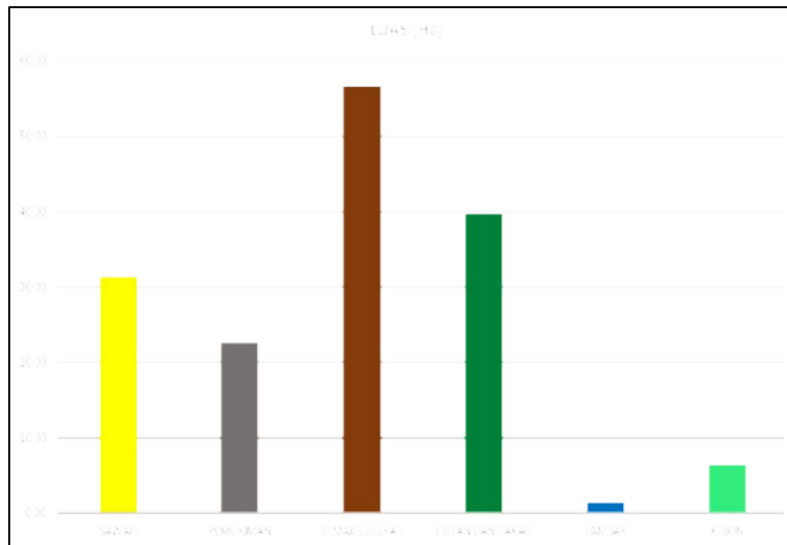
Based on the type of land cover in Papela Village for the next few years there could be changes in land cover, this is based on a fairly large area of shrubs that make it possible for residents to build settlements, this is caused by the increasing population, while for types of land cover such as rice fields, gardens and ponds have the potential to experience very little change, due to the livelihoods of residents who are mostly fishermen.
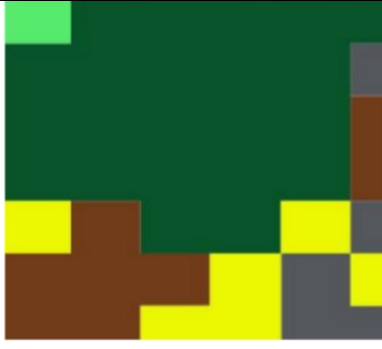
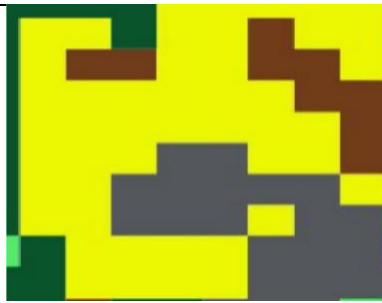### 3.1. Data Processing Landsat 8

Landsat 8 image data that has been downloaded, to get a Natural Color image, a composite is made of the band, satellite imagery produces different colours depending on the composite used, the composite process aims to sharpen the colour of satellite imagery to get a better visual image so that classification can be done on the image, from the composite image results can distinguish the appearance of objects on the earth's surface marked by the colour difference between each object. The selection of composites is not just done because each composite has different applications so that the image composite must be adjusted to the user's application in order to make it easier to analyse objects. The composite process is shown in the following image:

| (a) | (b) | (c) | (d) |
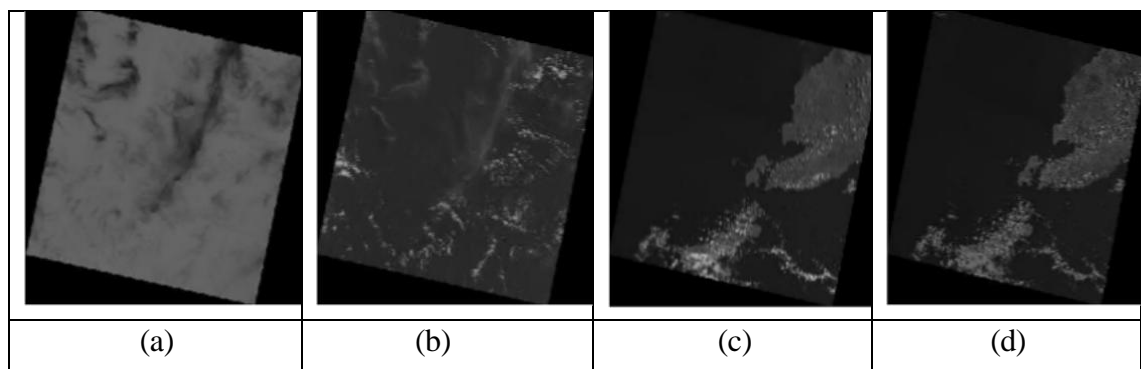
This research uses two image composites, namely natural colour (band 432) because this composite is better for the classification process because for making land cover maps, bands that have good characteristics or functions in placing land cover objects are needed. Image classification is an important stage in making land cover maps because in this process the pixels will be grouped based on colour so that they will become land cover classes, in this study Landsat images were classified into six (6) classes namely Settlements, Rice Fields, Ponds, Forests and Mangroves, Shrubs and Gardens.

The land cover map shows the results of the object's appearance in each band. The classification is based on colour, so that all areas of object appearance with colours close to the colour of the training area will be classified into one class. So that each classification result for each composite band will vary depending on the ability of the composite band. table of the colour appearance of land cover objects can be seen in the table below:

NO	Land Cover	Colour	Wide (Ha)	Figure

1	Shurbs	Brown	56,52	
2	Tree	Dark Green	39,76	
3	Rice Field	Yellow	31,39	
4	Settlement	Grey	22,73	
5	Garden	Easy Green	6,48	
6	Pond	Blue	1,46	

4. CONCLUSION AND RECOMMENDATION

The conclusion obtained based on the research conducted, regarding land cover mapping in Papela Village, East Rote District using remote sensing is that Papela Village has 6 land cover classes, namely settlements, forests and mangroves, rice fields, ponds, gardens and shrubs The area of each land cover in Papela Village, East Rote

District in 2021 is shrubs with an area of 59.52 Ha; Forests and mangroves with an area of 39.76 Ha; rice fields with an area of 31.39 Ha; settlements with an area of 22.73 Ha; gardens with an area of 6.48 Ha; and ponds with an area of 1.46 Ha

The suggestion in this research is that further research needs to be carried out in Papela Village, East Rote District, which is more in-depth about land cover analysis in a long enough time span, so that it can be seen how the direction of land cover changes from several periods.

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