

**Land suitability Assessment Rubber Commodities ( *Hevea brasiliensis*) In Nias Selatan District Scale 1: 250,000****Pengkajian kesesuaian lahan Komoditas karet (*hevea brasiliensis*) di kabupaten nias selatan skala 1 : 250.000****Lukas Sebayang***Pusat Riset Hortikultura dan Perkebunan, Oerorganisasi Riset Pertanian dan Pangan, BRIN**Corresponding author : lukassebayang261@gmail.com***ABSTRACT**

South Nias district was the new district developed of Nias district in 2003. South Nias was part of area hit earthquake and tsunami in 2004 and 2005. The district was the producer of rubber which second superiority commodities after coconut. There were 29,125 Ha of rubber area in South Nias (Statistic of Sumatera Utara Province. 2021). This research activity was carried out in 6 subdistricts in Nias Regency in January 2019 - November 2019. Assessment of land suitability was needed in order to know a directions of superiority commodities development area. This assessment was conducted by using ALES (*Automated Land Evaluation System*). SDPLE (*Standard Procedure for Land Evaluation*) data was imported to ALES program. Land evaluation result was show in spatial form. This form made by imported tabulation data to GIS (*Geographical Information System*) form. Suitability land maps (scale 1:250.000) present based on each commodities by ArcView program.

**Keywords** : Suitability land; rubber; South Nias

**ABSTRAK**

Kabupaten Nias Selatan merupakan Kabupaten baru hasil pemekaran dari Kabupaten Nias pada tahun 2003. Kabupaten ini termasuk salah satu wilayah yang terkena bencana gempa dan tsunami pada tahun 2004 dan 2005. Kabupaten ini merupakan penghasil karet (*Hevea brasiliensis*) rakyat yang merupakan komoditas unggulan ke dua setelah komoditas unggulan kelapa dengan luas tanam 29.125 Ha (BPS Nias Selatan, 2021). Kegiatan penelitian ini dilakukan di 6 Kecamatan yang ada di Kabupaten Nias Selatan pada bulan Januari 2019 – Nopember 2019. Pengembangan komoditas karet di Kabupaten Nias Selatan cenderung terus meningkat, sehingga perlu dilakukan pengkajian kesesuaian lahan untuk melihat arah lokasi pengembangan yang sesuai. Pengkajian ini dilakukan dengan memanfaatkan program ALES (*Automated Land Evaluation System*). Pelaksanaan komputasi dilakukan dengan mengimport data SDPLE (*Standard Procedure for Land Evaluation*) atau data yang sudah tersedia dalam format Excell ke program ALES. Penyajian hasil evaluasi lahan dalam wujud spasial atau peta dilakukan dengan cara mengimport data tabulasi kedalam format GIS (*Geographical Information System*). Penyajian peta kesesuaian lahan (skala 1 : 250.000) dibuat berdasarkan jenis komoditas pertanian dengan menggunakan program ArcView.

**Kata kunci** : Kesesuaian lahan; karet; Nias Selatan

**INTRODUCTION**

Plantation crops are crops that have been cultivated by farmers in South Nias District for

generations. Several plantation commodities that could become the mainstays of this district are coconut, rubber, cocoa and patchouli, but the

productivity of each of these crops is still very low (Sembiring *et al.*, 2018).

If you look at the area of rubber plantations in South Nias from 2016 to 2020 it tends to increase with an average increase of 1.7% which is also accompanied by an average increase in production of 5.4% (BPS, 2021). However, when compared to the rubber producing districts on the island of North Sumatra, rubber productivity in South Nias is still low.

The constraints faced by rubber farmers in this district are price fluctuations and the high costs required to cultivate this commodity (Pertanian, 2020). Because costs at the farm level (on farm) are quite high, the ability to compete with rubber from other regions is very low.

The high costs incurred by farmers in rubber cultivation are caused by many things, including cultivation practices that have not been carried out efficiently and technology adoption which is still low (Siregar, 2019). Inefficient cultivation practices are due to the lack of information regarding the biophysical condition of the land suitable for rubber planting by farmers. Therefore it is necessary to make a study that is commonly used as a reference for land suitability for rubber commodities in this area. Because this study is still on a scale of 1: 250,000, its application in the field is still at the level of direction used in the future development of the rubber commodity in South Nias Regency.

## MATERIALS AND METHODS

The research was conducted in South Nias District, North Sumatra Province which is geographically located at coordinates 0012'00"-0032'00" North Latitude and 970 -980 East Longitude. Because it is located near the equator, South Nias district belongs to a tropical climate area. Altitude 0 – 800 m above sea level with hilly geographical conditions. Administratively, South Nias Regency consists of 6 sub-districts, namely Teluk Dalam, Amandraya, Lahusa, Gomo, Lolowau and Lolomatua Districts (excluding the

Batu Islands and Hibala sub-districts) from January 2019 to November 2019.

The materials used in this study are secondary data from related agencies, as well as some software such as ALES (Automated Land Evaluation System), Arc Info and Arc View as well as GPS (Global Positioning Systems) tools.

### Implementation Method

#### (1) Preparation of Land Evaluation Model

The preparation of the land evaluation model (ALES) is carried out through the following stages:

a. Determine the type of land use or LUT (Land Use Type). Are the types of land use that are described in detail regarding management, the required inputs and the expected outputs specifically.

b. Determine plant growth requirements or LUR (Land Use Requirements) for each LUT.

c. Choose the land characteristics or LC (Land Characteristic) for each LUR for each LUT. Land characteristics that can be measured or estimated, such as slope size, effective depth, drainage, texture, soil reaction, base saturation and aluminum saturation (Djaenudin *et al.*, 2000).

d. Decision tree or DT (Decision Tree). Is a decision-making method for determining land suitability classes using a "hierarchal multi-way key". The decision making for determining the land suitability class has a multilevel hierarchy and is determined by one or more land characteristics that are closely related to one another.

The procedure for developing a land evaluation model in detail will refer to the Standard Procedure for Land Evaluation (Environmental System Research Institute.Inc, 2005).

#### (2) Computing

Land evaluation is carried out by utilizing the ALES (Automated Land Evaluation System) program. The operation of the ALES program is in accordance with the ALES User Manual Version 4.65 (Rositer, 2005). Computation is

carried out by importing SDLE data or data that is already available in Excel format into the ALES program.

(3) Data Compilation

Presentation of land evaluation results in spatial or map form is done by importing tabulated data into GIS format. The presentation of the land suitability map

is made based on the type of agricultural commodity using the ArcView program.

The results of the land evaluation present land suitability classes for rubber commodities in South Nias Regency. Land suitability for each commodity in each land unit is divided into 3 classes, namely: suitable (S), marginally suitable (CS) and not suitable (N). Soil map units in the form of associations or complexes can have 2 to 3 different land suitability classes so as to make their use easier a simplification is carried out as shown in Table 1.

Table 1. Class Simplification Criteria Commodity Land Suitability Rubber, South Nias Regency.

Class	Description
Suitable Land (S)	
S	>75% suitable land
C/S	50-75% suitable land
	25-50% marginal land
Marginal Appr. Land (CS)	
CS	>75% marginal land
CS/N	50-75% marginal land
	25-50% unsuitable land
Unsuitable Land (N)	
N	>75% unsuitable land
N/CS	50-75% unsuitable land
	25-50% marginal land

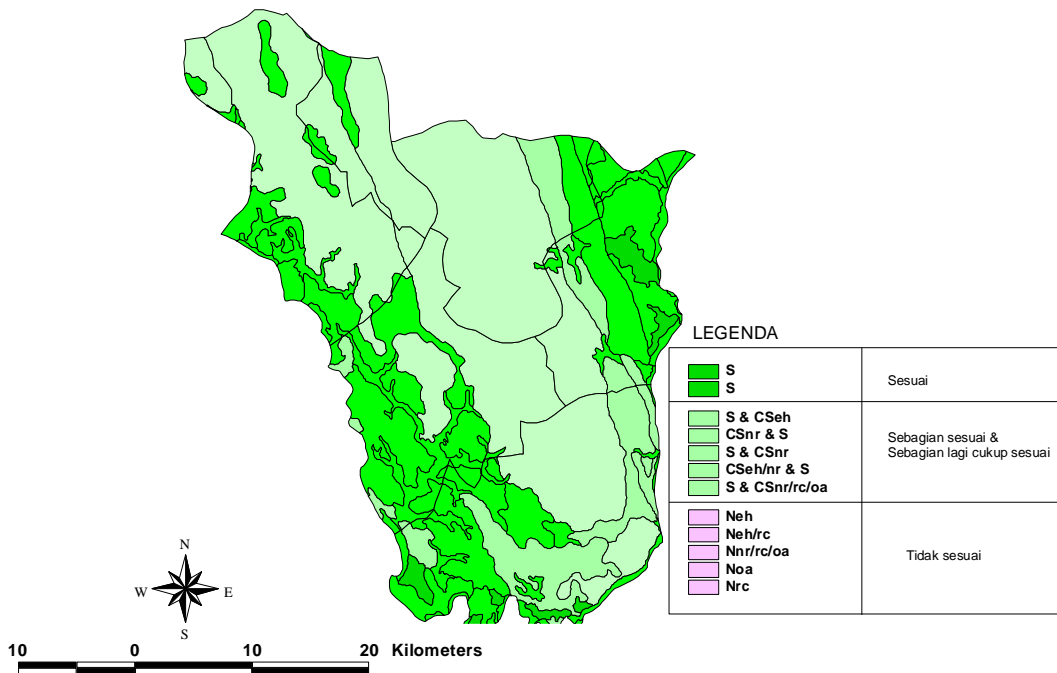
Source: Pუსlittanak. 2017.

(4) Presentation of Results

The results of the preparation of the land unit map and land suitability map for the rubber commodity are presented in the form of a map accompanied by a report text (BPTP Sumut, 2019). The map format follows the projection system and coordinates of the Topographical Map, namely the UTM (Universal Transvere

Mercator) projection system. The map scale is presented at a scale of 1: 250,000. Map scale information is affixed to the map in the form of a numerical scale and a graphical scale (Environmental System Research Institute.Inc, 2005).

**PETA PEWILAYAHAN KOMODITAS KARET  
KABUPATEN NIAS SELATAN**



Gambar 1. Peta Kesesuaian Lahan Komoditas Karet Kabupaten Nias Selatan.

**RESULTS AND DISCUSSION**

Although there is a tendency for land development, rubber planting in South Nias Regency is currently being carried out on suitable land, but to increase efficiency a more detailed study is needed so that more complete information is obtained to determine recommendations for optimal fertilization technology for rubber plant growth (Prastowo et al. , 2010).

The land suitability class of an area for the development of rubber commodities is basically determined by several physical environmental factors which include climate, soil, elevation above sea level, slope, topography/relief, rocks on the surface and in the cross-section of the soil as well as rock outcrops, hydrology, and requirements land use and plant growth requirements (Ibrahim et al., 2019). The suitability between the physical characteristics of the environment of an area and the requirements for use or the commodity being evaluated provides an overview or information that the land has the potential to be developed for that commodity (Pujiyanto, 2013).

Table 2. Land Suitability Analysis Results Rubber in South Nias Regency (Ha)

Subdistrict	S1	S1/CS	CS/S1	N
Teluk	8.678	2.620	1.453	4.247
Dalam				
Amandraya	9.388	3.358	753	1.291
Lahusa	4.450	1.590	987	3.472
Gomo	4.901	1.334	560	2.449
Lolowau	5.534	3.431	589	-
Lolomatua	7.553	3.878	457	-
Total	40.504	16.211	4.799	11.459

*Note: excluding the Batu Islands and Hibala sub districts.*

Besides being more detailed, the land suitability approach is not only from the aspects of climate, terrain and soil but also from economic and social aspects as well as the availability of infrastructure. In an effort to make rubber development activities in South Nias Regency achieve the degree of success expected, a location-specific farming system is needed that is efficient, sustainable and has a comparative advantage by taking into account the availability of labor, capital and the ability of farmers (Amien and Karama, 2007). In order for the system and site-specific technology to be produced in a more efficient, economical, targeted and appropriate manner for development areas, it is necessary to carry out agroecological zoning or ZAE (Amien, 2005). Through the introduction of regional agroecology, land resources can be utilized in a directed and efficient manner (Puslittanak, 2017). One of ZAE's activities is the provision of integrated information on production systems and up-to-date regional socio-economic data by utilizing the GIS method.

In the future, with efficient land management and location-specific rubber cultivation technology, it is hoped that South Nias Regency rubber products will be able to compete because they have competitive advantages. So as to open up new market opportunities, in addition to remaining dominant in the market that has been controlled previously.

## CONCLUSION

The results of land suitability analysis for rubber plantations in South Nias Regency, there are 40,504 ha of suitable land (S1) spread across six sub-districts.

Districts that have the widest area of land suitability for rubber plantations are Amandraya District 9,388 ha, Teluk Dalam 8,678 ha, and Lolomatua 7,553 ha

The use of information that is precise with GIS technology needs to be an alternative consideration in determining the direction of rubber development in South Nias Regency.

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