





Evaluation of Land Suitability For Durian (*Durio Zibethinus*) Plants In Parmaksian District, Toba Regency

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ABSTRACT

Durian (*Durio zibethinus*) dikenal sebagai tanaman yang memiliki nilai ekonomi cukup tinggi yang banyak ditanam di lahan masyarakat di Kecamatan Parmaksian Kabupaten Labuhanbatu, Provinsi Sumatera Utara. Penelitian ini bertujuan untuk mengevaluasi kelas kesesuaian lahan untuk durian sebagai salah satu tanaman agroforestri di Kecamatan Parmaksian, Kabupaten Toba. Kegiatan penelitian meliputi beberapa tahap kegiatan, yaitu: persiapan, survei, analisis tanah di laboratorium, pengolahan data, dan pemetaan. Metode survei dilakukan untuk mengumpulkan sampel tanah di lapangan. Kelas kesesuaian lahan tanaman durian dianalisis dengan menggunakan metode *matching*. Metode tersebut mengacu pada referensi dan kriteria yang diadopsi dari Kesesuaian Tanah Tanaman Pertanian oleh Pusat Penelitian Tanah dan Agroklimat, Bogor, Indonesia. Hasil penelitian menunjukkan bahwa kelas kesesuaian lahan aktual untuk tanaman durian di kecamatan Parmaksian, adalah sesuai marginal (S3) pada Unit Lahan 1 dan 6 dan tidak sesuai (N) pada Unit Lahan 2, 3, 4, dan 5 dengan faktor pembatas adalah suhu dan tekstur tanah. Hasil analisis SIG menunjukkan bahwa 52,5% dari total luas kecamatan adalah sesuai marginal (S3) dan 47,8% dari total luas kecamatan adalah tidak sesuai (N).

Keyword: , *Durian, Evaluasi lahan, Overlay, Kecamatan Parmaksian*

ABSTRAK

Durian (*Durio zibethinus*) is known as a plant that has a fairly high economic value which is widely planted on community land in Parmaksian District, Lauhanbatu Regency, North Sumatra Province. This study aims to evaluate the land suitability class for durian as an agroforestry plant in Parmaksian, Toba Regency. Research activities include several stages of activities, namely: preparation, survey, soil analysis in the laboratory, data processing, and mapping. The survey method was carried out to collect soil samples in the field. Durian land suitability class was analyzed using the matching method. The method refers to the references and criteria adopted from the Soil Suitability of Agricultural Crops by the Center for Soil and Agroclimate Research, Bogor, Indonesia. The results showed that the actual land suitability class for durian plants in Parmaksian sub-district, was marginally suitable (S3) on Land Units 1 and 6 and not suitable (N) on Land Units 2, 3, 4, and 5 with limiting factors. are temperature and soil texture. The results of the GIS analysis show that 52.5% of the total sub-district area is marginally suitable (S3) and 47.8% of the total sub-district area is not suitable (N).

Keyword: , *Durian, Land evaluation, Mapping, Parmaksian District*



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1. Introduction

Appropriate technology must be developed to maximize land use sustainably because of the growing demand for land, the shortage of productive and prospective agricultural land, the competition between the agricultural and non-agricultural sectors for land use, and other factors (Harahap et al., 2018).

According to Hahap et al. (2019), land evaluation is the process that determines how suitable the area of land is for a given use by assessing it for that objective. Land evaluation is the process of evaluating a piece of land's potential for a given use, taking into account both the current and future conditions of the property after repairs have been made (Hardjowigeno and Widiatmaka, 2007).

The kind of land use that is being considered can affect an area's appropriateness class unlike land. Depending on the kind of land use being considered, a place may have several appropriateness classes. Capacity evaluation is typically meant for broader applications, such as agricultural, urban, and so forth, as opposed to land suitability evaluation. One way to determine the suitability of a piece of land is to choose plants that grow well there (Sitorus, 1985).

Parmaksian subdistrict is one of the subdistricts where a large number of people cultivate durian on community land; nevertheless, no mapping has been done to determine which spots are ideal for durian plants. This makes the research imperative. In the Parmaksian District of Toba Regency, North Sumatra Province, this study is to map the actual land suitability class for durian, one of the agroforestry plants.

This happens because the land characteristics of each region are different and influenced by many factors. Difference This characteristic is not the cause of all the region is capable of producing agricultural commodities well (Luntung et al., 2020). On the other hand, Every crop commodity has growing conditions certain conditions that must be adapted to the conditions land that will be used as cultivation land. Land that is not suitable for growing conditions plants will cause production to become not optimal.

2. Materials And Method

There are four steps to this research: a study of slope class maps, land cover maps, and soil maps; a review of the literature; and a stage of secondary data collection. The position of the research observation area is determined by consulting the study's findings. The application of research in the field, specifically: primary data collection, which comprises the material properties of soil samples for laboratory examination, and data processing using a corresponding technique.

Depending on the data that is available, both quantitative and qualitative land suitability categorization can be done using the FAO approach (1976) that was outlined by Rahmawaty et al. (2011). Land suitability that is determined by quantitatively (with numbers) assessing the qualities of the land in question is known as quantitative land classification. Typically, economic calculations (costs and income) are also performed, taking into consideration factors related to productivity and land management (Hardjowigeno, 2003).

Qualitative land appropriateness is the suitability of a piece of land that is evaluated without doing any economic calculations, but rather by a qualitative appraisal of the land's qualities. Typically, this is done by contrasting the requirements for each land suitability class with the qualities (characteristics) of the surrounding land. Physical elements (land characteristics/quality) are the strongest factors that determine land suitability class (Hardjowigeno, 2003).

Order, Class, Subclass, and Unit levels make up the hierarchy of land suitability classification in the FAO framework (1976), which can be divided into many categories. The overall state of land appropriateness is called order. Land that is categorized as suitable (S = Suitable) and land that is not suitable (N = Not Suitable) are divided at the level of the land suitability hierarchy. The level of conformance inside the order level is called class. Table 1 illustrates the differentiation between land suitability classes.

Table 1. Definition of land suitability class

Class Level	Information
S1 class, very suitable	Land has no significant or significant limiting factor for sustainable use
S2 class, quite appropriate	Land has limiting factors, which will affect productivity, require additional inputs, usually the farmers can handle themselves
S3 class, according to class margin	Land has a severe limiting factor, affects productivity, requires more input than S2, requires high capital, farmers are not able to overcome it.
N = not suitable	Land that is not suitable because it has limiting factors that are very heavy or difficult to overcome

Source : (BPT, 2011)

3. Results And Discussions

3.1.Toba Regency Biophysical Condition

Toba Regency with its capital Rantauprapat has an area of 922,318 ha (9,223.18 km²) or equivalent to 12.87% of the total area of North Sumatra Province. As the second-largest district after South Tapanuli Regency, Toba Regency is the eastern route of Sumatra Island with a distance of 285 km from Medan, the capital of North Sumatra Province, 329 km from Riau Province, and 760 km from West Sumatra Province. Toba Regency is located at coordinates 10 260 – 20 110 North Latitude and 910 010 – 950 530 East Longitude with the following boundaries: Northside with Asahan Regency and Malacca Strait, Eastside with Riau Province, Southside with South Tapanuli Regency, Westside with Toba Samosir Regency and North Tapanuli. The average air temperature ranges from 27°C-31°C.

Toba Regency also experiences a dry season and a rainy season. The dry season occurs from February to October, because the average temperature in that period is relatively higher than the period from November to January. The maximum temperature is 35oC in May, while the minimum temperature is 23.50C in October.

3.2.Land Suitability Class

The actual and potential land suitability classes for Durian plants in Parmaksian District are shown in Table 2. The results of the data obtained in the field and the laboratory, the actual land suitability class for sorghum plants in Table 2. The suitability of durian plants in Parmaksian District can be seen in Table 2.

Based on Table 2, it can be seen that the characteristics of nutrient retention in base saturation and availability of P₂O₅ soil nutrients in other use areas in Parmaksian District, for durian (*Durio zibethinus* Murr.) are relatively low. In addition to temperature, the main limiting factor is also on the root media in the form of soil texture, because the soil texture will not change in a short time, for example, the texture of the sand is difficult to convert into clay or clay texture is difficult to convert into the sand. This is supported by Rayes (2007) which states that in the evaluation of land with root media factors in the form of texture, improvement efforts cannot be made.

Table 2. Suitability of durian land in Parmaksian District

Land Unit No.	Actual Land Suitability
1	S3 -tc, rc, nr,na
2	N-tc
3	N-tc.rc
4	N-tc.rc
5	N-tc.rc
6	S3 -tc, rc, nr,na

3.3. Land suitability for Durian (*Durio zibethinus* Murr.)

Actual and potential land suitability classes for Durian plants located in Parmaksian District. From the results of Table 3 analysis, the actual land suitability area in Parmaksian District is obtained, for durian plants the actual and potential land suitability areas in Parmaksian District for durian plants are 4,050.81 ha,

Table 3. Land Suitability Area for Durian Plants in Parmaksian District

Land Unit No.	Actual Land Suitability	Large (ha)	Percentage (%)
1	S3-tc, rc, nr, na	1148,51	28,4
2	N-tc	367,38	7,8
3	N-tc, rc	407,84	9,9
4	N-tc, rc	596,80	17,2
5	N-tc, rc	633,17	12,8
6	S3-tc, rc, nr, na	897,11	23,8
	Total	4.050,81	100

Durian (*Durio zibethinus* Murr.) has long been known by the public. The durian plant is a type of tropical fruit native to Indonesia (Rukmana, 1996). The characteristics of the durian plant are tree-shaped, 27-40 m high. Taproot. The stem is woody, cylindrical, erect, cracked skin, rough surface, sympodial branching, many branches, horizontal direction (Soedarya, 2009).

Durian plants include the following botanical classification, Kingdom: Plantae, Division: Spermatophyta, Class: Dicotyledoneae, Order: Malvales. Family: Bombacaceae, Genus: *Durio*, Species: *Durio zibethinus* L. (Rukmana, 1996).

The types of soil suitable for planting durian are Latosol, Podsolik Merah Kuning, and Andosol, and the soil acidity must be neutral, which is in the range of pH 6.0-7.0 (Rukmana, 1996).

4. Conclusions

The actual land suitability class for durian plants in Parmaksian Subdistrict, is marginally suitable (S3) on Land Units 1 and 6 and not suitable (N) on Land Units 2, 3, 4, and 5 with the limiting factors being temperature and texture. soil. The results of GIS analysis show that 52.5% of the total area of Parmaksian sub-districts is marginally suitable (S3) and 47.8% of the total sub-district area is not suitable (N).

References

- [PPT] Pusat Penelitian Tanah. (1983). Kriteria Penilaian Data Sifat Analisis Kimia Tanah.
- [Puslittanak] Pusat Penelitian Tanah dan Agroklimat. (1997). Kriteria Kesesuaian Lahan Untuk Komoditas Pertanian. Badan Penelitian dan Pengembangan Pertanian. 185.
- Arsyad, S. (2006). Konservasi Tanah dan Air. IPB Press, Bogor Balai Penelitian dan Pengembangan Pertanian Departemen Pertanian. Bogor.
- Djaenudin, D., Marwan., Subagjo. & Hidayat, A. (2003). Petunjuk Teknis Evaluasi Lahan untuk Komoditas Pertanian. Balai Penelitian Tanah, Puslitbangtanak, Bogor.
- FAO. (1976). A Framework for Land Evaluation, FOA Soil Bull. Soil Resources Management and Conservation Service Land and Water Development Division. FAO Soil Bulletin No. 52. FAO-UNO, Rome.
- Harahap, F.S., Rauf, A., Rahmawaty, R. & Sidabukke, S.H., (2018). Evaluasi kesesuaian lahan pada areal penggunaan lain di Kecamatan Parmaksian Kabupaten Pakpak Bharat untuk pengembangan tanaman cabai merah (*Capsicum annum* L.). Jurnal Tanah dan Sumberdaya Lahan, 5(2), pp.829-839.
- Harahap, F.S., Sitompul, R., Rauf, A., Harahap, D.E. & Walida, H. (2019). Land suitability evaluation for oil palm plantations (*Elaeis guenensis* jacq) on Parmaksian, Pakpak Bharat District IOP Conference Series: Earth and Environmental Science 260(1): 012116
- Hardjowigeno, S. & Widiyama. (2007). Evaluasi Kesesuaian Lahan dan Perencanaan Tataguna Lahan. Universitas Gadjah Mada Press. Yogyakarta.

- Hardjowigeno, S., Widiatmaka, Yogaswara, A. S. 1993. Klasifikasi Tanah dan Pedogenesis. Akademia Pressindo. Jakarta.
- Prahasta, E. 2002. Konsep-konsep Dasar Sistem Informasi Geografis. Bandung: Informatika.
- Rahmawaty, Villanueva. T. R., Carandang, M. G. 2011. Participatory Land Use Allocation, Case Study in Besitang Watershed, Langkat, North Sumatera, Indonesia. Lambert Academic Publishing.Jerman.
- Rahmawaty. 2009. Penggunaan Geographic Information System (GIS) untuk Pemetaan Kesesuaian Lahan di DAS Besitang. Prosiding. Optimalisasi Pengelolaan Lahan dalam Upaya Menekan Pemanasan Global Mendukung Pendidikan Berbasis Pembangunan Berkelanjutan. 12-13 Februari 2010. Medan. Hal:113-119.
- Ritung S, Nugroho, K., Mulyani, A., Suryani, E. 2011. Petunjuk teknis evaluasi lahan untuk komoditas pertanian (Edisi revisi). Balai Besar Penelitian dan Pengembangan Sumberdaya Lahan, Badan Penelitian dan Pengembangan Pertanian, Bogor.
- Ritung, S., Wahyunto. 2007. Panduan Evaluasi Kesesuaian Lahan. Bogor: Balai Penelitian Tanah Bogor.
- Sitorus, S. R. P. 1998. Evaluasi Sumberdaya Lahan. Edisi ke-3. Tarsito: Bandung. pp.
- Sukristiyonubowo., Mulyadi., Wigena, I. G. P., Kasno, A. 1993. Pengaruh pemberian bahan organik, kapur, dan pupuk NPK terhadap sifat kimia tanah dan hasil kacang tanah. Pemberitaan Penelitian Tanah dan Pupuk