Journal of Environmental and Development Studies (JEDS) Vol. 03, *No.* 02, 2022 | 36-48

Journal of Environmental and Development Studies
Journal homepage: https://talenta.usu.ac.id/jeds

Analysis of the Function of Forest Area in Spatial Planning of the North Tapanuli Regency

***Rano Karno Sihombing*[*1], *Erika Revida*[2], *Suwardi Lubis*[3]**

[*1]*Regional and Rural Planning Study Program, Postgraduate School, Universitas Sumatera Utara, Medan, 20155, Indonesia*
[2]*Department of Public Administration, Faculty of Social Sciences and Political Science, Universitas Sumatera Utara, Medan, 20155, Indonesia*
[3]*Department of Communication Science, Faculty of Social Sciences and Political Science, Universitas Sumatera Utara, Medan, 20155, Indonesia*

Abstract. *Spatial pattern planning of a certain area includes protected area and cultivated area allocation, based on the principle of the use of natural resources and environmental preservation for sustainable development. Included in the spatial pattern are forest areas designated by the Minister. The Objective of the research is to analyze 1) the function of feasible forest area in Tapanuli Utara Regency viewed from its biophysics, 2) the land cover in Tapanuli Utara Regency from 2014 to 2020 and 3) the forest area in Tapanuli Utara Regency which is still preserved as Fores Area or could be changed to be a non-forest area. The research uses descriptive qualitative method. The data are processed and analyzed by using overlapping method on biophysical data, existing condition, and other thematic data, using GIS (Geographic Information System). The Result of the analysis of the function of forest area in Tapanuli Utara Regency shows that the fungtion of its forest area of 198.002 hectares consisted of 1) Nature Reserve Area is 2.011 hectares, 2) Protected Forest area is 49.772 hectares, 3) Limited Production Forest Area is 69.093 hectares, and Production Forest Area is 77.126 hectares*

Keywords: *Spatial pattern, forest area, Tapanuli Utara Regency, biophysics condition, GIS*

Abstrak. Rencana pola ruang di suatu wilayah meliputi peruntukan kawasan lindung dan kawasan budidaya berdasarkan prinsip pemanfaatan sumber daya alam yang berasaskan kelestarian lingkungan menuju pembangunan yang berkelanjutan. Termasuk di dalam pola ruang adalah kawasan hutan yang ditunjuk oleh Menteri. Tujuan dari penelitian ini adalah (1) Menganalisis fungsi kawasan hutan di Kabupaten Tapanuli Utara yang layak apabila dikaji berdasarkan kondisi biofisiknya, kondisi existing saat ini dan Peta Register Kawasan Hutan; (2) Menganalisis penutupan lahan di Kabupaten Tapanuli Utara Tahun 2014 sampai dengan tahun 2020 dan (3) Menganalisis Kawasan Hutan Kabupaten Tapanuli Utara yang dipertahankan menjadi Kawasan Hutan atau dapat berubah peruntukan menjadi bukan kawasan hutan. Metode penelitian yang digunakan adalah metode deskriptif kualitatif. Teknik pengolahan dan analisis data dilakukan dengan metode tumpang tindih terhadap data biofisik, kondisi eksisting dan data tematik lainnya dengan menggunakan Sistem Informasi Geografis (SIG). Hasil analisis fungsi kawasan hutan Kabupaten Tapanuli Utara adalah arahan kawasan hutan di Kabupaten Tapanuli Utara seluas 198.002 Ha dengan rician fungsi Kawasan Hutan terdiri dari (1) Kawasan Suaka Alam/Kawasan pelestarian Alam seluas 2.011 Ha; (2) Kawasan

*Corresponding author at: Postgraduate School, Universitas Sumatera Utara, Jalan Prof. Mass, Medan 20155, Indonesia

E-mail address: sranokarno@gmail.com | doi: https://doi.org/10.32734/jeds.v3i2.8527

Hutan Lindung seluas 49.772 Ha; (3) Kawasan Hutan Produksi Terbatas seluas 69.093 Ha; dan (4) Kawasan Hutan Produksi seluas 77.126 Ha.

Kata Kunci: Pola ruang, kawasan hutan, Kabupaten Tapanuli Utara, kondisi biofisik, SIG.

Received: 12-08-2022 | Revised: 15-09-2022 | Accepted: 10-10-2022

1. Introduction

Article 2 of Law No. 26/2007 on Spatial Pattern Planning states that Spatial Planning is organized based on principle, integration, harmony, conformity and balance, sustainability, efficiency and effectiveness, transparency, sense of togetherness and partnership, protection for public interest, legal certainty and justice, and accountability. The implementation of spatial planning includes the process of spatial planning, the use of qualified space (efficient and effective) and its controlling. General spatial planning has a hierarchy of national spatial planning area, provincial spatial planning area, district spatial planning area, and urban spatial planning area. National, provincial, and district spatial planning includes land, sea, and air spaces, including the space under the earth. The contents of spatial planning include spatial structure planning (residences and facility and infrastructure) and spatial pattern planning (protected area and cultivated area). Spatial planning means to manage anything in an integrated way which is related to geographical, biological, physical, economic, and social aspects. All of them should be analyzed to become one unit in order to create the harmony in their natural and aesthetic environment. According to Marlina in [1], a space can consist of spatial components and each of them is called spatial sub-system which is interconnected with each other.

The Provincial Government of North Sumatera revised its Regional Regulation No. 2/2017 on August 3, 2017. The Tapanuli Utara District Government issued its Regional Regulation No. 3/2017 on October 4, 2017 on Spatial Planning of Tapanuli Utara Regency for the period of 2017-2030. The spatial pattern of this regulation is a forest area determined by the Minister of Environment and Forestry based on the Decree of the Minister of Forestry Number 579/Menhut-II/2014 and updated in accordance with the Decree of the Minister of Environment and Forestry Number: SK.8088/MENLHK-PKTL/ KUH/PLA.2/11/2018 covering an area of 221,188 hectares (54.48% of the district area). The forest area is considered not in accordance with current land cover conditions, causing problems in the community. Within the forest area there are still settlements, public facilities, social facilities, agricultural land and customary land claims. In the book Profile and Potential of North Tapanuli Regency in 2020 it is stated that the agricultural sector of North Tapanuli Regency is the backbone of the regional economy as a producer of added value and foreign exchange as well as a source of income or a provider of jobs for the majority of the population. The most dominant sub-sector cultivated by the community in North Tapanuli Regency is the food crops sub-sector including rice, palawija and horticulture. Rice has the largest harvest area of 42,162 hectares. As for vegetable crops, chili has the largest harvest area of 1,680 hectares. The overlap between part of the land already controlled by the community and forest areas will cause problems and uncertainty in carrying out activities. The community's agricultural

land that overlaps the forest area causes the lack of certainty of land ownership by the community because it cannot be certified. This condition causes frequent land conflicts. This land problem can hinder the progress of development in an area which in turn affects the welfare of the community. In addition, the adequacy of forest areas is also very important because forests are a resource that has a very high value for human life. According to Pranata and Hamzari, in [2], Forests are a medium for reciprocal relationships between humans and other living things with natural factors consisting of ecological processes and are a cyclical unity that can support life. According to Soraya in [3], Forests are one of the determinants of the life support system and source of people's prosperity whose existence must be optimally maintained and their carrying capacity maintained in a sustainable manner. Therefore, it is necessary to re- examine the forest area to be the spatial pattern in the spatial planning of the North Tapanuli Regency. According to Danile, et. al., in [4], the management of using spaces becomes the function which is required to be done by the government as its responsibility for increasing the people's welfare, realizing justice, decreasing conflicts and the negative impact on spatial planning, and guaranteeing the continued existence of efficient and effective development which is in accordance with its function ad consistent with RT/RW.

2. Method

The research was conducted in North Tapanuli Regency, North Sumatera Province. North Tapanuli Regency with the capital city of Tarutung is one of the regencies of 33 regencies/cities in North Sumatera Province which is geographically located at 1°20′ – 2°41′ North Latitude and 98°05' - 99°1' East Longitude.

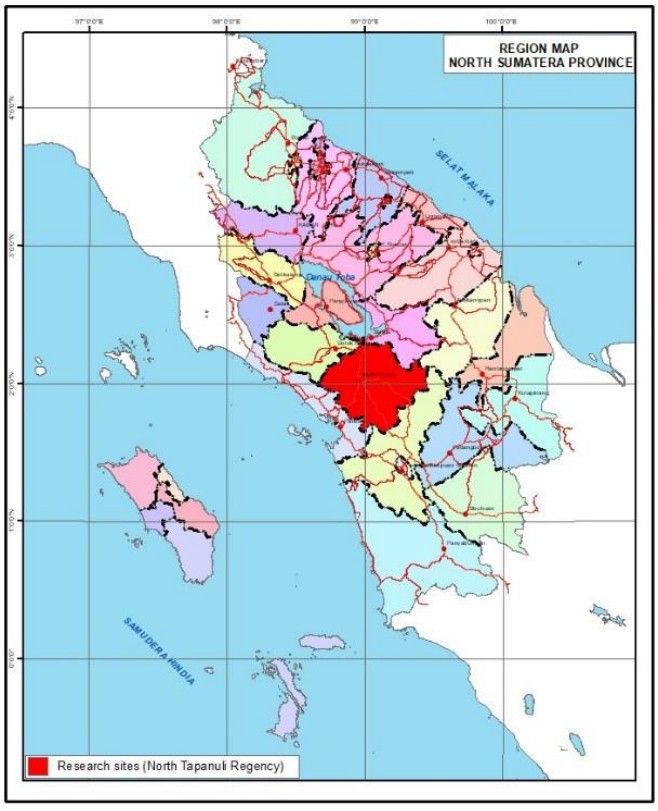


Figure 1. Research Location Map

The research used descriptive qualitative method. The data were processed by using overlay and spatial analysis methods with Geographical Information System (GIS) software, Acr Gis, and Remote Sensing technology and ENVI software. According to Kusumaningtyas and Ivan Chofyan in [5], spatial analysis is an analytical method which is specifically in geography since this is the study on spatial variety of the earth's surface by analyzing each spatial aspect. According to Aronoff in [6] GIS is a computer-based information system that used to process and store geographic data or information. GIS data has two types of data, namely digital data in raster or vector format. Vector data stores digital data in a series of x,y coordinates. Points are stored as a pair of coordinate numbers and polygons as a series of coordinates forming a closed line. According to Budiyanto in [7], raster data is graphic data in the form of a series of squares stored as numbers in pixels that form a grid and has its own attributes. According to Prahasta [8], raster data is data that displays, locates and stores spatial data using a pixel structure. The raster data model provides spatial information in the form of a generalized picture. Vector models store spatial data using points, lines and polygons along with their attributes. The stages of implementing this research was as follows:

2.1 Re-scoring Forest Area in Tapanuli Utara Regency

Nurwijayanto in [9] points out that analysis on forest area can be based on the scoring process of area physical parameter on 3 (three) parameters of physical determination: acclivity, type of soil, and rainfall intensity by doing the weighting in every factor according to the weighting criteria done the Directorate General of Forestry Planology and Environment, the Ministry of Environment and Forestry of the Republic of Indonesia.

Table 1. Criteria Used in Scoring Forest Area

No.	Function of Area	Types of Criteria
1	HL (Protected Forest):	Score ≥ 175, slopes ≥ 40%, Lithosol Types of Soil, Lathosol, Regosol, Rendzina, Elevation ≥ 2.000 m usl, oil is sensitive to erosion with field slope ≥15 %, Water Absorption Area, Coastal Protective Area.
2	HPT (Limited Production Forest)	Score 125-174
3	HP (Permanent Production Forest)	Score < 125
4	HPK (Converted Production Forest):	HPK (Converted Production Forest) Score < 125, Outside KSA/KPA, Spatially, it is reserved for transmigration, residential area, farming, and plantation

2.2 Evaluating Land Cover and Deforestation

Land cover data was obtained by interpreting Landsat satellite imagery in 2000, 2014 and 2020. The use of satellite imagery at that time was intended to determine the difference between land cover at the time of designation of forest areas and current conditions. As information material in the analysis, serial land cover is also provided since 2000. According to Banskota in [10], the availability of a large amount of free landsat image and the advancement of image processing method and the capacity of computation have encouraged the spread of LTS (Landsat Time

Series) in many applications, including classification and evaluation on the change in forest ecosystem in order to obtain the data and the result of satellite image estimation from the data processing, consisting of two techniques: raster based-Analytical Image technique, using ENVI software and vector based-Geographical Information System, using ArcGis software. According to Gaol, M.R.I. et.al. in [11], the use of long-range reconnaissance technology can present various data and information about the condition and the phenomena of the earth surface as quickly as possible and can be related to a geographical reference.

2.3 Mapping Forest Area and other Thematic Maps

In order to be able to analyze the basic map and other thematic maps, it is necessary to do the processing of data to be digital data. Processing and analyzing the data/maps was done by using SIG (Geographical Information System) software and analysis using the overlapping method. The process of analyzing and processing data up to the overlay stage is carried out using ArcGis software in detail as follows 1) Scanning/georeferencing / Digitizing, 2) Viewing Data using Arc Gis software, 3) Vector creation (Line, Point, Polygon) using ArcGIS software by transferring Raster shape data (digital image data) into digital data that is easy to process/calculate, 4) Overlay/Overlapping Analysis is in the same map format. According to Prahasta in [12], Digital Scanning aims to convert paper-shaped maps into digital formats so as to get all the data available on the map, as well as to facilitate analysis in digital form with the aim of equalizing data formats and transformation (providing location coordinates) to equate the projection system with a unified display. Georeferencing is to make corrections to raster maps and position them according to the coordinate system used. The data that has been georeferenced is then digitized to convert the raster map data into vector data.

2.4 Analysis on Evaluating the Function of Forest Area

Analysis and limitation in the study on evaluating the function of forest area toward Spatial Planning of Tapanuli Utara Regency were done in stages and gradually: 1) doing scoring,
2)the borderline of registered and managed forest areas was maintained as forest areas, 3) the area renunciation of rights which had been obtained from the Minister of Forestry were removed from the forest areas, 4) The existence of forest area which had changed its function, based on the Decree of the Minister of Forestry, was maintained as a forest area which function was in accordance with the Decree on the Change in Function, 5) The adat (customary) forest area and culturally protected area would be removed from the forest area as long as they were recognized by the Regional Regulation, 6) The use of forest area issued by the Minister or the Governor was maintained as a forest area, 7) The enclave area reflected in the registered maps of forest area was recognized and described as non-forest area, 8) Registered area which had been in the deforestation more than 20 (twenty) and farming land was removed from the forest area, 9) Registered area which had been in the deforestation fewer than 20 (twenty) was still the forest area, 10) Deforestation area after the last notification/decree on forest area except residential area was still a forest area, and 11) The area which has the potency of being primary forest, except the

notification of forest without imposing the rights, was included as a forest area according to the result of scoring to adjust the biophysical conditions of the area, namely slope, soil type and rainfall.

3. Result and Discussion

3.1 Forest Areas Based on the Allocation

The forest area in Taanuli Utara Regency based on the Decree No. 579/Menhut-Ii/2014 and the development of the confirmation in 2017 was 221,188 hectares.

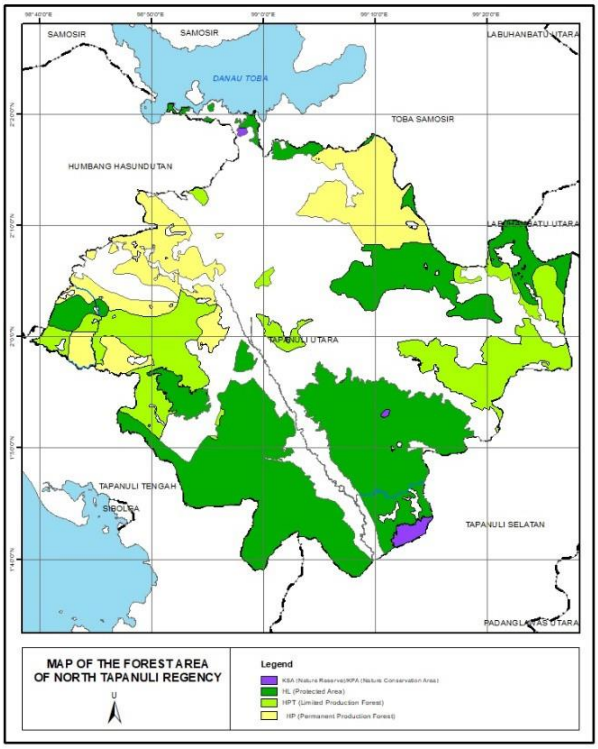


Figure 2. Map of the forest area of North Tapanuli Regency based on the Decree of the Minister of Forestry No. SK.579/Menhut-II/2014 dated 24 June 2014 and SK.8088/MENLHK-PKTL/KUH/PLA.2/11/2018 dated 23 November 2018

Table 2. Forest Area in Tapanuli Utara Regency

No	Function of Forest	Area	
1	KSA (Nature Reserve)/KPA (Nature Conservation Area)	2.019	Hectares
2	HL (Protected Area)	123.266	Hectares
3	HPT (Limited Production Forest)	48.952	Hectares
4	HP (Permanent Production Forest)	46.951	Hectares
	Total	**221.188**	**Hectares**

3.2 Registered Forest Area

Registered forest area is a forest area which was recognized by the Dutch colonialist, and it had existed until 1982. Registered forest area in Tapanuli Utara Regency, based on the data of the distribution of registered forest area in the Forest Area Consolidation Center I, Medan, is 86,054.87 hectares in 12 sub-districts.

3.3 Scoring Result of Forest Area in Tapanuli Utara Regency

Analysis on the scoring of forest area in Tapanuli Utara Regency was done by analyzing 3 (three) determining parameters of forest area concerning the physical areas: acclivity, types of soil, and rain intensity. The scoring result of forest area in Tapanuli Utara Regency was then done by clipping according to the boundary or mapping delineation of forest area, based on the Decree of the Minister of Forestry No. SK 579/Menhut-II/2014 and No. SK.8088/MENLHK-PKTL/KUH/PLA.2/11/2018.

Table 3. Result of Scoring Analysis on Determining the Function of Forest in Tapanuli Utara Regency

Rain Intensity			Activity			Types of Soil			Total Score	Function of Forest	Area (Ha)
Category	**Class**	**Score**	**Category**	**Class**	**Score**	**Category**	**Class**	**Score**			
Very Low	1	10	(0-8%)	1	20	insensitive	1	15	45	HP	4,608
						lack of sensitiveness	3	45	75	HP	4,449
						sensitive	4	60	90	HP	75,737
			8-15%	2	40	lack of sensitiveness	3	45	95	HP	4,885
						sensitive	4	60	110	HP	38,648
			15-25%	3	60	lack of sensitiveness	3	45	115	HP	31,336
						sensitive	4	60	130	HPT	25,737
			25-40%	4	80	lack of sensitiveness	3	45	135	HPT	28,817
						sensitive	4	60	150	HPT	6,553
			>40%	5	100	lack of sensitiveness	3	45	155	HL	31,469
						sensitive	4	60	170	HL	15,745
Low	2	20	(0-8%)	1	20	insensitive	1	15	55	HP	3,931
						lack of sensitiveness	3	45	85	HP	638
						sensitive	4	60	100	HP	20,944
			8-15%	2	40	lack of sensitiveness	3	45	105	HP	1,461
						sensitiveness	4	60	120	HP	16,966
			15-25%	3	60	lack of sensitiveness	3	45	125	HPT	14,783
						sensitive	4	60	140	HPT	18,955
			25-40%	4	80	Lack of sensitiveness	3	45	145	HPT	19,143
			>40%	5	100	Lack of sensitiveness	3	45	165	HL	13,816
						sensitive	4	60	180	HL	1,322
Total (Ha)											379,955

Source: Data processed, 2021

Table 4. Re-Scoring Result of Forest Area in Tapanuli Utara Regency

No	Function of Forest Area	Area (Ha)
1	HL (Protected Forest)	53,223
2	HP (Permanent Production Forest)	93,519
3	HPT (Limited Production Forest)	74,446
	Total	**221,188**

Source : Data processed, 2021

3.4 Land Covering

From the interpretation of satellite imagery, it was found that there were 12 classes of land covering in Tapanuli Utara Regency. The largest area of land covering was Secondary forest in the area of 137,995 (36.3% of the regency area). From the data of estimation, it was found that the area of Tapanuli Utara Regency in which the existence of land covering still had forest, either primary forest, secondary forest, or plantation, was 199,497 hectares or 52.5% of the area of Tapanuli Utara Regency. The function of forest area in Tapanuli Utara Regency seems not in accordance with the current condition of land covering because there are residential areas and smallholders in it.

Besides the satellite image estimation in 2020, satellite image estimation in 2014 was also done in order to find out the condition of land covering by the time the maps of forest area in the North Sumatera Province was issued by the Minister of Environment and Forestry through the Decree of the Minister of Forestry No. SK.579/Menhut-II/2014 on June 24, 2014. Based on the result of satellite image estimation in 2014 ad in 2020, it was found that there was the change in land covering in Tapanuli Utara Regency. The change occurred in all classes, either increasing or decreasing. Deforestation which occurred in the forest area of Tapanuli Utara Regency from 2014 until 2020 was in the area of 5,785 hectares.

Table 5. Satellite Image Estimation in Tapanuli Utara Regency in 2020

No.	Deforestation	Area (Ha)	Percentage
1	Hp (Primary Dry Forest Area)	38,739	10.2%
2	Hs (Secondary Dry Forest Area)	137,995	36.3%
3	Ht (Plantation Forest)	22,763	6.0%
4	B (bushes)	27,253	7.2%
5	Pc (Dry Farming Land and Bushes)	28,143	7.4%
6	Pt (Dry Farming Land)	96,963	25.5%
7	Pk (Plantation)	305	0.1%
8	Sw (Wet Rice Field)	23,349	6.1%
9	T (Open Land)	1,589	0.4%
10	Pm (Residential Area)	2,512	0.7%
11	Bdr (Airport)	199	0.1%
12	A (Body of Water)	145	0.0%
	Total	**379,955**	**100.0%**

In order to make sure the accuracy of satellite image estimation, field observation was done, and after that, the data were processed by using confusion matrix method. The value of kappa accuracy was 93.84% which indicated that the result of satellite image estimation used in this research was accurate and feasible.

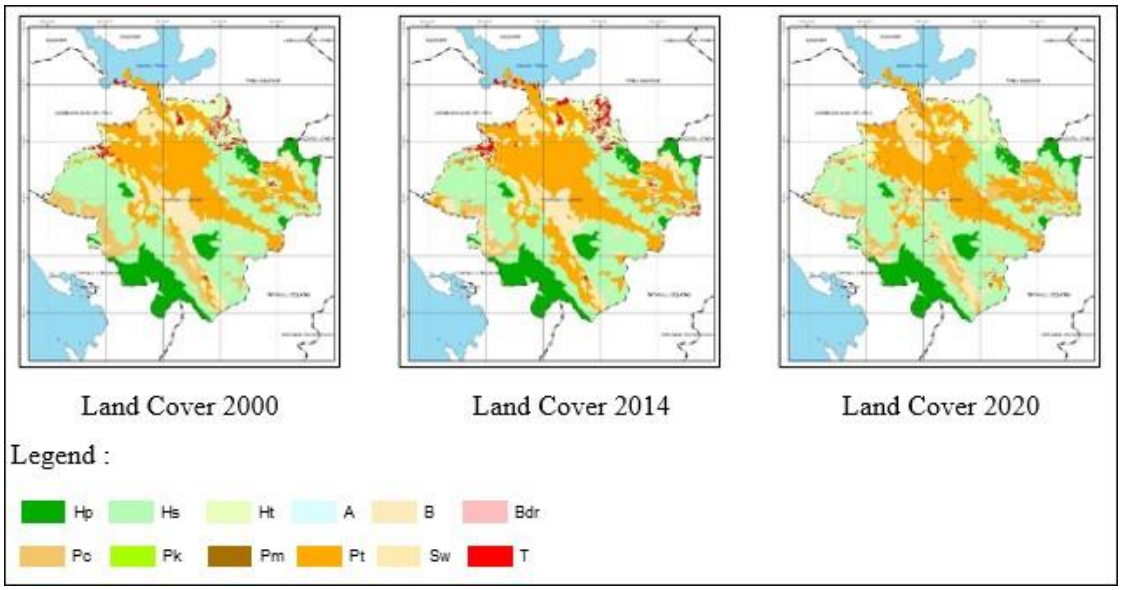


Figure 3. Map of Land cover Classification of Nort Tapanuli Regency

3.5 Permit for Using Forest Area

There are some forest areas in this Regency which can be used by the people by getting permit from the authorities. The forest areas which are permitted to be used were 50,965 hectares which spread in seven sub-districts; there are eight permits for forest areas in the area of 678.2 hectares.

3.6 Result of the Analysis on the Evaluation of the Function of Forest Area

Analysis used in determining the function of forest area used today was by using areal bio-physical analysis. According to Nurwijayanto in [9], the technique used was by combining areal bio-physical parameter – topographical land span and vegetation on it.

Table 6. Direction of Forest Area in Tapanuli Utara Regency

No.	Function of Forest Area	Area (Ha)
1	KSA (Nature Reserve)/KPA (NatureConservation Area	2,011
2	HL (Protected Area)	49,772
3	HPT (Limited Production Forest)	69,093
4	HP (Permanent Production Forest)	77,126
	Total	**198,002**

The area of forest areas is in accordance with the result of the analysis which undergoes decrease in Forest Area based on the Decree No. SK.579/Menhut-II/2014 and its update, according to the Decree No. SK.8088/MENLHK-PKTL/KUH/PLA.2/11/2018, issued on November 23, 2018 in the area of 23,186 hectares. This change occurred because the forest area, based on its allocation, was not in accordance with the current condition since it becomes farming land, residential area, and wet rice fields obtained from the result of satellite image estimation. Not all of the changes in the allocation occurred from forest area to non-forest area even though there were some changes among the functions of forest area. Generally, there was no change in the nature reserve area because it was partially appointed since it had its own characteristics which met the requirements for being determined as the nature reserve area with a special policy. Nevertheless, in the analysis

on forest area there was previously residential areas in the nature reserve area so that the function of the area of eight hectares had to be changed to another use.

Registered forest area which had been allocated since the Dutch colonial period was known well the local people surrounding the forest. The registered forest area allocated as the forest area in the map of forest area, according to the Decree No. SK.579/Menhut-II/2014 is maintained consistently to become the forest area.

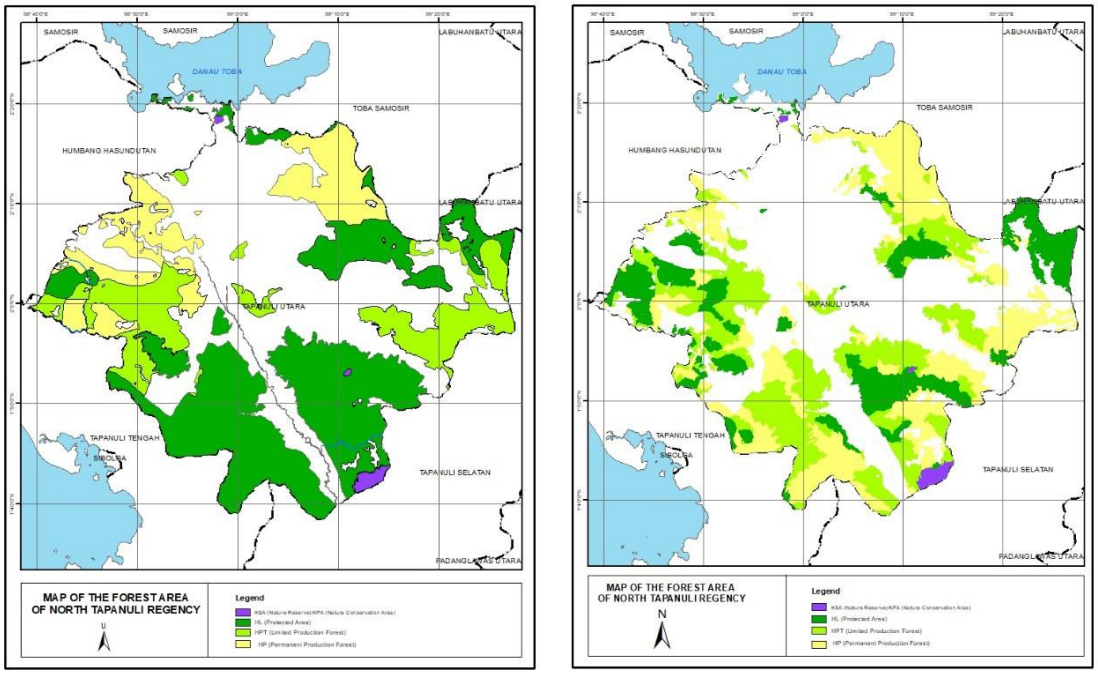
Table 7. Changes in Forest Areas in Tapanuli Utara Regency

Function of Area based on SK.579/Menhut-II/2014	Direction of Forest Area as the Result of Analysis						
	Nature Reserve Area/ KSA (Nature Conservation Area)	**HL (Protected Forest)**	**HPT (Limited Production Forest)**	**HP (Permanent Production Forest)**	**APL (Other Used Areas)**	**A (Body of Water)**	**Total**
KSA	2,011				8		2,019
HL		32,007	44,558	39,471	7,229		123,266
HPT		11,152	15,964	14,217	7,619		48,952
HP		6,613	8.,71	23,437	8,335		46,955
APL					158,252		158,252
Body of Water				1		510	511
Total	**2,011**	**49,772**	**69,093**	**77,126**	**181,444**	**510**	**379,955**

The direction of forest area as the result of the analysis on function, the forest area could be maintained, either its width or its sufficiency, and the current condition of land covering in Tapanuli Utara Regency. The maintained forest area is 52.1% of the area of Tapanuli Utara Regency. Based on the result of image estimation, it was found that there was no more farming land and residential area in the forest area; it was in accordance with the result of the analysis on function which had been done.

Table 8. Difference of the Forest Area in Tapanuli Utara Regency from the Result of the Analysis

Function of Forest Area	Forest Area Based on SK.579/Menhut-II/2024		Forest Area Based on the Result of the Analysis		Changes
	Area (Ha)	**% on the Administrative Area of Tapanuli Utara Utara Regency**	**Area (Ha)**	**% on the Administrative Area of Tapanuli Utara Regency**	
KSA	2,019	0.5%	2,011	0.5%	-8
HL	123,266	32.4%	49,772	13.1%	-73,494
HPT	48,952	12.9%	69,093	18.2%	20,141
HP	46,951	12.4%	77,126	20.3%	30,175
Total	**221,188**	**58.2%**	**198,002**	**52,1%**	**-23,186**



Forest Area Based on SK.579/Menhut-II/2014

Forest Area Based on the Result of the Analysis

Figure 4. Directional Map of the Forest

The direction of forest area as the result of the analysis on function was that the forest area could be maintained, either its width or its sufficiency, and the current condition of land covering in Tapanuli Utara Regency. The maintained forest area was 52.1% of the area of Tapanuli Utara Regency. Based on the result of image estimation, it was found that there was no more faming land and residential area in the forest area; it was in accordance with the result of the analysis on function which had been done

Allocating forest area in a certain region should be concerned with the supporting power and the capacity of environment, according to the direction of function which can be determined such as conservation function, protective function, and production function a what is specified in the Decree of the Minister of Environment and Forestry No. 7/2021. The criteria of supporting power and capacity of environment are to keep the function of protection by using indicator of land capacity class: a) steep acclivity, b) soil with sensitiveness to high erosion, and c) high rainfall. These criteria have been done in accordance with the previous scoring result, and included the areas in the criteria to become the Protected Forest Area.

The criteria of supporting power and capacity of environment to guard off the function of production are by using indicator of land capacity class: a) acclivity less than or the same as 40% (forty hundredth), b) soil with sensitiveness from low until moderate erosion, and c) from low until moderate rainfall. These criteria are in accordance with the scoring, and determining the land in the criteria to become the Production Forest Area. The forest area allocated in Tapanuli Utara Regency has surely an important function in life. Suparmoko (1997) points out that some

functions of forests, among others, are 1) arranging water management, preventing and mitigating flood, erosion, and taking re of soil fertility, 2) providing forest products for the people in general and for industrial and export development specifically in order to support economic development, 3) protecting climatic atmosphere and providing good influence, 4) providing natural beauty in general in the form of nature preserve for wildlife reserve, hunting area, and national recreation park as the laboratory of knowledge, education, and tourism, and 5) it is one of the strategic elements in national development.

The result of the analysis from scoring, land covering, until the use of forest area showed that there was no correspondence between the function of forest area, based on SK.579/Menhut-II/2014 and SK.8088/MENLHK-PKTL/KUH/PLA.2/11/2018 and the condition or the facts in the field during this research was conducted. This inappropriateness was indicated by the significant difference in the result of re-scoring. Based on satellite image estimation, it was found that there were residential area, farming land, and wet rice fields in the forest area which could not be reforested or to be managed according to the regulation in forestry so that the new direction should be considered.

4. Conclusion

Based on the analysis on the function of forest area in spatial planning in Tapanuli Utara Regency, it can be concluded that

1. The forest area in Tapanuli Utara Regency is feasible, after it has been studied based on the biophysical condition, the current condition of land covering and the Map of Forest Area Register and the other Thematic Maps, in the area of 198,002 hectares, with the details as follows:
    a. KSA (Nature Reserve Area/KPA (Nature Conservation Area) in the area of 2011 hectares;
    b. HL (Protected Forest Area in the area of 49,772 hectares;
    c. HPT (Limited Production Forest Area) in the area of 69,093 hectares; and
    d. HP (Production Forest Area in the area of 77,126 hectares.
2. There was Land Covering which was not a forest in the forest area in Tapanuli Utara Regency from 2014 until 2020: 19.2% of the forest area. The occurrence of deforestation in the area of 5,785 hectares had influenced the condition of forest area so that it should be revised.
3. The areas which are maintained to be the forest areas are the areas which meets the criteria as the forest area, viewed from biophysical point of view, registered forest, boundaries, and the existing condition of the forest area in the area of 198,002 hectares and which undergoes changes to become non-forest area in the area of 23,186 hectares.

References

[1] Marlina, S. 2016. Arahan Fungsi Kawasan Hutan yang Optimal dalam Rencana Tata Ruang Wilayah Kota Palangka Raya melalui Pendekatan Analisis Spasial. Media Ilmiah Teknik Lingkungan Volume 1, Number 1, February 2016

[2] Pranata dan Hamzari, 2020. Analisis Kesesuaian Fungsi Kawasan Hutan Lindung Pada Kesatuan Pengelolaan Hutan Lindung (KPHL) Tepo Asa Aroa Di Kecamatan Petasia Kabupaten Morowali Utara. Hamzari. Jurnal Warta Rimba Volume 8. Nomor 1

[3] Soraya, E. 2019. Seberapa Luas Hutan Yang Kita Perlukan. Jurnal Ilmu Kehutanan 13. 2019

[4] Danile, E. T. 2017. Analisis penggunaan Lahan dan Arahan Pengendalian Pemanfaatan Ruang Di Kabupaten Bogor. Tata Loka Volume 19 Number 1, February 2017.

[5] Kusumaningtyas, R. Dan Ivan Chofyan. Pengelolaan Hutan Dalam Mengatasi Alih Fungsi Lahan Hutan di Wilayah Kabupaten Subang. Jurnal Perencanaan Wilayah Dan Kota, Vol.13 No.2.

[6] Aronoff, S. 1989. Remote Sensing For GIS Manager (terjemahan). Yogyakarta: Gajah Mada University Press

[7] Budiyanto, Eko, 2002, Sistem Informasi Geografi menggunakan ArcView GIS, Yogyakarta : Andi Yogyakarta

[8] Prahasta, E. 2001. Konsep-konsep Dasar Sistem Informasi Geografis. Informatika Bandung

[9] Nurwijayanto, E. 2008. Analisis Kawasan Hutan dan Kawasan Lindung Dalam Rangka Arahan Penataan Ruang Di Kabupaten Deli Serdang. Sekolah Pasca Sarjana Institut Pertanian Bogor.

[10] Banskota, A. et al. 2014. Forest Monitoring Using Landsat Time Series Data: A Review. Canadian Journal of Remote Sensing. VOL. 40, NO. 5, OCTOBER/OCTOBRE 2014

[11] Gaol, M.R.L. dkk. 2008. Analisis Fungsi Kawasan Hutan Menggunakan Penginderaan Jauh Dan Sistem Informasi Geografis di Taman Nasional Kutai. Jurnal Kehutanan Tropika Humida 1 (2), Oktober 2008.

[12] Prahasta, E. 2001. Konsep-konsep Dasar Sistem Informasi Geografis. Informatika Bandung.