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Peatland Conversion in Catchment Areas in Other Use Areas Impacts and Solutions to Sintang Flood

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Abstract. This paper aims to discuss the conversion of catchment areas, especially peatlands, and solutions that it can do to minimize the impact of flooding in the Sintang Regency. Late October to mid-November 2021, there was a flood in Sintang, which affected more than 53,365 people. Triggered by global climate change resulting in extreme rain, there is a lot of speculation about the cause of the flood, including the conversion of land to oil palm plantations. The method used in this paper is a literature study and remote sensing using ESRI. The results indicated that the causes include switching its function, namely peatland in other use areas. The solution to minimizing the impact of flooding from a government perspective is to make policies, and strict supervision of the Regional Spatial Plan (RSP) is determined. The companies must apply HCV to their plantation lands to help restore the forest areas and rehabilitate essential ecosystem areas.

Keywords: *catchment area; flood; peatland; remote sensing, sintang.*

1 Introduction

Sintang Regency, part of West Kalimantan Province, is located in a tropical forest area and has fairly high humidity, so this area has a fairly high rainfall in the RPJMD [1]. According to the climate classification of Schmidt and Ferguson, the climate in Sintang Regency is classified as climate A (wet climate), with wet months between 7-9 months, while dry months between 2-3 months. This area is crossed by the Kapuas River and has a fairly large tributary, the Melawi River. This topographic and geographical condition causes Sintang Regency, which is located in the upstream area, to experience flooding every year by Irawan and Mulki [2].

In general, floods occur in Sintang caused by overflowing water from the Kapuas River. Prolonged rain with the intensity of rains for several days also exacerbated flooding. The water storage capacity of each river area unit that is eventually

exceeded becomes runoff which will then flow quickly to nearby rivers and overflow inundated lowland areas on either side of the river by Putuhuhu [3]

At the end of October 2021, this area experienced the largest flooding in the last 40 years. In addition to affecting 12 of the 14 existing sub-districts, the flood lasted for more than four weeks, submerged residential areas, the affected more than 53,365 people. The flood, which began on October 22 until the end of November, was the longest flood that had ever occurred in the area [4]

There is a lot of speculation regarding the cause of the flood, apart from what has started. The issue of land transfer which causes the change of function of the catchment area to another area is suspected to be the cause of the high water discharge and the long duration of the flood. In Sintang Regency, there are several catchment areas such as rivers, lakes, swamps, peatlands, water catchments, and river boundaries [5]. This location not be used for settlements and aquaculture activities because it can damage the water catchment areas. Therefore, this paper was written to discuss the transfer of catchment area functions, especially peatlands, and is the solution to minimize the impact of flooding in the Sintang Regency.

2 Study Area

Sintang Regency is one of the eastern regions in West Kalimantan Province traversed by the equator with the capital city Sintang located between 1˚ 05′ North Latitude and 0˚ 46′ South Latitude and 110˚ 50′ East Longitude and 113˚ 20′ East Longitude. . The area of Sintang Regency is 21,635 km² by BAPPEDA Sintang [6]. This area is divided into several regions with the largest being other use areas, which is 880,664.08 ha or 40.71% of the total area (figure 1). APL is a forest area determined based on the Decree of the Minister of Forestry concerning Designation of Provincial Forest and Water Areas, or based on an agreed forest use arrangement (TGHK) to become a non-forest area[1]. This area can use for settlement and cultivation activities.

However, other use areas turn out to be catchment areas. This location is the area of land from which water flows into a river, lake, or reservoir [7]. The Catchment area is the starting point in the analysis and is essential for all hydrological

[1] Based on the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.38 of 2016 concerning Approval for Construction and/or Use of Corridors.

calculations by Bonacci [8]. This research was conducted at two points of the area known to be peatland, namely Ketungau Hilir District and the Field Village of Sintang District.

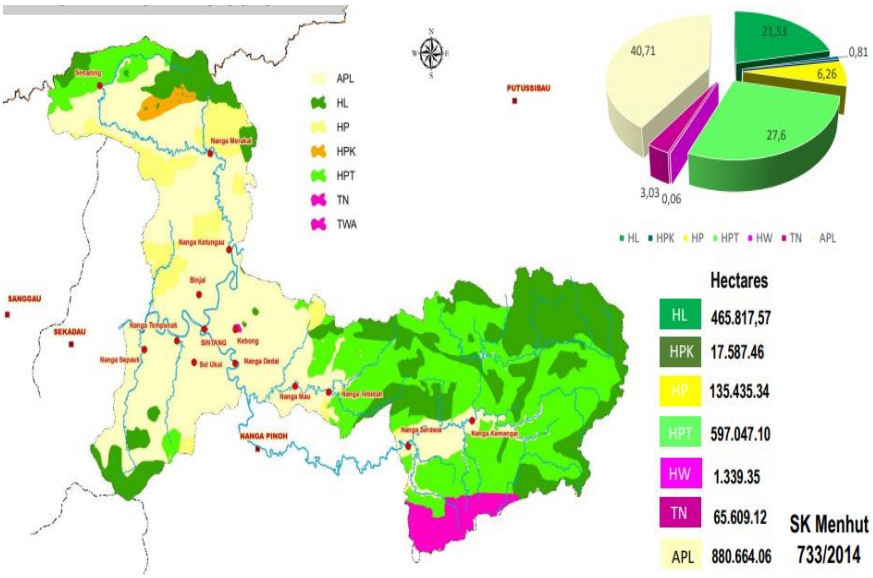

Figure 1. Map of the Protected and Cultural Areas of Sintang Regency

3 Method

In this paper, the method used to detect the catchment of peatland areas is by remote sensing using ArcGIS from ESRI (Environment Science & Research Institute) with visual map interpretation between peatland data and the appearance of objects in satellite imagery. From this application, the overall goal is to make spatially explicit, landscape representation methods available to users so that they can easily account for the effects of spatial proximity and hydrologic activity (ie, runoff potential) using simple landscape representation methods by Peterson and Pearse [9]. In addition, a literature study was conducted to find out

how the catchment area, in this case, peatland, could be the location of plantations and residential areas.

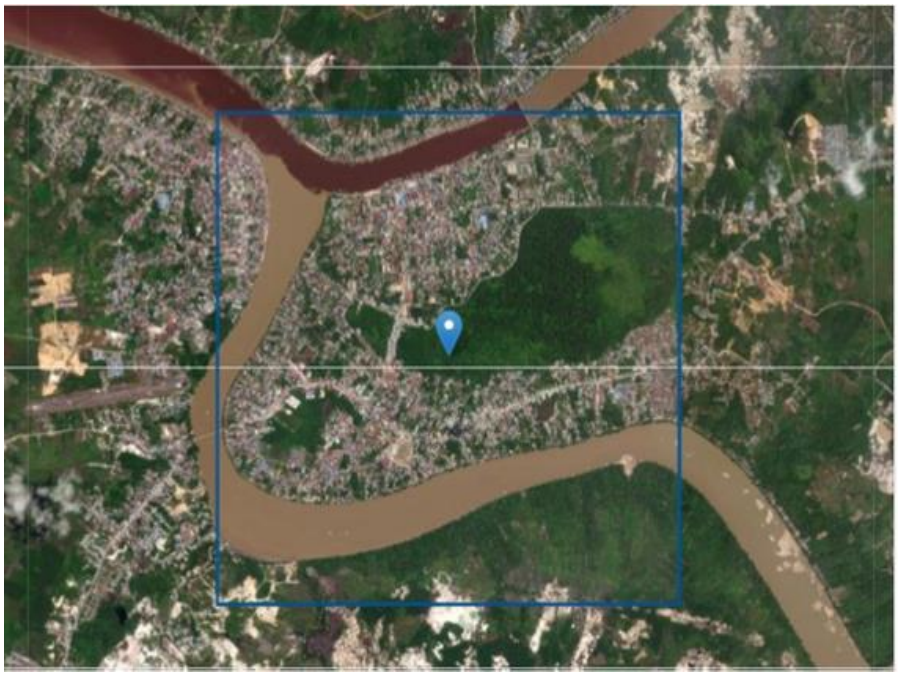

Figure 2. Map of Sintang Regency [10].

4 Results and Discussion

Peatlands are the most important role in climate change mitigation and adaptation. Although the amount of peatland is only about 3-5% on the earth's surface, its existence is home to more than 30% of the world's carbon reserves stored in the ground by Purnomo [11]. The area of peatlands in Sintang Regency reaches 35,463.38 ha or about t 1.64% of the total area of Sintang Regency spread over several locations (figure 3). Although the percentage of peatland is smaller, its existence as a water absorption area is most important.

The results of remote sensing in this study indicate that the peatlands of the two selected locations are indicated to overlap with plantation lands and residential areas. On remote sensing in the Ketungau Hilir sub-district, plantations are found on peatlands (figure 4). Meanwhile, remote sensing at the Sintang sub-district location found residential areas right on peatland, namely Jalan Lintas Melawi, Ladang sub-district (figure 5). Disruption of the peatland area causes the water

catchment area to be increasingly limited. As a result, during the rainy season, flooding is easy in this district.

Figure 3. Map of peat land distribution in Sintang district

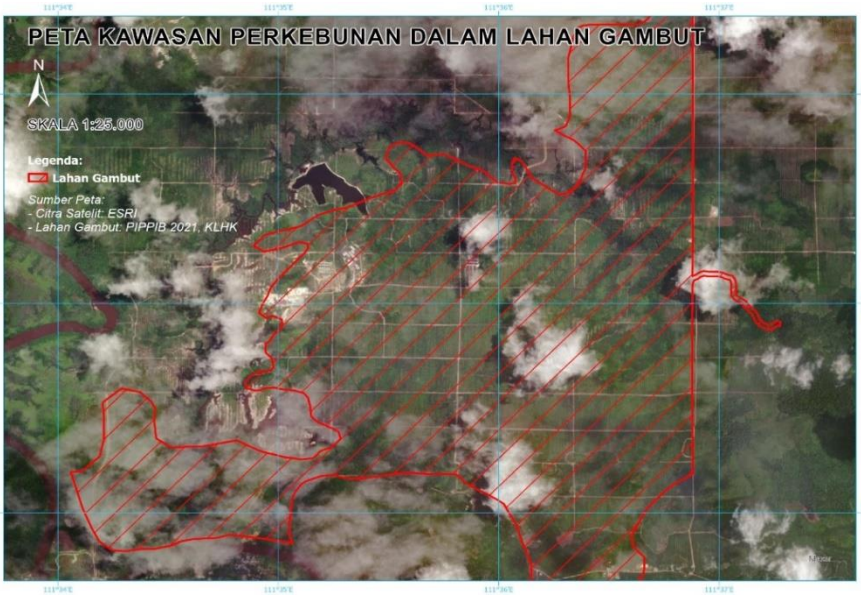

Figure 4. Map of plantation area in peatland

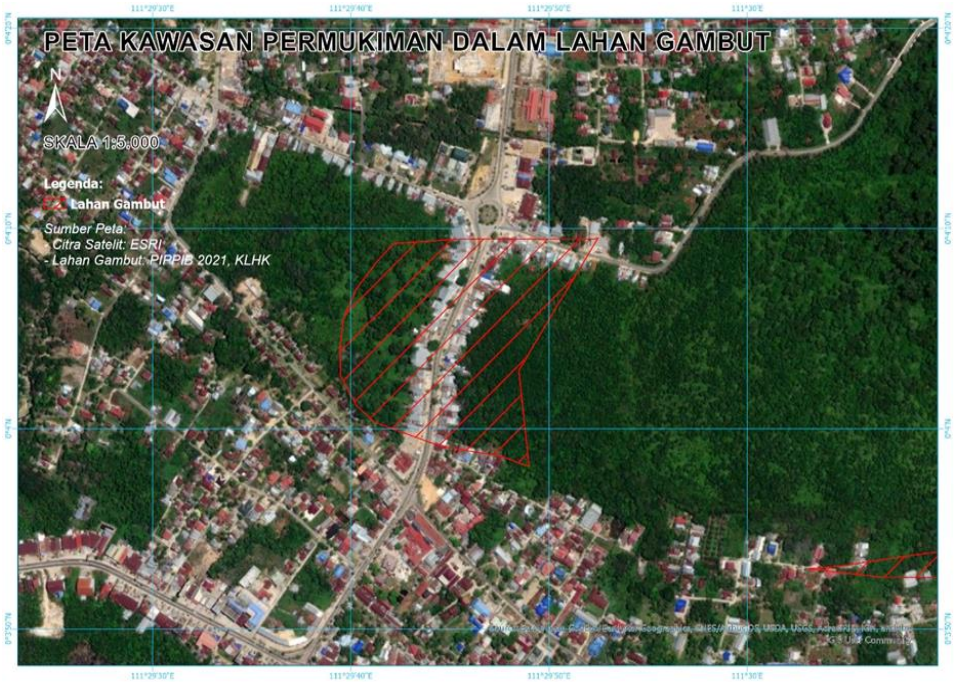

Figure 5. Map of residential areas in peatlands.

The existence of plantations on peatlands in the Sintang Regency is due to several factors, both from the regulatory system, implementation of operational standards in the field, and supervision from related parties. From the regulatory system, permits for plantation land clearing in this case oil palm plantations in Sintang Regency began in 1998. until 2007. The land clearing was carried out by those who already had HGU (Hak Guna Usaha). Cultivation rights are rights to cultivate land which is directly controlled by the State, for agricultural, fishery, or animal husbandry companies. Cultivation rights are granted on land with an area of at least 5 hectares, provided that if the area is 25 hectares or more, appropriate capital investment and good corporate techniques must be used, in accordance with the times[2]. In line with the increasing number of parties receiving HGU, there was a massive land clearing by burning until 2018. This land clearing by burning has an impact on the disruption of natural ecosystems, especially the catchment area in the area.

Land clearing by burning is no longer allowed, after the Sintang Regent's Regulation Number 57 of 2018 concerning the procedures for land clearing for the community was established and the joining of Sintang Regency to become a member of the Lestari Regency Gathering Circle (LRGC). The LRGC is a district government association formed and managed by the district government to realize sustainable development that protects the environment and improves the welfare of the community through cooperation. LRGC is a sustainable development caucus from the Association of District Governments throughout Indonesia (APKASI) which was established in July 2017. The vision and mission carried out in the LRGC are in line with the decision of the Minister of the Environment and Forestry concerning the prohibition of clearing forests with peatlands in them[3]. In addition, it is also prohibited to change the function of peatland, and the need to return peatland to its function if it has been damaged as a water catchment area [12].

In line with the regulations that have been set, the company must also pay attention to the HCV (High Conservation Value) in its HGU. The HCV map in Sintang District is divided into HCVs one to six with the composition of managed HCV, non-managed HCV, and KPNKT (figure 6). From the results of the literature study, it has known that the operational standards in the process of land

[2] According to Law no. 5 of 1960 concerning Agrarian Principles, in article 28 points 1 to 3.

[3] SK.5446/MENLHK-PKLT/IPSDH/PLA.1/8/2021 concerning the establishment of an indicative map of termination of business licenses, approval of the use of forest areas, or approval of the designation of new forest areas in primary natural forests and peatlands in 2021 period II.

clearing, planting, maintenance of mature plants have been regulated according to existing regulations. These rules include not clearing land by burning land (zero burning). All employees must comply with Occupational Safety and Health regulations. May not clear land that is included in the Conservation Area. Criteria Land Clearing activities can only be carried out after there is a study on High Conservation Value[4]. However, in practice especially peatland that overlaps with plantation land. This is because the applicable rules are set after the HGU is owned by the related company.

Then, from the sides of supervision of related parties, namely government agencies, it is necessary to enforce the RSP. Furthermore, the rules that have been set should be evaluated. Evaluation actions are carried out by carrying out the function of space utilization and controlling space utilization. In the case of the conversion of the catchment function of the peatland area, it is necessary to enforce severe sanctions against those who violate it, and there need to be strict regulations related to development in residential areas so as not to damage peatlands.

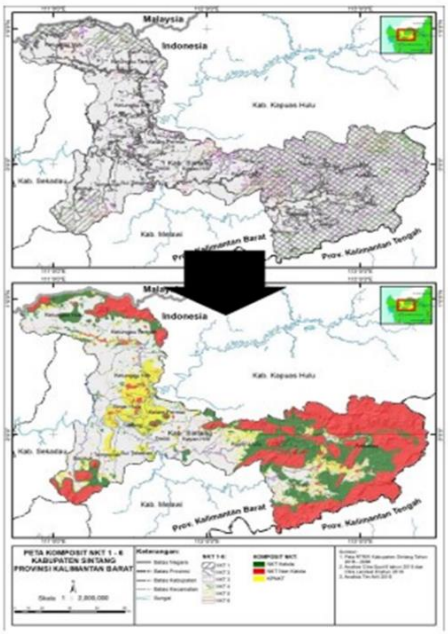

Figure 6. Map of HCV distribution in Sintang District.

[4] SOP PT. BIO INTI AGRINDO tahun 2017

The RSP that has been made to deal with floods, namely by improving spatial management based on disaster mitigation is contained in (Article 7) related to: a. increases the availability of data or information on areas with potential and prone to natural disasters; b. limit the development of cultivated areas built in areas prone to natural disasters; c. develops cultivation areas that can adapt to climate change; d. develop open spaces and evacuation routes in areas that have a high level of natural disaster risk; e. preserve protected areas to reduce the risk of natural disasters.

The flood control system and river security are carried out with the provisions contained in (Article 16), namely: a. protection of water catchment areas (upstream watersheds in all sub-districts); b. river normalization; c. Drainage improvement; d. Construction of embankments on rivers that are prone to flooding and landslides; e. Construction, rehabilitation and operation and maintenance of flood control structures; f. Revitalization of rivers or lakes or springs.

5 Conclusion

From the results of this study, it is known that the catchment function of peatland areas in other use areas becomes plantations and settlements so that the water catchment area is decreasing. Efforts that can be made to overcome the impact of this flood are that the government and companies must synergize with each other. The government must be able to implement and supervise the RSP that has been determined. Meanwhile, the company must be able to implement the HRV that has been agreed upon in the SOP for land clearing, planting, and maintenance of mature plants, as well as replanting after the end of the productive age of the plant in this case oil palm.

Acknowledgement

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References

[1] D. Team, "Regional Medium-Term Development Plan," BAPPEDA, Sintang , 2020.

[2] G. Z. M. Deddy Irawan, "Analisa Kawasan Rawan Banjir Kota Sintang Menggunakan Sistem Informasi Geografi," *Jurnal Teknik Sipil,* vol. 16, no. 2, pp. 1-11, 2016.

[3] F. Puturuhu, Mitigasi bencana dan penginderaan jauh, Yogyakarta: Graha Ilmu , 2015.

[4] C. I. Team, "Walhi: The Biggest Sintang Flood in the Last 40 Years," CNN Indonesia, 17 November 2021. [Online]. Available: cnnindonesia.com/nasional/20211117192246-20-722625/walhi-banjir-sintang-terbesar-dalam-40-tahun-terakhir. [Accessed 4 Desember 2021].

[5] S. M. Mulyadi, "The Biggest Flood Phenomenon in Sintang 2021," Spatial Planning and Land Office of Sintang Regency, Sintang, 2021.

[6] D. Team, "Laporan Kinerja Instansi Pemerintah Kabupaten Sintang Tahun 2019," BAPPEDA, Sintang, 2020.

[7] Admin, "dictionary," cambridge, [Online]. Available: https://dictionary.cambridge.org/dictionary/english/catchment-area. [Accessed 5 Desember 2021].

[8] O. Bonacci, "Hydrological investigations of Dinaric karst at the Krčić catchment and the River Krka springs.," *J. Hydrol,* vol. 82, p. 317–326, 1985.

[9] A. R. P. Erin E. Peterson, "Idw-Plus: An Arcgis Toolset For Calculating Spatially Explicit Watershed Attributes For Survey Sites," *Journal Of The American Water Resources AssociatioN,* vol. 53, no. 5, pp. 1-9, 2016.

[10] Admin, "Peta Kabupaten Sintag," Mapnall, [Online]. Available: http://www.mapnall.com/id/Peta-Sintang_1426614.html. [Accessed 5 Desember 2021].

[11] H. Purnomo, Mengapa Lahan Gambut Penting, Bogor: Pusat Penelitian Kehutanan Internasional (CIFOR) , 2017.

[12] Admin, "Vision and mission," LTKL, [Online]. Available: https://www.kabupatenlestari.org/visi-misi/. [Accessed 8 Desember 2021].

[13] "Kondisi Wilayah Kabupaten Sintang," 31 September 2010. [Online]. Available: http://e-journal.uajy.ac.id/843/3/2TA12910.pdf. [Accessed 4 Desember 2021].