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In the Question of Geospatial Information Data Use in the Forestry Legislation Making in Indonesia

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Abstract: The high rate of deforestation and many forest disputes in Indonesia show that forest management in Indonesia is not based on the principles of good forest governance. It also shows that there is still a lack of attention to the aspect of sustainable forest development which focuses on a balanced sustainability condition between the three forest functions (production, ecology, and socio-economic functions). Geospatial Information is expected to be the solution to help provide an accurate data and information which mapping forest development in accordance with the conditions of each forest area, so that the three functions can operate coherently. Furthermore, with the presence of integrated geospatial data, it can be used as a tool in policy formulation, decision making, and/or dispute resolution in the forestry sector. This paper applies empirical juridical research consisting participatory methods through discussions and interviews with related parties. In practice, the legal materials are firstly collected by using inventory and documentation. Then, it's completed by interviews and Focus Group Discussion data. Moreover, it also applies statutory, conceptual, and case approaches. This paper highlights the use of geospatial information data in the forestry legislation making in Indonesia. Hence, this paper will present new information about the model of forestry dispute resolution based on geospatial information.

Keywords: Forestry; Geospatial Information; Suistainable Forest Development

1. Introduction

Forest is one of the most pivotal factors to support life system and a is source of prosperity whose existence must be optimally maintained wisely, professionally, and responsibly consistent with the essence of forest management must carried out for the greatest prosperity of the people to establish functional and sustainable forest areas for the present and future generations.[1] This type of forest management and utilization is a manifestation of the principles of sustainable forest development. The principle of sustainable development lays the basis that every forest management and utilization shall in no event sacrifice the interest of the future generations by prioritizing social, economic, and environmental objectives.[2]

[1] MacDicken, Kenneth G., Phosiso Sola, John E. Hall, Cesar Sabogal, Martin Tadoum, and Carlos de Wasseige. "Global progress toward sustainable forest management." *Forest Ecology and Management* 352 (2015): 47-56.

[2] Muhammad Mujibudda'awat, "Implementasi the Forest Principle dalam Pengelolaan Hutan di Indonesia dari Aspek Hukum" (Thesis, Universitas Airlangga, 2001), 19.

Consistent with Indonesian commitment to the implementation of the Sustainable Development Goals (SDGs) 15 concerning life on lands, which is also governed under the Presidential Regulation Number 59 of 2017 concerning the implementation of SDGs in Indonesia. The SDG 15 mandates countries to protect, restore and promote sustainable use of terrestrial ecosystems, manage the forest sustainably, combat desertification, and halt and reverse land degradation as well as halt biodiversity loss. However, the implementation of these principals and objectives have yet manifest themselves successfully. In fact, forests in Indonesian experience a complex level of crisis, such the high rate of deforestation in Indonesia.

The recent data released by the Directorate General of Forestry Planning and Environmental Management of Indonesian Ministry of Environment and Forestry stated that deforestation in Indonesia between 2018-2019 occupied 462.46 thousand hectares and by the period of 2019-2020, the deforestation amounted to 115.46 thousand hectares.[3] It's evident that there's a decrease in the deforestation rate of 75.03% and this downward trend has occurred over the last 4 years. However, by referring holistically to the data released by Global Forest Watch, the rate of deforestation in Indonesia is crucial because it has lost 9.75 million hectares of primary forest between 2002 and 2022.[4]

Accordingly, Indonesia requires a supporting framework to advance the implementation of sustainable development of forest areas. In this case, the Geospatial Information (GI) is presented as one of the solutions to support good forest governance by providing accurate data and information to map the direction and type of forest development based on the local circumstances of each forestry area. Pursuant to Law Number 4 of 2011 concerning the Geospatial Information, Geospatial Information (GI) consist of Geospatial Data (GD) which include data on geographic locations, dimensions or sizes, and/or characteristics of natural objects and/or man-made objects which are under, on or above the surface of the earth. These GD are then processed to be utilized as a tool in the process of policy formulation, decision-making, and/or implementation of activities related to the spatial aspect of the earth.

The data within the GI can assist the implementation of various policies in the forestry sector, one of which is the One Map Policy (OMP) or *Kebijakan Satu Peta* (KSP). OMP is a government policy to support the implementation of good forest and land governance as a means of preventing conflicts related to forest and land use in Indonesia. This policy was proposed in 2010 when the President in office mandated the Geospatial Information Agency (GIA) to create OMP to integrate all map information produced from various sectors into one integrated map to avoid different interpretations or overlapping information in the maps released by GIA.[5] The OMP is later expected to become a

[3] Press Release of the Minister of Environment and Forestry Number: SP. 062/PR/PP/HMS.3/3/2021, https://www.menlhk.go.id/site/single_post/3645/laju-deforestasi-indonesia-turun-75-03, accessed October 27, 2022.

[4] BBC News, "Indonesia termasuk negara Pembabat hutan terbanyak, Menteri LHK: 'Pembangunan era jokowi tidak boleh berhenti atas nama", https://www.bbc.com/indonesia/dunia-59151007, accessed October 27, 2022.

[5] SETAPAK, "Ketidakjelasan Informasi Geospasial Resmi di Indonesia", https://programsetapak.org/setapak-blog/ketidakjelasan-informasi-geospasial-resmi-di-indonesia/, accessed October 27, 2022.

guideline in the policies implementation related to forest. Forest policy offers four dimensions that can be used to describe and analyze the policy process, actors, power, rules of the game and discourse.[6] This research differs from the previous research related to forest and GI information because the focus of this research analyzes the urgency of GI in the formulation of forestry policies. Furthermore, a possible dispute resolution model can be formulated within the forestry sector based on GI, such as OMP in the context of Indonesia.

2. Method

This study is normative-legal because it uses statute, case, and conceptual approaches.[7] Data were analyzed through a descriptive qualitative and content method. A qualitative method was used to generate words rather than numbers.[8] An observation and interpretation approach was used to make these phenomena observable.

3. The Function of Geospatial Information as a Basis for Policy Formulation in Indonesia

Previous studies have shown that degradation of the quality and quantity of forest resources in Indonesia isn't merely prompted by population density and low level of prosperity, but also the state-based resource development policy which used centralistic and mere economic-oriented approach for development management in Indonesia. During the New Order era in Indonesia, the country's forest management policies were heavily influenced by the public's political and socio-economic conditions. For instance, the right to exploit natural forests outside of Java islands were granted by the rulers to their patrons, who have supported them.[9] The law in effect at that time, especially statutory regulations, reflect the ideology of State-based Forest Management, which is then interpreted in a single and narrow ways or considered as the Government-based Forest Management, rather than State Law as mandated by the 1949 Constitution.

During the Reform Order era, there wasn't any significant change towards Indonesian forest management policies. Legal instruments such as Government Regulation (GR) Number 6 of 2009 concerning Forest Exploitation and Collection of Production Forest Products is in principle similar with the GR Number 21 of 1970 concerning Forest Concession Rights and Forest Product Collection Rights. Moreover, the Law number 41 of 1999 concerning Forestry, is ideologically and substantially, similar with the Law Number 5 of 1967 concerning Main Forestry Provisions. The shift of paradigm from the Government-based Forest Management to Community-based Forest Management only

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[6] Mi Sun Park, Yeo-Chang Youn, "Development of urban forest policy-making toward governance in the Republic of Korea", *Urban Forestry & Urban Greening* 12, (2013): 273-281.

[7] Irwansyah. *Penelitian Hukum: Pilihan Metode dan Praktik Penulisan Artikel*. (Yogyakarta: Mirra Buana Media, 2020), p. 162-164.

[8] Patton, M.Q., and Cochran, M. (2007). *A Guide to Using Qualitative Research Methodology*, Medecins Sans Frontieres, UK.

[9] Yanuardi, Politik Kehutanan Jawa Dalam Perspektif Politik Poststruktural, within Politik Kehutanan Jawa Dalam Perspektif Politik Porstruktural. Laporan Pelaksanaan KSP 2016-2020.

began in the early 2001 through the proposal of Community-based Forest Management initiated by Perusahaan Umum Kehutanan Negara (Perhutani). Conceptually, pursuant to Decree of Supervisory Board of Perum Perhutani Number 136/KPTS/DIR/2001, Community-based Forest Management is defined as a system of forest resource management carried out together between Perhutani, forest village communities, and interested parties, to achieve common interest of sustainability. Thus, the function and benefit of the forest resources can be manifested optimally and proportionally. However, the normative framework of the Community-based Forest Management is only accommodated in 2007 by GR Number 6 of 2007 jo. GR Number 3 of 2008 concerning Forest Management and Preparation of Forest Management Plans and Forest Utilization. The various forms of management model offered are then translated into a series of technological regulations, such as the Minister of Forestry Regulation on Community Forestry; Community Plantation Forest; and Village Forest.

In principle, there are fundamental grounds underlying the significance of the community's role in forest management, which are:

a. Communities living in the forest areas have strong motivation to protect forest areas as it concerns directly with the sustainability of their lives.
b. Communities living in the forest areas have native knowledge on how to maintain and utilize the forest resources in their habitat;
c. Communities living in the forest areas have customary laws to be upheld upon;
d. Communities living in the forest areas have customary institutions which regulate harmonious interaction between them and the ecosystems in the forests;
e. There are some existing organizations and networks build within the communities living in the forest areas to support solidarity among indigenous peoples' communities, and to organize political and technical support for other relevant parties;
f. Communities living in the forest areas are protected by the 1945 Constitution which requires the State to recognize, respect and protect their traditional rights.

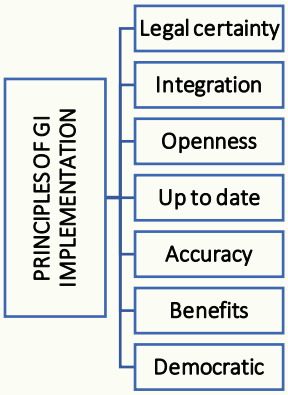
Therefore, it’s fundamental to consider and involve the aspirations of communities living in the forest areas. In relation to Community-based Forest Management, there are two pivotal considerations, which are the capacity building and accessibility of the community to the surrounding forest resources. Forestry development policies and programs shall be consistent with the mandates of the Constitution, which aim for the greatest prosperity of the people.

Before analyzing the urgency of Geospatial Information in the formulation of forestry policies, it’d be wise to firstly review the relevant principles applicable in the implementation of GI as regulated in article 2 of the Law Number 4 of 2011 concerning Geospatial Information. The principles are, among others:

a. Legal certainty: GI implementation based on laws and regulations.
b. Integration: the implementation of GI is carried out jointly by the Government, local governments, and everyone.
c. Openness: implementation of GI is intended to be used by many parties by providing easy access to the public to obtain GI.

d. Up to date: GI must be able to describe the latest phenomenon and/or its changes.
e. Accuracy: the implementation of GI must attempt to produce geospatial data and GI, which is thorough, precise, correct, and of high quality according to the relevant needs.
f. Expediency: GI must be able to provide the greatest benefit to society.
g. Democratic: the implementation of GI is carried out widely by involving the participation of the community.

Chart 1. Principles of GI Implementation



Source: Article 2 of Law Number 4 of 2011 concerning Geospatial Information

These principles are fundamental foundations which strengthen the urgency of GI utilization in formulating forestry policies in Indonesia. As previously elaborated, Gi has a strategic function as a tool in policy formulation, decision making, and/or implementation of activities related to earth space, including forestry.[10] The many forest problems such as land use conflicts, overlapping ownership, and/or permits indicate that Geospatial Data (GD) related to forestry has not been properly organized. Therefore, the Government of Indonesia initiated the establishment of a One Map Policy (OMP) which functions as a reference for geospatial standards in mapping forest and land management as a whole and integrated map to avoid conflicts over area management.[11]

In OMP, there available a thematic map, a map which only presents data or information from a certain concept/theme, both in the form of qualitative data and quantitative data in relation to specific topographic details, especially those that are in accordance with the theme of the map. Thematic maps in the Implementation of OMP include 7 themes, which are regional boundaries, forestry, spatial planning, infrastructure, permits and land, natural resources and the environment, special areas and transmigration. The 7 themes are spread across 34 provinces which are under the authority of 19

[10] Sudarwanto, Albertus Sentot, Lego Karjoko, I. Gusti Ayu Ketut Rachmi Handayani, Arifin Ma'aruf, and Henning Glaser. "The Policy on Illegal Oil Palm Plantation Reform in Forest Area during Jokowi's Presidency." *Hasanuddin Law Review* 8, no. 2 (2022): 171-185.

[11] Gita M. Nurhidayah, "The Challenges of Greenpeace Indonesia's Supports on One Map Policy Indonesia", *Journal of International Studies on Energy Affairs* 3 (2), (2022): 109.

Ministries/Institutions involved as Thematic GI (*Informasi Geospasial Tematik* or IGT) Guardians.

Considering its holistic thematic map, the OMP should be a means to improve the conditions for the implementation of GI comprehensively. Thus, Indonesia can anticipate various development factors related to global GI. The global community also show that the utilization of GI has increased exponentially, especially with the rapid development of satellite systems and internet technology. In fact, the GI has been and is increasingly utilized to support more effective and efficient development and public services. For instance, Egypt uses such information to assist economic development and efficiency in tax collection. The Spanish government utilize the GI to manage the agricultural sector. Brazil utilizes GI to reduce crime. Korea uses GI for updating cadastral maps and managing land ownership. Thus, it can be understood that each country has specific goals in utilizing GI. This means that through expansion of utilization of GI, the challenges and accuracy of the GI can be accommodated. In the Indonesian context, with the OMP, each level of government is expected to use the same base map. By utilizing the same map, we can avoid overlapping permit issuance on land management, especially those in forest areas.

4. One Map Policy in Materializing Sustainable Forest Development

4.1. The Urgency of Using Geospatial Information as a Basis for Forestry Policy Formulation

The acceleration of the OMP also known as the Acceleration of the One Map Policy (*Percepatan Kebijakan Satu Peta* or PKSP) materialized through the promulgation of Presidential Regulation Number 9 of 2016 concerning the Acceleration of One Map Policy Implementation (PR No. 9/2016). In this PR, the map scale is also set, which is 1:50,000 which refers to the previous geospatial data, and refers to one data source, standard and portal.[12] The main function of implementing this OMP is to produce: a reference for improving IGT data in each of the sectors involved and a reference for planning the use of large-scale space integrated in the Spatial Plan document.[13] Basically, the function of PKSP is to overcome several problems based on geospatial data, such as: overlapping permits, conflicts over space use, and agrarian disputes which hinder the effective implementation of national development planning.[14]

The process of integrating geospatial data in the OMP mechanism began in 2016 on the island of Kalimantan, continued by the islands of Sumatra, Sulawesi, Bali and Nusa Tenggara in 2017. By 2018-2019, the focus of KSP integration was implemented in Maluku, Papua and Java regions. Meanwhile, the synchronization process was carried out in parallel throughout 2016-2019. The synchronization activity is expected to become the solution of overlapping existing geospatial data which affected several other activities as

[12] Article 1, Presidential Regulation Number 9 of 2016 concerning acceleration of the implementation of the One Map Policy ("PR No. 9/2016").

[13] *Ibid*, Article 2, paragraph (2).

[14] Kukuh, "Integrasi Kebijakan Satu Peta (KSP) Direktorat Pengukuhan dan Penatagunaan Kawasan Hutan Sebagai Walidata Peta Penunjukkan Kawasan Hutan dan Peta Penetapan Kawasan Hutan, http://kukuh.menlhk.go.id/file_ksp, accessed October 27, 2022.

depicted in Figure 1. Three derivative processes are carried out in this process, which are: Identification, Analysis, and Completion. In the Identification process, the committee conducted overlapping IGT (thematic map) which has previously been changed and adjusted to the standard. This first stage established 3 typologies of classified problems: Not Problematic, Not Problematic with Certain Conditions and Problematic Indications as outlined in the design of the Thematic Geospatial Information Overlapping Indicative Map (*Peta Indikatif Tumpang Tindih Informasi Geospasial Tematik* or PITTI). The draft map must be validated by ministries/institutions and/or local governments pursuant to the Coordinating Minister for the Economic Affairs Regulation Number 2 of 2019 concerning Synchronization between Thematic Geospatial Information in the Context of Accelerating One Map Policy. The determination of PITTI then becomes a reference map for the work of government agencies or institutions to formulate policies related to the use of IGT. In addition to determining the typological classification, this synchronization activity also produces a percentage of overlapping problems that occur in each region. Currently, the highest percentage of overlap occurs in the Java Island region with a magnitude of 50.61% and the lowest occurs in the Maluku Islands and Papua with a magnitude of 35.31%.

After designing and considering the gap analysis, the secretariat seeks to formulate solutions to the overlapping problem which are carried out in stages: 1. Determination of location and priority schemes, and 2. Formulation of overlapping resolution recommendations. The basis for determining priorities refers to the proposed priorities of ministries/institutions or local governments, the direction of the PKSP team and the strategic direction of the President as well as related laws and regulations. As for the second phase, it should be carried out simultaneously and refer to coordination between ministries/institutions and local governments with the secretariat.

Table 1. The results of the gap analysis overlap. PKSP Secretariat, 2020

Category	Percentage	Area
Overlapping Provincial-District/City RTRW (*Rencana Tata Ruang Wilayah*) in Non-Forest Areas	9.33%	17,778,664 ha
Overlapping RTRW- Forest Areas	10.58%	20,161,769 ha
Overlapping permits/land rights in RTRW and Forest Areas which are consistent	16.12%	30,714,635 ha
Overlapping combinations involving permits/land rights on layout which are not integrated	4.63%	8,810,156 ha

The concept of overlap resulting from the analysis of gaps and synchronization of IGT maps includes the problem of overlap between the use of space and the laws and regulations in each sector. Thus, to solve this problem, a new design or formulation is needed to ensure the policies for the use of space, forest areas and land permits/rights can be harmonized. The principles which can be used as a reference for policies

formulation or design include legal legitimacy, respect for communities' rights, guarantee on investment certainty, and consideration on sustainable development.

Provisions regarding the preparation, updating and determination of PITTI are further regulated in Government Regulation Number 43 of 2021 concerning the Settlement of Discrepancies in Spatial Planning, Forest Areas, Permits, and/or Land Rights (GR No. 43/2021). This regulation was formulated to implement the provisions of article 17 (2) of the Law Number 11 of 2020 concerning Job Creation, which mandates that "In the event of a discrepancy between the spatial pattern of the spatial plan and the forest area, permits, and/or land rights, the resolution of the discrepancy is regulated in a Government Regulation". With this GR, it's expected that it can assist the community, especially with many spatial conflicts. The existence of a guarantee for a comprehensive spatial plan and certainty of licensing and investment to create jobs, as mandated by Job Creation Law which is currently replaced by a Government Regulation in Lieu of Law Number 2 of 2022 concerning Job Creation.

Considering the addition to thematic maps, including environmental and forestry maps, maritime maps, disaster maps, land maps, economic maps, financial maps, and licensing maps. This shows that the OMP is an epiphany of most of the legal problems or disputes in the environmental, agrarian, and licensing sectors which occur in the community. It's also consistent with the benefits of OMP, which is a reference for planning and utilizing space that is integrated in spatial plans on land, sea, earth, and air; suitability and licensing of space utilization of each sector; completion of overlapping space utilization; and improvements to the IGT data of each sector. Therefore, further assessment of the OMP and its impact on national development is necessary. Although OMP is a product of the Coordinating Ministry for Economic Affairs, the existence of OMP has provided solutions to disputes in this sector.

4.2. The Importance of Forestry and Environmental Thematic Geospatial Information in Materializing Sustainable Forest Development

As previously explained, Geospatial Information (GI) focuses on information of the geographical, time and spatial context of an object.[15] Pursuant to Law Number 4 of 2011, GI is divided into 2 types, which are Basic Geospatial Information (IGD) and Thematic Geospatial Information (IGT). IGT is GI which describes a specific theme. IGT includes horizontal points which refer to the horizontal geodesic control net on IGD, vertical points which refer to the vertical geodesic control net to IGD, and theme elements depicted on a topographical map.[16] Elements of the topographical map are considered as relevant as required. IGT is created relevant to the necessity of the implementation of the duties and functions of ministries, non-ministerial government agencies, provincial governments, district/city governments, business entities, or individuals.

Therefore, the government aims to fully integrate forestry with the National Geospatial Information Network (*Jaringan Informasi Geospasial Nasional* or JIGN). The objective of this policy is to facilitate the implementation of the OMP in Indonesia to create a single

[15] U.S. Department of Labour, based on definitions from the Geospatial workforce Development Center, University of Southern Mississippi.

[16] Academic Paper of the Draft Law on Geospatial Information.

map with a scale of 1:50,000 which is utilized as a geospatial reference, based on the same standards, databases, and geoportals. Another objective is to change the forest governance towards better direction, including monitoring forest resources; the use of IGT on the environment and forestry to support the OMP; and legal certainty of Forest Areas. The OMP allows Indonesia to establish good resource governance as the it provides the geospatial location of all existing resource exploitation sites, both current and future sites, which have been granted permits at all levels of government, such as permits for natural forest timber concessions, industrial plantation forests, oil palm plantations, mining permits and contracts of work, as well as oil and gas production sharing contracts, and overlapping acreage.

Hereby the analysis regarding the significance of the influence of integration of these elements on sustainable development in Indonesia. Pursuant to the Regulation of the Minister of Environment and Forestry Number 24 of 2021 concerning Procedures for the Implementation of Thematic Geospatial Information within the Scope of the Ministry of Environment and Forestry, article 3 states that IGT consists of Geospatial Data, Basic Geospatial Information, and other necessary data. More specifically, article 3 paragraph (1) states that geospatial data on the environment and forestry includes the following areas:

a. forestry planology and environmental management;
b. conservation of natural resources and ecosystems;
c. watershed management and forest rehabilitation;
d. sustainable forest management;
e. pollution and environmental damage control;
f. management of waste, waste and hazardous and toxic materials;
g. climate change control;
h. social forestry and environmental partnerships;
i. standardization and instruments of the environment and forestry;
j. enforcement of environmental and forestry laws; and
k. others scope of the Ministry.

To implement Thematic Geospatial Information to achieve the SDGs, the government through the Ministry of Environment and Forestry has taken concrete steps through the distribution of tasks and functions regarding Geospatial Data Producers and IGT in the field of environment and forestry, with the following provisions:

No	Geospatial Data Producers	Thematic Geospatial Information
I	Forestry Planning and Environmental Management Sector	
1	Directorate of Forest Resources Inventory and Monitoring	- Forest Area Land Closure - Forest Cover - Forest Potential - Forest Resources Balance (NSDH) Land Cover - Forest Resources Balance (NSDH) of Forest Areas - Indicative Map on Termination of Business Permits, Approval for Use of Forest Areas, or Approval for Changes in the Designation of New Forest Areas in Primary Natural Forests and Peatlands (PIPPIB)

		- Deforestation - Reforestation - Distribution of National Forest Inventory Clusters
2	Directorate of Forest Area Plan and Use and Establishment of Forest Management Areas	- National Forestry Plan (RKTN) - Forest Management Units (KPHP and KPHL) - Conservation Forest Management Unit (KPHK) - Special Purpose Forest Area (KHDTK) - Indicative Map of Social Forestry Areas (PIAPS) - Forest Area for Food Security (KHKP) - Forest Area Use Agreement - Production/Non-Mining and Exploration - Approval of Cooperation in the Use of Forest Areas - Approval for the Survey Activities of Forest Area Use
3	Directorate of Forest Area Stipulation and Administration	- Forest Area - Forest Area Designation - Forest Area Release - Indicative Map of Land Tenure Settlement in the Context of Forest Area Management - Recalculation of Forest Area Boundaries
4	Directorate of Environmental Impact Prevention of Regional and Sector Policy	- Inland Ecoregions - Marine Ecoregions - Landscape Characteristics - Characteristics of natural vegetation - Vegetation Type - Environmental Carrying Capacity (DDDTLH)
5	Directorate of Prevention of Environmental Impacts on Business and Activities	- Environmental Impact Assessment (AMDAL) - AMDAL Addendum (Environmental Impact Analysis) and RKL (Environmental Management Plan) – RPL (Environmental Monitoring Plan) - Environmental Management Efforts and Environmental Monitoring Efforts (UKL-UPL)
II	Natural Resources and Ecosystem Conservation Sector	
6	Directorate of Conservation Area Planning	- Conservation Area Profile - National Park Zoning - Block Conservation Area
7	Directorate of Conservation Area Management	- Buffer Area - Conservation Partnerships
8	Directorate of Species and Genetic Biodiversity Conservation	- Distribution of protected animals - Natural Plant Encounters in conservation areas - Animal and Human Conflict
9	Directorate of Ecosystem Management and Recovery	- Essential Ecosystem Areas - Indicative Essential Ecosystem Area (Area with high precautionary value outside KSA/KPA/TB) - Ecosystem Recovery
10	Directorate of Utilization of Environmental Services for Conservation Areas	- Potential of Water Environment and Water Energy Services in Conservation Areas - Areas of Water Utilization and Water Energy Activities in Conservation Areas

		- Utilization of Water Environment and Water Energy Services in Conservation Areas - Geothermal Potential - Geothermal Working Area Preliminary Survey and Exploration Area - Prospect Area in Conservation Area - Utilization of Geothermal Environmental Services (Exploration Activity Areas/ Business Activity Areas) in Conservation Areas - Carbon Environmental Services in Conservation Areas - Site Design of Natural Tourism Management in Conservation Areas - Business Licenses for the Exploitation of Natural Tourism Environmental Service Facilities in Conservation Areas
III	Watershed Management and Forest Rehabilitation Sector	
11	Directorate of Watershed Management Planning and Supervision	- Critical Land - Watersheds - Runoff Prone - Erosion Prone - Watershed classification
12	Directorate of Soil and Water Conservation	- Soil and Water Conservation Buildings
13	Directorate of Forest Plantations	- Forest Crop Seed Zone - Permanent seedbed distribution - Distribution of forest plant seed sources
14	Directorate of Forest Rehabilitation	- Forest and Land Rehabilitation
15	Directorate of Inland and Mangrove Water Rehabilitation	- Lake Catchment Area - Mangrove - Spring
IV	Sustainable Forest Management Sector	
16	Directorate of Forest Utilization Plan Development	- Forest Management (KPH) - Forest Utilization Directive Map for Forest Utilization Business Permits
17	Directorate of Forest Utilization Business Development	- Permits for Forest Use
18	Directorate of Forest Utilization Business Control	- Forest Utilization Business Work Plan (RKUPH) - Boundary of Forest Utilization Business Licensing Work Areas
19	Directorate of Forest Product Processing and Marketing	- Forest Product Processing Business Permit (PBPHH)
V	Pollution and Environmental Damage Control Sector	
20	Directorate of Peat Ecosystem Damage Control	- Peat Ecosystem Functions - Peat Hydrological Unit - Status of Peat Ecosystem Damage

21	Directorate of Coastal and Marine Pollution and Damage Control	- Seawater Quality Index - Impact of environmental pollution due to oil spill events - Marine Debris Monitoring
22	Directorate of Land Damage Recovery	- Indicative Land Damage
23	Directorate of Water Pollution Control	- Distribution of water quality monitoring points in water bodies - Distribution of water polluting sources
24	Directorate of Air Pollution Control	- Distribution of Points and Ambient Air Quality Monitoring Results - Distribution of sources of air pollutants
VI	Waste, Waste and Hazardous and Toxic Materials Management Sector	
25	Directorate of Waste Handling	- Distribution Waste Management
26	Directorate of Hazardous and Toxic Materials Management	- Mercury Monitoring
VII	Climate Change Control Sector	
27	Directorate of Forest and Land Fire Control	- Distribution Hotspot - Forest and Land Fire Areas - Forest and Land Fire Prone
28	Directorate of Climate Change Adaptation	- Climate Change Vulnerability - Climate Village Program Location
29	Directorate of Greenhouse Gas Inventory and Monitoring Reporting and Verification	- REDD Performance Measurement Areas - Carbon Reserves
VIII	Social Forestry and Environmental Partnerships Sector	
30	Directorate of Social Forestry Area Preparation	- Village Forest Management Approval (PPHD) - Community Forest Management Approval (PPHKm) - People's Plantation Forest Management Agreement (PPHTR) - Forestry Partnership Agreement (PKK)
31	Directorate of Conflict Management, Tenure and Customary Forests	- Determination of the Status of Customary Forests - Forest Rights
IX	Standardization of Environmental and Forestry Instruments Sector	
32	Secretariat of the Environment and Forestry Instrument Standardization Agency	- Research Forest
33	Center for Standardization of Sustainable Forest Management Instruments	- Permanent Measuring Plot (PUP)
X	Environmental and Forestry Law Enforcement Sector	
34	Directorate of Environmental Dispute Resolution	- Distribution of Environmental Dispute Resolution through the Courts - Distribution of Out-of-Court Environmental Dispute Resolution

By non-overlapping GI data, appropriate mapping policy making guided by sustainable development will be likely achieved. As stated by Menno Jan Kraak that all SDGs indicator data can be visualized, and many indicators have a clear geospatial component so that they can be mapped.[17] The purpose of geospatial information in optimizing the role of SDGs is to monitor proposed SDGs indicators on various spatial scales including global, national, provincial and district/city levels. In addition, many SDGs indicators have geospatial characteristics, so geospatial data and technology are necessary to measure them adequately. Moreover, the availability of accurate, current, integrated, and accessible data is very pivotal to improve the effectiveness and accuracy of sustainable development planning, especially to overcome development gaps between regions and spatial-based regional planning towards the 2030 SDGs agenda.

4.3. Forestry Dispute Resolution Model based on Geospatial Information (One Map Policy)

Michelle Huang elaborates that legal formulation: "*For legal purposes, it could be interpreted as "improving law" or "making law better*".[18] Thus, it can be understood that the purpose of legal formulation is to make the rule of law better. Hereby the formulation of a forestry dispute resolution model based on GI will be described. In general, forestry disputes based on GI in Indonesia are dominated by administrative problems in the land sector which are inadequate to support the optimal use of forest, such as: changes in the allotment and function of forest land from its origin; overlapping forest land use; and differences in the function of forest land use between the data and empirical practices. If not properly resolved, these will also negatively affect the forest sustainability.[19]

To find solutions for the above problems, OMP was formulated to gather all GI which has been collected, processed, and visualized by various sectors into one integrative map with a map accuracy level reaching a scale of 1:50,000.[20] The integrative map concept is not only seen as a compilation of data, but the OMP makes all data from various geospatial into:[21]

a. One Reference, where there is one base map which is utilized as a reference in creating thematic maps by each sector (both in the form of institutions and ministries) in Indonesia;
b. One Standard, where there is a standard reference regarding the definition, classification and application of data methodology by the Geospatial Information Agency;

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[17] Menno Jan Kraak, *et.al*., "Challenges of Mapping Sustainable Development Goals Indicators Data", *ISPRS International Journal of Geo Information*, no. 12 (2018): 482.

[18] Michelle Viandy Huang, "The Power Of Evidence Of Victims In Immoral Criminal Procedure In The West Pasaman Courta Review On The Non-Demarcation Border Cooperation Between Indonesia And Malaysia," *IVerity – UPH Journal of International Relations 11*, (2019): 41-50.

[19] Iskandar, *Hukum Kehutanan* (Bandung: *Mandar Maju*, 2015), 88.

[20] Op. Cit, Article 2 paragraph (2), PR No. 9/2016.

[21] Marthalina, "Kebijakan Satu Peta dalam Mendukung Pembangunan Nasional", *Jurnal Manajemen Pembangunan* 2, no.5 (2018), 149-169.

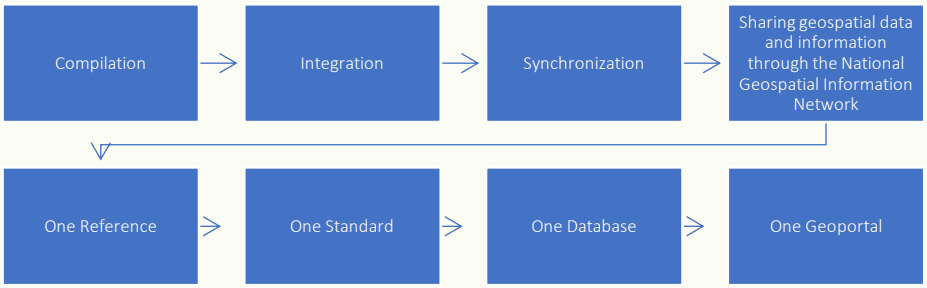
c. One Database where there is one data center from spatial and non-spatial data to minimize the presence of overlapping data; and
d. One Geoportal, where it's possible to share data between agencies and ministries to create data transparency.

Moreover, in implementing the OMP, it must at least cover the following activities:

a. Combined data on Thematic Geospatial Information of the institutions or ministries, National Working Groups on Thematic Geospatial Information, and/or local governments for all regions of Indonesia.
b. Integration of Thematic Geospatial Information Data follow the process of verification and correction of thematic geospatial information on basic geospatial information
c. Alignment and synchronization between integrated Thematic Geospatial Information data
d. The process of preparing recommendations and facilities for solving Thematic Geospatial Information problems, including the provision of budget allocations to solve relevant problems

The above provisions are regulated in the PR Number 9 of 2016 jo. PR Number 23 of 2021. With the presence of one integrative map, all government actions in relation to the process of utilizing forest areas in Indonesia will have the same reference and basis, thus preventing overlapping licensing by each sector for forest management in Indonesia. Furthermore, in the PR Number 23 of 2021, there are at least 4 OMP activities which can be utilized as a model in resolving forestry disputes based on geospatial information.

Chart 2. Geospatial Information Model



Source: Author Analysis Results

To date, the presence of the Acceleration and Implementation Team has been utilized by the Government to resolve forestry disputes in Indonesia, such as:

a. Case on overlapping forest utilization, where there is a discrepancy in the granting of oil palm plantation permits covering an area of 855,645 hectares within the Forest Area in Central Kalimantan Province.[22] In this case, the Acceleration Team held a

[22] Sekretariat Tim Percepatan Kebijakan Satu Peta, "Kemenko Perekonomian Sosialisasikan Kepmenko Perekonomian Nomor 134 Tahun 2022 tentang Peta Indikatif Tumpang Tindih Pemanfaatan Ruang

socialization activity and discussion of an action plan to collect data and map the existence of oil palm plantations or independent plantations to avoid future cases in the forest areas. The activity was also attended by representatives from various relevant state institutions and ministries, such as the Ministry of Environment and Forestry and the Ministry of Agriculture;

b. Cases on discrepancies in determining the total area of forest areas in 34 provinces which are divided into 6 areas, including northern Sumatra, southern Sumatra, Java, Kalimantan, Sulawesi, Bali, Nusa Tenggara, Maluku Islands and Papua.[23] From the identification which has been carried out, it was found that at least 43.49 million hectares or around 22.8% of forest areas in Indonesia which experienced overlapping problems;

c. Cases on overlapping forest utilization, where there is a discrepancy in the use of space which provides mining business permits (*Izin Usaha Pertambangan* or IUP) in 4.7 million hectares of forest area. This can occur due to lack of coordination regarding data from each relevant ministry, including the Coordinating Ministry for Economic Affairs, Coordinating Ministry for Maritime Affairs and Investment, Geospatial Information Agency, and the National Aeronautics and Space Institute.[24]

Therefore, it can be concluded that the 4 main activities of the OMP in the PR Number 23 of 2021, which include compilation, integration, synchronization, and data sharing through the national geospatial information network are indeed urgently required to become a model to resolve forest area disputes based on GI to make the forest utilization process more optimal. *Lex Semper Debit Remidium,* the classic adagium means that the law must serve as a medicine. Therefore, a forestry dispute resolution model based on geospatial information OMP should in essence provide solutions to these following problems: *First*, address inequality of access and control in the utilization of forest resources, which are mainly controlled by corporations and the State; Second, each level of government ultimately has one policy reference and one basic map to avoid overlapping permit issuance over forest management; Third, facilitate the utilization of space and use of forestry areas by synchronizing various maps; Fourth, diminish the number of disputes over the use and control of forestry areas in Indonesia; Fifth, optimize the role of SDGs, which is to monitor the proposed SDGs indicators on various spatial scales including the global, national, provincial, and municipal levels; Last but not least, drive changes towards sustainable development based on human rights and equality.

Ketidaksesuaian Perizinan Perkebunan Kelapa Sawit dalam Kawasan Hutan di Provinsi Kalimantan Tengah", https://satupeta.go.id/news-detail/80, accessed December 14, 2022.

[23] Sekretariat Tim Percepatan Kebijakan Satu Peta, "Tim PP. 43 Tahun 2021 Melakukan Penyepakatan Rencana Aksi Penyelesaian Ketidaksesuaian Batas Daerah, Tata Ruang dan Kawasan Hutan untuk 34 Propinsi" https://satupeta.go.id/news-detail/68 , accessed December 14, 2022.

[24] Sekretariat Tim Percepatan Kebijakan Satu Peta, "Penyusunan PITTI Ketidaksesuaian Mendorong Penyelesaian Permasalahan Peta Indikatif Tumpang Tindih Pemanfaatan Ruang Ketidaksesuaian Perizinan Pertambangan dalam Kawasan Hutan", https://satupeta.go.id/news-detail/58 , accessed December 15, 2022.

5. Conclusion

Forest plays a pivotal role in every element of life in the world. However, forest utilization activities are currently still affected by various problems such as land use conflicts, overlapping ownership, and/or problems in the field of licensing. This is due to the lack of information about the location, setting and position of forests in one coordinate, resulting in a lack of harmonious policies on forest utilization provided by the government sectors. Therefore, Geospatial Information (GI) is required to function as a tool in policy formulation, decision making, and/or implementation of activities related to earth space, including forestry. By utilizing GI, data on forests in Indonesia will be easier to map properly, thus assisting the government to plan which good policies will be carried out in utilizing forests in Indonesia.The One Map Policy (OMP) is a form of government initiation which aims to assist materializing forest governance to avoid forest tenure conflicts in Indonesia.

To realize the implementation of the OMP, in 2016, the government finally passed Presidential Regulation Number 9 of 2016, which regulates the technicalities of the acceleration of the implementation of the OMP, including 3 main activities which will be carried out in accelerating the implementation of the one map policy. The three main activities are aimed to strengthen coordination between sectors related to forest utilization, both institutions and ministries, to minimize the occurrence of forestry disputes in Indonesia. The presence of OMP will encourage the use of GI, which is clear, concrete and doesn't overlap because it adheres to the principles of one reference, one standard, one database, and one geoportal. In addition, it will be more accessible for the government of Indonesia take appropriate policies measures regarding the use of forests considering Indonesia's vision to realize sustainable development goals consistent with the SDGs, such as environmental sustainability, social inclusion, and economic growth.

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