

Land Use Planning and Land Control Analysis on the Buffer Area of the Asahan Hilir River

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Article Info

Received: 2024-12-20

Revised: 2025-04-12

Accepted: 2025-06-10

Keywords:

River buffer zone, land use planning, land control, Asahan Hilir River.

Abstract

This research examines land use planning and land control in the buffer zone of the Asahan Hilir River, a strategic area that intersects between the City of Tanjung Balai and Asahan Regency, North Sumatra Province. The river buffer zone is a protected area that has important ecological functions but is under pressure due to the development of settlements, plantations, and infrastructure that do not align with its intended use. The method used is empirical legal research and case studies, focusing on the inventory of land ownership status and land utilization. The study results show that based on inventory data, there are still settlements established without ownership rights to the land, either in the form of land rights certificates, based on control status, found in the study area in Asahan Regency and Tanjung Balai City totaling 7344 plots, with land rights status or lease status, as well as based on the use and utilization of space, including: community settlements, government and non-government buildings, markets, public facilities, state-owned enterprise plantations, private and community plantations, as well as palm oil mills (PKS) and sand mines. There are conflicts of interest between environmental preservation, regional development interests, and community needs. This research recommends a multidisciplinary approach in reorganizing the river buffer zone, through strengthening regulations, law enforcement, community participation, and the application of incentive and disincentive systems to encourage land use that aligns with its ecological functions.

1. Introduction

The river buffer zone is a protected area along the river that forms a unity with the river (Putri Sriwahyuni Kasba, 2018), which functions to collect, store, and flow water from rainfall to lakes or the sea naturally, where the land boundary serves as a topographic separator and the sea boundary extends to the water area still influenced by land activities (Putu Aryastana, 2015). The river buffer zone, as a transition zone between aquatic and terrestrial ecosystems, has important ecological functions in maintaining water quality, controlling erosion, and providing habitat for various types of flora and fauna. Inappropriate use of the river buffer zone can have negative impacts on the area and the surrounding community (Githanisa Elgazy Athadiva, 2024).

Housing and settlement development is an effort to meet one of the basic human needs. Housing and settlement development sometimes does not comply with its permits, including erecting buildings that should not be done or in places where building is prohibited. The conversion of river buffer land into residential settlements is caused by the community's ignorance of the regulations for erecting buildings in the river buffer zone (Muhammad Ananta Firdaus, 2021). The condition of land conversion in border areas is also not only by the community, but in some locations there are also plantation companies owned by the private sector or owned by the government.

The condition of land conversion in the buffer area is not only by the community, but in some locations, there are also plantation companies owned by private entities or the government. One of the regulations regarding rivers that establishes river buffer zones is Government Regulation of the Republic of Indonesia Number 38 of 2011 concerning Rivers. This regulation explains that the river space consists of the riverbed and the river buffer zone. The river buffer zone serves as a buffer between the river and terrestrial ecosystems, so that the functions of the river and human activities do not depend on each other. In the context of environmental preservation efforts and sustainable water resource management, the river buffer zone falls within the scope of protected areas with the main function of protecting the sustainability of the environment, which includes both natural and artificial resources. This is emphasized in Presidential Decree Number 32 of 1990 concerning the Management of Protected Areas. The delineation of buffer lines is further established based on the Regulation of the Minister of Public Works and Public Housing Number 28/PRT/M/2015, Article 3 emphasizes that "the establishment of this buffer line is intended as an effort to ensure that protection, use, and control activities over the resources in rivers and lakes can be carried out according to their objectives." Thus, the scope of this regulation technically includes the establishment of river buffer lines, utilization of buffer areas, and supervision of buffer area utilization.

Land tenure analysis in the river border area also plays an important role in determining the right management strategy. Uncontrolled or inconsistent land tenure can trigger conflicts of interest between various parties, such as local communities, governments, and the private sector (Naharuddin, 2023). Complex land management and land tenure issues in river border areas require a multidisciplinary approach involving various fields of science, such as geography, hydrology, ecology,

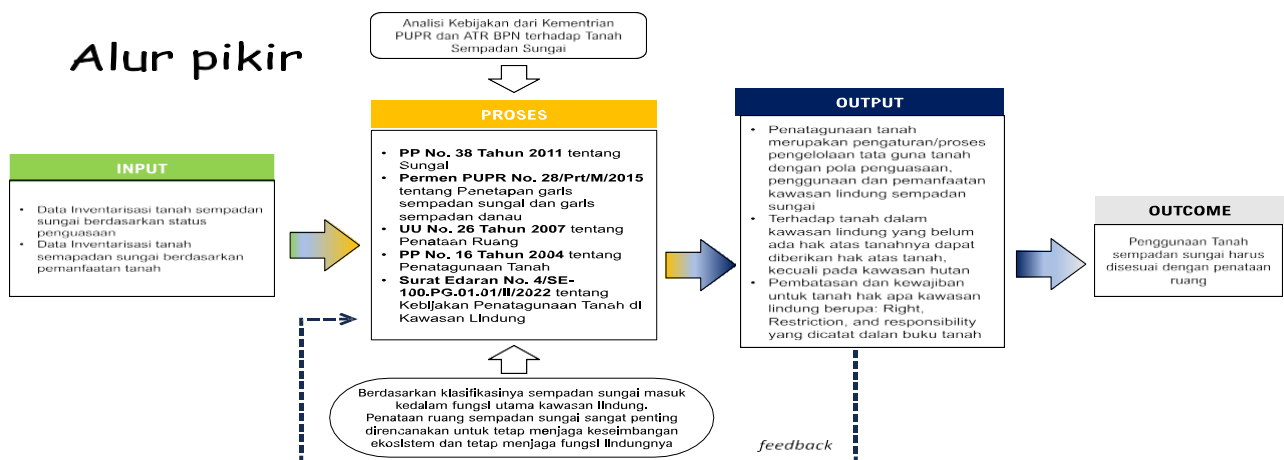
socioeconomics, and law. Legal reform related to national land regulation requires an in-depth study of various aspects such as legal, social, economic, and political that are interrelated and influencing.

In this study, a sample is presented in the border area of the Asahan Hilir river, this area intersects between Tanjung Balai City and Asahan Regency in North Sumatra Province, is one of the objects studied to determine the level of land control and utilization in the area. Thus, this paper includes a study of aspects of land management regulations in border protected areas, data on land and river inventory of the Asahan Hilir River, as well as the role of the government in the spatial arrangement of the study object area.

2. Research Method

The method used in producing this paper uses empirical *legal research*. Abdulkadir Muhammad explained that empirical legal research explores the patterns of behavior that live in society as juridical symptoms through the expression of actual behavior experienced by members of society. Real behavior has a dual function, namely as a pattern of actions that is justified, accepted, and appreciated by society, and at the same time a normative form that lives in society (Abdulkadir Muhammad, 2004). Salim HS and Erlies Septiana Nurbaini, describe empirical legal research is legal research that examines and analyzes the legal behavior of individuals or communities in relation to the law and the data sources used come from primary data (Salim HS and Erlies Septiana Nurbani, 2013). Case study methods are also a popular choice in qualitative research, as they allow researchers to study phenomena in depth in real-world contexts. (Assyakurrohim, 2022) The location of this study refers to the place where the research was conducted, which is adjusted to the title and problems of the research as well as the results of the initial observations carried out, namely in the Asahan Downstream River border area.

The Thought Flow used in this article, is as follows:



3. Results and Discussion

a. Overview of Sungai Asahan Hilir Area

The Asahan River Watershed is part of the Toba Asahan River area with an area of 3,789.07 km² or 52.44% of the outside of the entire Toba Asahan River area, and has 153 tributaries that flow into Lake Toba. The Asahan river basin area is divided into 3 (three) sub-watersheds, namely:

- a. The Asahan sub-watershed with its main river is the Asahan River, having 34 tributaries;
- b. The Silau sub-watershed with its main river is Sungai Silai, has 38 tributaries;
- c. The Piasa sub-watershed with its main river is the Piasa River which has only 1 tributary.

The Asahan River headwaters at Lake Toba and empties into the Straits of Malacca, with the administrative area in the area of Asahan Regency and Tanjung Balai Middle City. For the administrative area of Asahan Regency, there are 10 (ten) sub-district administrative areas that are passed, namely: Aek Songsongan, Bandar Pulau, Rahuning, Pulau Rakyat, Teluk Dalam, Simpang Empat, Sei Kepayang, East Sei Kepayang, West Sei Kepayang, and Tanjung Balai District. Meanwhile, the Tanjung Balai Middle City area is through the administrative area, Datuk Bandar, Bandar Timur, South Tanjung Balai, North Tanjung Balai, Sei Tualang Raso, and Teluk Nibun.

Analysis of the inventory of land status at the location of the Asahan Hilir river border based on empirical studies taken in the period 2024-2025, data on the study location in the Asahan Hilir River border area, data was produced:

1. Based on inventory data, there are still residents who are established with the status of not having land ownership rights either in the form of land rights certificates or SKT. This is exacerbated by the settlement of communities that are deliberately built on watersheds or rivers by using pillars or house support boards, as shown in the example below:



The residential status of people located on the border of the river is a complex issue that involves various legal aspects, especially land and environmental law. In general, the existence of housing on river borders often raises legal and environmental problems, considering that the conservation function in the river border area is very important.

2. The overall data on river border land inventory based on ownership status, obtained in the study area in Asahan Regency and Tanjung Balai City amounting to 7344 parcels, with the status of land rights with certificates of Property Rights, Business Use Rights (HGU) and Building Rights (HGB), land status under local government management, controlling land with lease status and land ownership as evidenced by the Land Certificate (SKT) issued by the Sub-district Head.

Inventory of Land Downstream Border of Asahan Based on Ownership Status

Annex 1: Summary of Land Downloaded Based on Possession Based on Ownership Status										
Yes	Regency/ City	District	Types of Land/Building Letters							
			Certifi cate	Sub- district Letter	Rent	Government- Owned	HG U	HG B	Other	Sum
1	Kab. Asahan	Aek Songsongan	1				1			2
2		People's Island	17	353	1		12	2	6	391
3		Aek Songsongan	3	3			2			8
4		São Paulo		25			4		11	40
5		Simp. Four	12	34			5			51
6		Sei Kepayang Barat		285						285
7		Tanjung Balai	2	5036	4	2				5044
8	Tanjung Balai City	Nibung Bay	27	887						915
9		Tanjung Balai Selatan	114		16		1			131
10		Shawn Shawn	58	238	1					297
11		Tanjung Balai Utara	3							3
12		East Mayor		177						177
TOTAL			237	7038	23	2	25	2	17	7344

3. Data on river border land inventory based on the use and utilization of space, obtained in the study area in Asahan Regency and Tanjung Balai City in the form of: community settlements, government and non-government buildings, markets, public facilities, state-owned plantations, the private sector, and the community, as well as PKS (oil palm plantations) and sand mines.

Inventory of Asahan Downstream Border Land Based on Its Use and Utilization

Y	Regency/	District	Land/Building Type Boundary Use
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es	City		Communi Settlem ent	Gov ern men t Buil din g	Non-Gover nmen t Build ing	Mar ket	Fas um	State- Owne d Plant ations	Private Plantati ons	Com muni ty Plant ation s	MC C	Tbg San d	Stuttga rt
1	Kab. Asahan	People's Island	333			5	4	4	4	39		4	391
2		Aek Songsong an	1	2	1		1	4	1				10
3		São Paulo	29						2	7	1	1	40
4		Simp. Four	46							5			51
5		Tanjung Balai	5042	2									5044
6		Sei Kepayang Barat	285										
7	Tanjung Balai City	Nibung Bay	899	7			9						906
8		Tanjung Balai Selatan	4	3	3	106	15						131
9		Shawn Shawn	293				4						297
10		Tanjung Balai Utara				1	2						3
11		East Mayor	177										
TOTAL			7109	14	4	112	35	8	5	51	1	5	7344

The data shows that it is necessary to arrange the river boundary space. Settlement development and land use above the river border also pose a risk because border land that tends to be labile and prone to landslides will endanger the people living in houses on the river border (Yoel Karunia Sianturi, 2019). Concerns about the high burden of river pollution in the Sempada downstream Asahan area, because the development of settlement will increase the number of people who throw their garbage in the river.

b. Land Management Policy In The River Boundary Protected Area

Government Regulation Number 16 of 2004 concerning Land Management, Article 1 states that "land management is the same as the pattern of land use management which includes the control, use, and utilization of land in the form of consolidation of land use through institutional arrangements related to land use as a unified system for the benefit of the community in a fair manner." The management of land use is carried out based on the Regional Spatial Plan (RTRW) to realize the prosperity of the people by paying attention to, among others, the people's rights to land, the social function of land rights and the maximum limit of land ownership, especially agricultural land, including various other efforts to prevent the concentration of land tenure and land abandonment (Irpan Suriadiata, 2024). The regulation on land management refers to Law Number 24 of 1992 concerning Spatial

Planning, which has now been replaced by the new Spatial Planning Law Number 26 of 2007.

The purpose of land management is described in Article 3 of Government Regulation Number 16 of 2004, as follows:

1. Regulating the control, use, and utilization of land for various development activities in accordance with the Regional Spatial Plan;
2. Realizing the control, use, and utilization of land in accordance with the direction of the Region's functions in the Regional Spatial Compliance Plan;
3. To establish land order which includes the control, use, and utilization of land including land maintenance and control of land utilization;
4. Ensuring legal certainty to control, use, and utilize land for communities that have a legal relationship with land in accordance with the Regional Spatial Plan that has been determined.

This regulation explains that land use management includes 3 patterns, namely:

1. Land tenure, which is the legal relationship between individuals, groups of people, or legal entities with land as referred to in Law Number 5 of 1960 concerning Basic Regulations on Agrarian Principles. In land activities, this is a unit in the agrarian cycle, which cannot be separated, including the regulation of land tenure and ownership, land management, regulation of land rights, and land registration.
2. Land use is a form of natural or artificial land use activities, or a form of earth surface cover, both natural and man-made. Examples of this type of land use are: settlements, rice fields, gardens, forests, and so on
3. Land use is defined as an activity to obtain added value without changing the physical form of land use, or the form of implementing land use activities, both agricultural and non-agricultural, in an effort to increase the value of land in accordance with the function of the land, the environment, the interests of the community and time, in the form of certain products or services. Examples of types of land use such as: residential land use, plantation land use, land for forest areas, and so on.

The right of control is the most basic thing contained in the agrarian system in one country or in one society. Land control is an important problem in agrarian affairs. From this point it will be determined how the agrarian structure will be built, which will be closely related to the structure of the society. Land management policies in river border protected areas are crucial in maintaining ecosystem balance and minimizing disaster risk (Badwi, 2022).

The determination of land management in river border areas is often faced with

a tug-of-war between the central government that focuses on environmental conservation, local governments that prioritize economic development and increasing local income, and local communities who feel they have the right to utilize the natural resources around the region. Likewise, the implementation of land management policies in river border protected areas often faces complex challenges, especially related to law enforcement, supervision, and lack of legal awareness and community participation in maintaining the preservation of river border areas.

In the Explanation of Article 5 of Government Regulation Number 38 of 2011, it is stated that river boundaries have several buffer functions between river ecosystems and land, including:

1. Because it is close to water, this area is very rich in biodiversity of flora and fauna. Biodiversity is an environmental asset that is very valuable for human life and nature.
2. Shrubs and grasses that grow on the river border serve as a very effective filter against pollutants such as fertilizers, anti-pest drugs, pathogens and heavy metals so that the quality of river water is maintained from pollution.
3. Plants can also withstand erosion because their root system that enters into strengthens the soil structure so that it is not easily eroded and eroded by water flow.
4. The lush foliage and remains of dead vegetation provide shelter, shelter and a source of food for a wide variety of aquatic animal species and other wildlife.
5. The riverside area with its borders is beautifully arranged making the property of high value because of the harmonious life between humans and nature. The environment is shady with vegetation, there are birds chirping near the clear water that flows creating a sense of comfort and tranquility.

The river boundary is designated as a protected area that provides local protection to preserve nature in Presidential Decree No. 32 of 1990 concerning the Management of Protected Areas and is the target location for handling land conservation to protect (Risha Oktavyana Djibrán, 2020). The river boundary is a conservation land that should be managed by the Water Resources Agency and cannot be controlled by individuals, Article 3 paragraph (1) of Government Regulation Number 38 of 2011 states that "rivers are controlled by the State and are state assets". Furthermore, Article 4 states that "river management is carried out by the Government, provincial government or district/city government in accordance with its authority."

Specifically, the determination of boundary lines is regulated in the Regulation of the Minister of Public Works and Public Housing of the Republic of Indonesia

Number 28/Prt/M/2015 concerning the Determination of River Boundary Lines and Lake Boundary Lines, by distinguishing in several categories, namely:

1. Rivers do not have embankments within urban areas;
2. Rivers that do not have embankments outside urban areas;
3. Rivers with embankments within urban areas;
4. Embankment rivers outside urban areas;
5. Rivers affected by sea tides; and
6. Spring.

Based on these categories, the amount of river boundary distance to be used is then regulated, including the regulation of activities that are allowed or not allowed to be carried out on the land of the river border area. The amount of river boundaries for each category as stipulated in the Minister of Public Works and Public Works Regulation Number 28/2015 is contained in the following table:

No.	Category	Boundary Line Provisions
1.	Embanked Rivers in Urban Areas	at least 3 (three) meters from the outer edge of the embankment along the river channel
2.	Embanked Rivers outside Urban Areas	at least 5 (five) meters from the outer edge of the embankment leg along the river channel
3.	Unembanked Rivers in Urban Areas	at least 10 (ten) meters from the left and right banks of the river trough along the river channel, in the event that the river depth is less than or equal to 3 (three) meters
		at least 15 (fifteen) meters from the left and right banks of the river trough along the river channel, in the case of a river depth of more than 3 (three) meters to 20 (twenty) meters
		at least 30 (thirty) meters from the left and right banks of the river trough along the river channel, in the case of a river depth of more than 20 (twenty) meters.
4.	Unembanked Rivers outside Urban Areas	at least 100 (one hundred) meters from the left and right banks of the river trough along the river channel, if included in the category of large rivers with a watershed area greater than 500 km ² (five hundred square kilometers)
		at least 50 (fifty) meters from the left and right banks of the river trough along the river channel, if included in the category of small rivers with a watershed area of less than or equal to 500 Km ² (five hundred square kilometers)
5.	rivers affected by sea tides	Same as the River rule in nos. 1,2,3 and 4
6.	spring.	Surround the spring at least 200 (two hundred) meters from the center of the spring.

Regarding the determination of the river boundary line, Article 13 of the Minister of Public Works and Public Works Regulation Number 28/2015 states that the following can be done by:

1. Minister, for rivers in cross-provincial river areas, cross-border river areas, and national strategic river areas
2. the governor, for rivers in river areas across districts/cities; and
3. Regent/Mayor, for rivers in river areas within one district/city.

The determination was made based on a study of the determination of river boundaries by considering the geomorphological characteristics of the river, the socio-cultural conditions of the local community, and paying attention to access roads for equipment, materials, and human resources to carry out river operations and maintenance activities. Article 15 of the Ministerial Regulation of PUPR Number 28/2015, emphasizes that in the event that the results of the study of the determination of river boundaries show that there are buildings within the river boundary, the building is declared to be in the status quo and must gradually be ordered to restore the function of the river boundary. In the land management space, in the pattern of control, management, and utilization according to their functions, Government Regulation Number 16 of 2004, in Article 11 emphasizes that "Land in protected areas where there is no land right can be given land rights, except in forest areas."

c. Strategies in Land Re-Utilization in River Border Areas as a Control Effort and Policy Recommendations

The strategy for rearranging river border areas requires an integrated multidisciplinary approach that synergistically integrates legal and non-legal instruments. Legal instruments, which include laws and regulations at the central and regional levels, serve as a normative basis in regulating space utilization, pollution control, and law enforcement against violations that damage river ecosystems. In addition, non-legal instruments, which include community-based approaches, local wisdom, environmental education, and economic incentives, have a complementary role in encouraging behavioral change and active community participation in preserving rivers (Surono, 2012).

In the context of law enforcement, strict against violations of spatial planning and land use on river borders is the key to the success of control (Indra, 2019). In addition to law enforcement, an effective land management strategy must also involve a participatory approach that involves local communities in the planning and decision-making process. People living around conservation areas often feel entitled to take advantage of existing natural resources, especially in the era of decentralization, so joint management between communities and local governments needs to be considered.

Local governments need to play an active role in supervising the use of coastal and marine resources, including rivers, to ensure ecosystem sustainability and

community welfare (Basri, 2021). The government hierarchically has an important role in protecting rivers that have ecological, hydrological, and socio-economic functions, so the government must establish and implement policies related to river boundaries. Law Number 32 of 2004 concerning Regional Government and on the explanation of Government Regulation Number 38 of 2007 concerning the Division of Government Affairs between the central government, provincial governments, and Regency/City Regional Governments. This regulation emphasizes that the division of government affairs is regulated in such a way that the duties of the local government can be more organized and responsible. The role of local governments is very critical in river management efforts. Local governments have the responsibility to formulate effective policies, regulations, and management programs to maintain water quality and river sustainability (Muhammad Azka Munawwir, 2025). Based on Law Number 32 of 2004, that the regulation of water resources is included in the mandatory affairs section of the field of public works and spatial planning, where this matter is related to basic services or public services to meet the basic needs of citizens. Article 7 paragraph (1) of Government Regulation Number 38 of 2007 states that mandatory affairs are government affairs that must be carried out by "provincial local governments and regency/city regional governments, related to basic services."

To achieve successful land management in river border areas, comprehensive and integrated policy recommendations are needed. These policies should include incentives and disincentives to encourage responsible behaviour in land use, as well as community empowerment programmes to increase awareness and participation in environmental management.

In the context of fostering and controlling the implementation of land management, the Government carries out monitoring of land control, use and utilization. Article 28 of Government Regulation Number 16 of 2004 states that: "The development and control of land management for land rights holders is also carried out by providing incentives and imposition of disincentives." Incentive devices are arrangements that aim to provide stimulus to activities that are in accordance with land management objectives. For example, incentives are given to land rights holders who voluntarily make adjustments to land use. Disincentives are arrangements that aim to limit or reduce activities that are not in line with the objectives of land management, for example, in the form of reviewing land rights, and imposing high taxes, among others. The review of land rights is based on the provisions as referred to in the government regulation on the management and utilization of abandoned land.

Forms of incentives and disincentives should not reduce the right of the population as citizens to obtain equal dignity and dignity, the right to obtain and

maintain their lives. The forms of incentives and disincentives are determined in accordance with the applicable laws and regulations in the Spatial Planning Law.

1. Incentives are tools or efforts to provide rewards for the implementation of activities that are in line with the spatial plan, in the form of:
 - a. tax relief, compensation, cross-subsidies, rewards, space rentals, and crowdfunding;
 - b. infrastructure development and procurement;
 - c. ease of licensing procedures; and/or
 - d. giving awards to the community, the private sector and/or local governments.
2. Disincentives are devices to prevent, limit growth, or reduce activities that are not in line with the spatial plan, in the form of:
 - a. the imposition of high taxes that are adjusted to the amount of costs needed to overcome the impact caused by the use of space; and/or;
 - b. restrictions on the provision of infrastructure, the imposition of compensation, and penalties.

Incentives and disincentives can be given by the Government to local governments, local governments to other local governments and the government to the community. The provision of incentives and disincentives in spatial planning is held for:

1. increasing efforts to control space utilization in order to realize spatial planning in accordance with spatial planning;
2. facilitate space utilization activities to be in line with the spatial plan; and
3. Increase the partnership of all stakeholders in the context of the use of space in line with the spatial plan.

Strategies that must be carried out in particular to overcome the problems of the Asahan Hilir river border area:

1. Provide disincentives to building owners who violate the river line
2. Providing disincentives can also be done in the form of special fees in licensing. For existing settlements, they are allowed to remain conditional, as for the condition, which is not allowed to erect permanent buildings. Buildings that have been permanently erected in the river border area are not allowed to expand the building
3. Increasing community participation by socializing the importance of preserving the environment.

Considering the Lower Asahan Border Area has a tendency for physical development that is quite developed both by the community, private companies, and the government, resulting in the use of the Suangi Border Area not in accordance with its designation and function, so it is necessary to carry out a strategy to restore its true

function as a protected area.

4. Conclusion

Considering the Lower Asahan Border Area has a tendency for physical development that is quite developed both by the community, private companies, and the government, resulting in the use of the Suangi Border Area not in accordance with its designation and function, so it is necessary to carry out a strategy to restore its true function as a protected area. The government already has a clear legal framework related to the management of river border areas, such as Government Regulation No. 38 of 2011, Regulation of the Minister of Public Works and Public Works No. 28 of 2015, and Government Regulation No. 16 of 2004 concerning Land Management. However, implementation in the field is still weak due to the lack of supervision, community legal awareness, and conflicts of interest between environmental conservation and local economic development. The strategy for re-using the Asahan Hilir river border area must be carried out in an integrated manner through legal and non-legal approaches. The legal approach includes strict enforcement of laws against violations and control of illegal buildings, while the non-legal approach includes community empowerment, environmental education, and incentives for citizens who are willing to support the preservation of the area. Incentives such as ease of licensing, relocation subsidies, and the development of supporting infrastructure can be used to encourage community participation. On the other hand, disincentives such as the imposition of high taxes and restrictions on permits can be used to suppress activities that are contrary to spatial plans.

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