Jurnal Natur Indonesia
22(2), October 2024: 143-149

p-ISSN 1410-9379
e-ISSN 2503-0345

Potential and Management Strategy of Indragiri Hilir Regional Conservation Area (MPA), Riau Province

Potensi dan Strategi Pengelolaan Kawasan Konservasi Daerah (KKD) Indragiri Hilir Provinsi Riau

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ABSTRACT

The Indragiri Hilir Regional Conservation Area, Riau Province, has various potentials with high economic value and can be used sustainably. The effectiveness of conservation area management is determined by aspects and factors from inside and outside the conservation area. This study aims to (1) identify the potential of the Indragiri Hilir Regional Conservation Area; (2) analyze internal factors and external factors in the management of regional conservation areas (KKD); (3) formulate the main strategies and alternative strategies in effective management of regional conservation areas in Indragiri Hilir Regency. The survey method was used in this study. The data collected consists of primary data and secondary data; the management strategy of the Indragiri Hilir Regional Conservation Area is carried out using SWOT Analysis and AHP analysis. The study results show that the potential of the Indragiri Hilir KKD area consists of human capital, natural resources capital, artificial capital, and social and economic potential. Internal factors in the management of regional conservation areas consist of community openness in improving an area, the commitment of the Central Government, the commitment of the Riau Provincial Government, the commitment of the Regency Government, local wisdom, the availability of potential natural resources, the number of population human resources, the quality of community human resources, coordination and communication, regional development directions and policies, legal instruments, and law enforcement. External factors consist of SDGs, government programs based on natural resource conservation, corporate involvement in environmental planning, participation of community empowerment companies, research and community-based community service, sectoral ego and spatial ego attitudes, land degradation and ecosystem damage, economic liberalization and political interests, moral hazard actions of stakeholders.

Keywords: Conservation areas, Internal factors, External factors, Management strategies

ABSTRAK

Kawasan Konservasi Daerah Indragiri Hilir, Provinsi Riau, memiliki berbagai potensi yang memiliki nilai ekonomi tinggi dan dapat dimanfaatkan secara berkelanjutan. Efektivitas pengelolaan kawasan konservasi ditentukan oleh aspek dan faktor yang berasal dari dalam dan luar kawasan konservasi. Penelitian ini bertujuan untuk (1) mengidentifikasi potensi Kawasan Konservasi Wilayah Indragiri Hilir; (2) menganalisis faktor internal dan faktor eksternal dalam pengelolaan kawasan konservasi daerah (KKD); (3) merumuskan strategi utama dan strategi alternatif dalam pengelolaan kawasan konservasi wilayah yang efektif di Kabupaten Indragiri Hilir. Metode yang digunakan dalam penelitian ini adalah metode survei, data yang dikumpulkan terdiri dari data primer dan data sekunder, strategi pengelolaan Kawasan Konservasi Daerah Indragiri Hilir dilakukan dengan menggunakan Analisis SWOT dan analisis AHP. Hasil penelitian menunjukkan bahwa potensi kawasan KKD Indragiri Hilir terdiri dari *sumber daya* manusia, modal sumber daya alam, *modal buatan manusia*, potensi sosial dan ekonomi. Faktor internal dalam pengelolaan kawasan konservasi daerah terdiri dari keterbukaan masyarakat dalam memperbaiki suatu kawasan, komitmen Pemerintah Pusat, komitmen Pemerintah Provinsi Riau, komitmen Pemerintah Kabupaten, kearifan lokal, ketersediaan potensi sumber daya alam, jumlah sumber daya manusia penduduk, kualitas sumber daya manusia masyarakat, koordinasi dan komunikasi, arah dan kebijakan pembangunan daerah, instrumen hukum dan *penegakan hukum*. Faktor eksternal terdiri dari SDGs, program pemerintah berbasis konservasi sumber daya alam, keterlibatan perusahaan dalam perencanaan lingkungan, keterlibatan perusahaan pemberdayaan masyarakat, penelitian dan pengabdian kepada masyarakat berbasis masyarakat, sikap ego sektoral dan ego spasial, degradasi lahan dan kerusakan ekosistem, liberalisasi ekonomi dan kepentingan politik, tindakan moral hazard pemangku kepentingan.

Kata Kunci: Kawasan konservasi, Faktor internal, Faktor eksternal, Strategi pengelolaan

Received: 15 September 2024
Accepted: 30 October 2024

INTRODUCTION

Management in coastal areas plays a vital role in the economic development of a region. Rapid development in coastal areas that do not pay attention to good governance also impacts ecosystems, which continue to degrade functionally and economically. The Critical ecosystems often affected by coastal development are mangrove, seagrass, and coral reef ecosystems. WWF–Indonesia reported that the destruction of coastal and marine areas is one of Indonesia's major problems and will impact the decline in biodiversity. If this continues, it can have implications for the threat of biota species. As an anticipatory step, it is necessary to formulate appropriate management of coastal areas to ensure the preservation of ecosystems and natural resources associated with them. Conservation areas are areas that have specific characteristics as a unity of ecosystems that are protected, preserved, and utilized sustainably (Sutomo et al., 2011)

KKD Indragiri Hilir Riau Province has various potentials and high economic value and can be utilized sustainably. Extensive mangrove ecosystems and beaches are beginning to be used as tourist attractions in Indragiri Hilir Regency. Not to mention, there is the potential for fisheries, essential habitats, and other coastal resources that support the livelihoods and economy of local communities in the coastal areas of Indragiri Hilir Regency. According to Warningsih et al. (2020), mangroves play an important role as a natural ecosystem for many organisms, contributing to our life needs. Mangroves produce two significant benefits, namely ecological and socio-economic. The social benefits of mangroves include the production of building materials, timber, medicine, food, agriculture, fisheries, and tourism. In addition to reducing coastal abrasion, mangrove ecosystems can also increase the availability of fishery resources in these waters. This is due to the biological role of mangrove ecosystems. The existence of mangrove ecosystems can increase the catch of fishermen and the availability of fishery resources as a source of community protein (Efriyeldi et al., 2021).

Currently, the Indragiri Hilir MPA in Riau Province has been designated as a conservation area through the Decree of the Minister of Marine Affairs and Fisheries Number 107 of 2023 concerning Conservation Areas in Waters in the Indragiri Hilir Region of Riau Province with an area of 126,097.64 ha. In the context of effective conservation area management, regional conservation areas' potential and management strategies must be carried out to provide significant benefits to a conservation area that supports sustainable fisheries.

MATERIALS AND METHOD

Time and place of research

This research was conducted in May 2023 at the location of the Indragiri Hilir Regional Conservation Area, namely in Mandah, Tanah Merah, Kuala Indragiri, and Concong Districts of Indragiri Hilir Regency. The boundary of the research location is the Water Conservation Area Boundary Map following the Riau Governor Decree Number Kpts.863/XI/2017 concerning the Reserve of Coastal and Small Island Conservation Areas in Indragiri Hilir Regency.

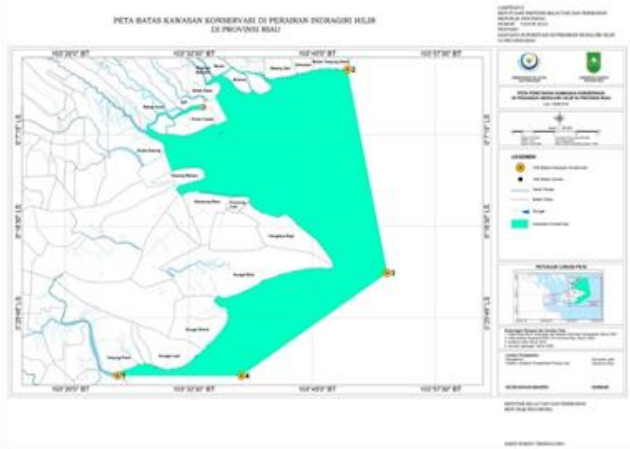

Figure 1. Research location

Methods

The survey method was used in this research. The primary and secondary data collected in this study were primary and secondary. Some data, such as biological, social, economic, infrastructure, and governance, were obtained through field observations, interviews, and focus group discussions (FGDs). Primary data was obtained

through field observations, stakeholder interviews, and focus group discussions (FGDs) with conservation area management policymakers. Filling out questionnaires by respondents to determine the level of importance of several variables in formulating the status and level of effectiveness of area management. Ecological aspects consist of data on high economic fish habitat and biota, rare fish habitat and biota, unique fish habitat and biota, endemic fish habitat, and biota, protected fish habitat and biota, mangrove density, aspects of naturalness and environmental services obtained in the form of primary and secondary data. Socio-economic and infrastructure aspects consist of data on fishing areas, docks and bridges, community income and income, community support, and local wisdom from primary and secondary data.

Analysis of the potential of Indragiri Hilir Regional Conservation Area

Data on the potential of conservation areas obtained through surveys and interviews in the form of primary data and information taken from published documents were compiled and tabulated. The data were processed using quantitative descriptive analysis techniques in the form of tables and charts and then subjected to interpretation, explanation, and discussion.

Management strategy analysis of Indragiri Hilir MPA

The management strategy of the Indragiri Hilir regional conservation area was conducted using Strength-Weakness-Opportunity-Treatment (SWOT) and Analysis Hierarchies Process (AHP) analysis. The primary/priority factors and strategies resulted from calculating the SWOT matrix, which was tested again for Consistency Index (CI) and Sensitivity Index (SI) using AHP Analysis. This combination of SWOT analysis and AHP analysis is called A'WOT analysis. The incorporation of AHP analysis in SWOT is because SWOT analysis is too qualitative. If it is quantified, it is not clear how much the weight is between each component of SWOT, namely the weight between strengths, weaknesses, opportunities, and threats. Alternative decisions are evaluated concerning each SWOT factor with the use of AHP. In this case, SWOT analysis is used as a basic frame that will result in situational decisions, while AHP is used to help improve SWOT analysis in elaborating the analysis results so that alternative strategy decisions can be prioritized.

RESULT AND DISCUSSION

Human capital potential

The population of Indragiri Hilir Regency in 2021 amounted to 658,025 people; compared to the population in 2020, which amounted to 654,909 people, there was an increase in population of 3,116. The population of Indragiri Hilir Regency is dominated by people aged 15 years and over, totaling 253,639 people. Based on absolute numbers, a dependency ratio of 44.1 can be obtained. This figure shows that every 100 people of productive age bear about 44-45 people of productive age.

Natural resource potential

Most of the area, or 93.31% of the area of Indragiri Hilir Regency, is a lowland area, namely river deposits, swamp areas with peat soil (peat), brackish forest areas (mangroves) consisting of large and small islands with an area of approximately 1,082,953.06 ha. The average height is approximately 0-3 meters above sea level. In contrast, a small portion of 6.69% is in hilly areas with an average altitude of 6-35 meters from sea level. Most of the Indragiri Hilir Regency area is lowland, including the area around the planned Regional Conservation Area in Indragiri Hilir, a tidal-influenced area with alluvial and peaty soil geology. Indragiri Hilir Regency has a wet tropical climate; rainfall in Kuala Indragiri Sub-district around Indragiri Hilir MPA in 2017, 2018, and 2019 was 2,548, 2,045 and 1.950 mm and 130, 91 and 98 rainy days. Current velocity ranges from 0.08-9.30 m/s, depth 1.45-12.00 m, brightness 12.50-170 cm, TDS 39.20-49.80 mg/L, turbidity 2.15-3.94 NTU, and temperature 26.00-34.10 0C. Chemical parameter water quality values ranged from salinity 27.00-32.00 ppm, pH 6.69-8.1, BOD5 9.02-11.73 mg/L, COD 22.87-39.09 mg/L, nitrate 6.50-6.90 mg/L, phosphate 0.10-0.11 mg/L, DO 3.85-4.32 mg/L. In general, the results of water quality measurements at the Indragiri Hilir Regional Conservation Area, Riau Province are still below the quality standards and classified as unpolluted. The average value of salinity is 30.5 ppm, pH 7.23, BOD5 10.24 mg/L, COD 34.13 mg/L, Nitrate 6.67 mg/L, Phosphate 0.11 mg/L, DO 4.04 mg/L.

Some biota of high economic value in capture fisheries commodities, including mangrove crabs (ketam), ronggeng shrimp (grandmother shrimp), tirusan, kurau, selampai, blood clams, lepu batu fish, sembilang,

belukang, mullet, grouper, snapper, tenggek shrimp, gerut, and galah shrimp are found in the waters of Indragiri Hilir Regency which is estimated to have a stable peak season throughout the year. Capture fisheries production in Indragiri Hilir Regency is dominated by marine fisheries with 53,057.13 tons (84.47%), followed by public waters with 7,273.22 tons (11.58%), ponds with 1,251.83 (1.99%), ponds with 1,232.72 (1.96%) and cages with 0.43 tons. The total production was 62,815.33 tons per year. A large amount of production is estimated to be due to the favorable water conditions of Indragiri Hilir Regency. Some critical and protected biota, such as coastal dolphins (*Orcaella brevirostis*), are found in Indragiri Hilir waters. Other biota, such as dolphins and freshwater rays, surround the Mandah Sea waters.

The potential of mangroves in this conservation area consists of several species, among others, namely *Sonneratia alba, Avicennia alba, Rhizophora apiculata, Kandellia candel, Xylocarpus granatum, Bruguiera cylindrica, B.parviflora, Nypa fruticans*. Mangroves *Sonneratia alba*, *A.alba,* and *R. apiculata* usually grow in large numbers by dominating a zone in the mangrove area. Solop Beach ecotourism area is one of the leading tourist attractions in Indragiri Hilir Regency. This ecotourism has a white beach along 2 km. This beach is unique compared to other beaches, namely white sand from fossils of marine animals such as corals and other similar biota, so it is known as Pasir Seresah. Right behind the beach is a 40 km^2 natural mangrove forest consisting of various mangroves (Aulia et al., 2023).

Potential infrastructure resources

The availability of facilities, infrastructure, and transportation to the Solop Beach tourist location is still lacking. Access to the area only uses sea routes, which do not require a small fee. Respondents said it is quite easy if they have a speedboat personally because renting does not require a small fee. Conservation areas know that the distance from the capital city to the area takes 1-2 hours, with transportation from the district capital to the MPA operating 2-3 times a day for specific locations. Some only operate 3 times a week.

A community's low level of education can be an obstacle to development, especially in accepting new things. Conversely, the higher the level of education in an area, the faster and easier they will accept changes and inputs. Educational facilities around the Indragiri Hilir conservation area are mostly elementary schools in the four sub-districts, followed by junior high and senior high schools. According to Aulia et al. (2023), the respondent's income level, the respondent's education level, the respondent's gender, the respondent's age, and the respondent's family dependents are factors in determining the value of benefits. The benefits of the existence of mangroves can be used as a basis for decision-making by local governments and surrounding communities in policy management and utilization of mangrove forests to maintain and preserve mangrove forest ecosystems for their sustainability in the future.

Health facilities and infrastructure located around the Indragiri Hilir conservation area are three units of puskesmas in the Mandah sub-district, two units in the Tanah Merah sub-district, and 1 unit each in the Kuala Indragiri and Concong sub-districts. There are 15 pustu units in the Mandah sub-district, eight pustu units in the Tanah Merah sub-district, seven pustu units in the Kuala Indragiri sub-district, and five pustu units in the Concong sub-district, each sub-district has a posyandu and there are only two drug stores in Tanah Merah sub-district.

Some respondents said that the condition of buildings around the conservation area is quite good, seen from some of the already available infrastructure, although it is still inadequate. The community does not manage related waste management around the conservation area, and household waste is directly disposed of into the seawater flow so that when the tide recedes, there is a buildup of garbage around the community housing.

Potential social and economic resources

The number of worship facilities in Mandah Sub-district there are 79 units of mosques, 109 units of mushola/surau, 1 unit of the temple for adherents of the tiong hoa belief, Tanah Merah sub-district there are 23 units of mosques, 20 units of mushola, and one temple, Kuala Indragiri sub-district there are 36 units of mosques, 20 units of mushola, and two units of temples. In comparison, the Concong sub-district has 12 units of mosques, 17 units of mushola, and one temple.

There is no local wisdom around the Indragiri Hilir Kapas conservation area related to coastal and marine resources. So far, there has been no prohibition on particular time agreements where fishermen do not conduct fishing activities. However, cultural attractions are still around the conservation area, especially in Tanjung Pasir Village, Tanah Merah Sub-district. Rules related to customary law around the Indragiri Hilir conservation area can be absent in three sub-districts: Tanah Merah, Concong, and Kuala Indragiri Hilir. Meanwhile, in the Mandah sub-

district, sea semah is still active and strongly influenced. In addition, belief in myths does not exist in 3 sub-districts, such as Concong, Tanah Merah, and Kuala Indragiri, and the community is already modern. Meanwhile, respondents in the Mandah sub-district mostly still believe in myths.

The estimated average income of fisheries business in 2022 is IDR69,999,996,- or a monthly average of IDR 5,833,333, while the estimated average non-fisheries income which is income obtained outside the fisheries business is IDR4,599,996,- or around IDR383,333,- per month. Meanwhile, the estimated average expenditure for fisheries business is IDR27,960,000, - or an average of IDR 2,330,000 per month, while the estimated average expenditure of the fishermen's household is IDR32,100,000, - IDR 2,575,000. Monthly. Based on NTN, family households have a good enough ability to fulfill their subsistence needs and have the potential to consume their secondary and tertiary needs by saving or investing in goods (Susanto, 2011).

Conservation area management strategy

The strengths in the Management of Conservation Areas in Indragiri Hilir Regency are Community Openness in the improvement of an Area with a value of 3.75, Government Commitment (Central) with a value of 3.95, Commitment of the Riau Provincial Government with a value of 4.15, District Government Commitment with a value of 3.85, Availability of Natural Resources with a value of 3.90, and Coordination and Communication between Regions with a value of 3.75. Then, when viewed from the priority weight assessment using AHP analysis Expert Choice 11 Software, the highest value was obtained in the Central Government commitment component and the provincial government commitment of 0.259 or 25.9%, followed by the openness component of the community to accept the program, district government commitment, and the availability of natural resources with a value of 0.136 or 13.6%. The coordination and communication component obtained the last position of 0.075 or 7.5%. The results of the AHP calculation of the components that make up the SWOT factor, in this case, strength (S), show that the government commitment component (central and provincial) has the highest value. Thus, this component can be used as the basis for constructing strategies. Then, the components of community openness to area improvement, district government commitment, and the availability of abundant natural resources can be used as an alternative basis for constructing strategies to be offered.

Weakness factors in the Management of Conservation Areas in Indragiri Hilir Regency include Local Wisdom, Number of Human Resources, Quality of Community Human Resources, Direction and Regional Development Policies, Legal Instruments, and Law Enforcement, which are still low. The main weaknesses in the Management of Conservation Areas in Indragiri Hilir Regency are Local Wisdom with a score of 2.56, Total Human Resources of the population with a score of 2.56, Quality of Human Resources of the Community with a score of 1.90, Direction and Policy of Regional Development with a score of 2.04, Legal Instruments and Law Enforcement which are still low resulting in a score of 2.90. The results of the AHP calculation of the components that make up the SWOT factor, in this case weakness (W), show that the Weak Legal Devices and Law Enforcement components that are still low are factor components that contribute 0.375 or 37.5%. This indicates that the components of the legal device and law enforcement factors must be prioritized to be overcome in formulating the strategy to be designed. Other factors still considered weak include local wisdom and the direction of environment-based development policies (which are still low), with a value of 0.180 or 18.0% and 0.168 or 16.8%.

Opportunities that will arise in the Management of Conservation Areas in Indragiri Hilir Regency are the Global Movement for Sustainable Development - SDGs with a value of 4.15, Government Programs & Activities based on the preservation of Natural Resources with a value of 4.65, Company Involvement in Community Empowerment with a value of 3.80, and Environment-based Research / Community Service with a value of 4.15. The results of the AHP calculation of the components that make up the SWOT factor, in this case, the external factor Opportunities (O), show that the components of the global development movement (SDGs), Development Programs that are increasingly in favor of the environment, and Research and Community Service both get a value of 0.286. These three components are the highest opportunity values that can be captured as strategies to prepare the regional conservation area management concept. These three components can contribute 28.6%, so these positive external factors can be maximized to prepare the regional conservation area management concept in Indragiri Hilir Regency. Company involvement in community empowerment through the Corporate Response Responsibility (CSR) program with a value of 0.143. This shows that the contribution of this component as an opportunity among other opportunity components is 14.3%, so components can be captured as opportunities to prepare the concept of regional conservation area management in Indragiri Hilir Regency.

The main threats to the Management of Conservation Areas in Indragiri Hilir Regency are company involvement in environmental management with a value of 2.68, sectoral ego and spatial ego with a value of 2.90, land degradation and ecosystem damage with a value of 1.11, Economic Liberalization and Political Interests with a value of 1.75, and moral hazard actions of stakeholders with a value of 1.75. The results of the AHP calculation of the components that make up the SWOT factor, in this case, the external threat factor (T), show that the company's concern component in environmental management and the sectoral ego and spatial ego attitude of the Regional Government each obtained a value of 0.333. Thus, the magnitude of the contribution of these two components that act as threats that can interfere with achieving optimal area management objectives is 33.3%. Therefore, the high contribution of this component acting as a threat must receive severe attention and be reduced through the design of strategies to be developed to manage regional conservation areas in Indragiri Hilir District. The components of land degradation and ecosystem damage that are expected to continue, as well as the threat of economic liberalization and practical political interests, received the exact value of 0.111 or a contribution value of 11.1%. This means that, although the value is relatively small (11.1%), these three components are threats that can hinder steps in achieving the objectives of regional conservation area management.

Prioritization strategy

SO strategy is the best formulation and is recommended as the primary strategy. Meanwhile, other strategy formulations can be used as alternative strategies or choices in sequence according to the ranking order of the resulting weight value. Calculation of weighting criteria using Expert Choice 11 software with an inconsistency of 0.01 obtained pairwise comparison results show that the SO strategy obtained the highest value of 0.467, followed by the WO Strategy with a value of 0.277, the ST Strategy with a value of 0.160, and the WT Strategy with a value of 0.095. Based on testing of the SWOT strategy formulation, it shows that the SO Strategy gets the highest value of 0.467 or 46.7%.

The ten SO strategies that have the highest value from the SWOT analysis include First Priority, the strategy that needs to be applied is to maintain and increase the commitment of the Riau Provincial Government through government programs and activities based on natural resource sustainability; Second Priority; the strategy that needs to be applied is to maintain and increase the commitment of the Government (Central) through government programs and activities based on sustainability; Third Priority; the strategy that can be done is the utilization (exploitation) of available natural resources through government programs and activities based on the preservation and sustainability of natural resources. The fourth priority is to maintain and increase the commitment of the Regency Government through development programs and activities by local governments that prioritize natural resource sustainability. Fifth priority: the community's openness in improving an area through development programs and activities by the local government based on the sustainability of natural resources. The sixth priority is to build coordination and communication between stakeholders through development programs and activities based on the sustainability of natural resources and the environment. The seventh priority is maintaining and increasing the commitment of the Riau Provincial Government through the use of the Global Sustainable Development Program (SDGs). Eighth priority: maintaining and increasing the commitment of the Riau Provincial Government through research and community service on utilizing natural resources and the environment. The ninth priority is to maintain and increase the commitment of the National (Central) Government by using the Global Sustainable Development Program (SDGs). Tenth priority: maintaining and increasing the commitment of the Central Government through research and community service on utilizing natural resources and the environment.

The SWOT assessment above is carried out with dynamic sensitivity testing using AHP Analysis. Based on the AHP Analysis of the SO Strategy Component, the combination of S3O2 components has the highest value of 0.232. Then followed by S2O2 and S5O2 with a value of 0.144. Strategic S4O2, S1O2, S6O2, and S3O1 have a value of 0.079, and the S3O4 strategy has a value of 0.069. Finally, strategies S2O1 and S2O4 with a value of 0.047. The results of this calculation mean that the S3O2 Strategy with the highest weight of 0.232 or equivalent to 23.2% can be selected as a strategy that can be recommended in managing the Indgragiri Hilir regional conservation area. Then, it will be followed by SO2 SO3 until SO10 can be proposed as a strategy included in the 10 (ten) that can be proposed. Based on the results of SWOT and AHP analysis and the above, the formulation of recommended strategies is as follows: Increasing the commitment of the provincial government through regional programs and activities based on improving environmental quality and natural resource sustainability; Increasing the responsibility of the central government through national programs based on improving

environmental quality and natural resource sustainability; Utilizing abundant natural resources through programs and activities that can improve community welfare and sustainability of natural resources and the environment; Increasing the commitment of district governments through regional programs that pay attention to environmental quality and natural resource sustainability; Utilizing the attitude of community openness to ecological improvement through environmental development programs / activities based on community empowerment and village social inclusion; Building inter-regional cooperation in the form of joint movements or programs for ecological development and sustainable natural resource utilization; Increasing the commitment of the Riau Provincial Government in order to obtain funding support from the Sustainable Global Development Movement (SDGs); Designing regulations and laws that can provide legal instruments (sanctions and rewards) and activities that can increase legal awareness; Designing regulations and regulations (sanctions and rewards) that can increase the role of parties in supporting and carrying out the global movement for sustainable development (SDGs); and Increasing research and studies in the field of environmental law and innovation studies that can strengthen legal instruments and public awareness.

CONCLUSION

Based on the study results, it can be concluded that the potential of Indragiri Hilir MPA consists of human capital, natural resources capital, infrastructure capital (artificial capital), and social and economic capital. Internal factors in the management of regional conservation areas consist of community openness in the improvement of an area, commitment of the Government (Central), commitment of the Riau Provincial Government, commitment of the Regency Government, local wisdom, availability of natural resource potential, number of human resources population, quality of human resources community, coordination and communication, direction and policy of regional development, legal instruments, and law enforcement. External factors consist of SDGs, government programs based on natural resource sustainability, company involvement in environmental management, company involvement in community empowerment, research, and community service based on the environment, sectoral ego and spatial ego attitudes, land degradation and ecosystem damage, economic liberalization, and political interests, moral hazard actions of stakeholders.

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