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Marine Protected Area Policy Networks as a Catalyst for Local Resilience: Evidence from Eastern Bintan Island

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A B S T R A C T

Marine Protected Areas (MPAs) are becoming an essential tool for marine biodiversity conservation and sustaining the livelihood of coastal communities. Nonetheless, the success of MPAs relies, to a great extent, on the efficiency of the policy networks that manage them. This research explores policy networks' role as drivers of local resilience in East Bintan Island, Indonesia. The objective of this research is to understand how policy networks and dynamics in MPA governance can support the social-ecological resilience of local communities. This study used a qualitative method design to identify the composition, dynamics, and effects of such networks and how they facilitate coordination among stakeholders, enhance the efficiency of resources, and solve social-ecological issues. The research established that policy networks in East Bintan Island have a transformative function of connecting government agencies, local communities, and non-government organizations. They facilitate knowledge, power, and resource sharing that optimizes adaptive capacity and enables sustainable practice. Yet, their complete potential is hampered by issues such as power imbalances, institutional obstacles, and conflicts of interest. This study makes a contribution to the literature by providing empirical insights into the catalytic function of policy networks in MPA governance. Additionally, it offers practical suggestions to practitioners and policymakers who aim to promote local resilience using adaptive and inclusive governance. Through the explanation of policy networks and their connection to community resilience, the study affirms that collaborative ecosystems are necessary as a reaction to socio-economic and environmental problems within the coastal region due to their complexity.

INTRODUCTION

The idea of a blue economy has been widely discussed recently and is being touted as a future economic prospect. This idea means the movement to utilize marine resources as a source of livelihood and economic growth by maintaining the sustainability and health of marine ecosystems (Manyilizu, 2023; Watson-Wright et al., 2024). The blue economy also emphasizes the importance of paying more attention to Marine Protected Areas (MPAs).

Within the context of MPAs as catalysts for enhancing local resilience, this research aims to fill an essential knowledge gap. Amidst growing acknowledgment of MPAs' primary role in conserving biodiversity, the actual contribution of such places in enhancing the resilience of surrounding local communities, especially in developing regions like East Bintan Island, has not been exhaustively investigated. There is evidence that the success of conservation efforts is highly dependent on community involvement, while recent research has concentrated more on ecological results and less on social patterns and dynamics of local stakeholders' involvement (Bennett et al., 2019; Christie et al., 2018). Additionally, whereas available literature stresses government and institutional initiatives in leading marine conservation, it pays less attention to how traditional knowledge and community-based initiatives have been incorporated in guiding successful MPA policies (Baker & Constant, 2020; Sejati et al., 2024). This study hopes to add a more integrated comprehension of how MPAs can optimally support local resilience by exploring the relationship between government policies, local community sentiments, and ecological outcomes.

MPAs have become a key instrument in global efforts to conserve marine biodiversity and support the sustainability of coastal resources (Chen et al., 2024; Mackelworth et al., 2019). However, the effectiveness of MPAs depends not only on policy design but also on the dynamics of policy networks involving various stakeholders, including governments, local communities, and non-governmental organizations (Ban et al., 2019; Kusumawati & Huang, 2015). This research was conducted to examine the role of policy networks as catalysts in building local resilience (Cashion et al., 2020) in the eastern of Bintan Island, Indonesia. This study is important because local resilience is a critical factor in facing global challenges such as climate change, environmental degradation, and increasingly complex socio-economic pressures (Addison et al., 2018; Beal et al., 2017).

Based on a Systematic Literature Review (SLR) conducted by analyzing 1,009 scientific articles collected from the Scopus database (February 2025) published from 1996 to 2025 with subject coverage in the fields of Social Science, Environmental Science, Multidisciplinary, Agricultural, and Earth Sciences, with a focus on the dynamics of policy networks, governance, collaboration, and the role of stakeholders in the management of Marine Protected Areas. Search criteria include keyword combinations such as ("policy network" OR "governance" OR "collaboration" OR "stakeholder") AND ("marine protected area" OR "MPA" OR "marine reserve" OR "ocean conservation") AND ("biodiversity" OR "ecosystem" OR "conservation" OR "sustainability") AND ("management" OR "regulation" OR "planning" OR "strategy") that reflect an interdisciplinary approach in the context of marine conservation. Document limitation to English language articles. Bibliometric analysis using Biblioshiny revealed thematic patterns and conceptual relationships, with thematic map and co-occurrence network visualizations confirming the dominance of three main clusters: (1) policy and governance, (2) ecosystem conservation, and (3) participatory management strategies.

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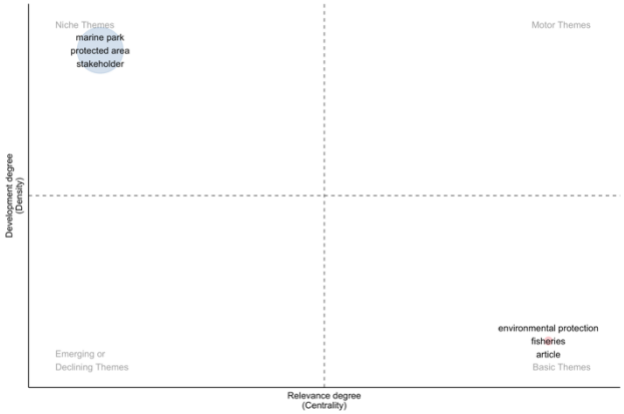

Figure. 1. Thematic Map
Source. Processed by the authors (2024)

Focus on Policy Networks: This research not only looks at policy in general but specifically analyses the network of actors and institutions involved in the management of Marine Protected Areas (MPAs). This approach is still relatively rare, especially in the Indonesian context.

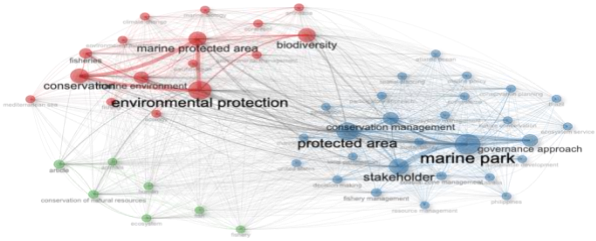

Figure 2. co-occurrence
Source. Processed by the authors using VOSviewer Software(2024)

The results of the SLR analysis show that the themes of policy and governance (policy network, governance) dominate the literature, especially in the context of MPA design based on multi-actor collaboration. Articles in this cluster often link MPA effectiveness to stakeholder engagement (government, NGOs, local communities) and an "adaptive governance" approach. Meanwhile, the "ecosystem conservation" ("biodiversity", "marine reserve") cluster emphasizes the ecological impacts of MPAs, such as increased fish biomass and habitat restoration, but less on socio-economic dimensions such as food security or resource conflicts. The third cluster, "participatory management strategies" ("participatory planning", "community-based management"), identifies opportunities and challenges in integrating local knowledge with formal regulations. However, the literature is still dominated by case studies from the Global North (e.g., Mediterranean, Canada), with limited representation from Southeast Asian archipelagic regions such as Indonesia and Southeast Asia.

Figure 3. *Word Cloud*
Source. Processed by the authors using NVivo 12 Plus (2024)

Although the SLR results show the importance of "policy networks" in the literature, some critical gaps identified are, firstly, Local Knowledge Integration, where only 12% of the articles discuss formal mechanisms for incorporating traditional knowledge in MPA design. Second, socioeconomic impacts indicate that analyses of how MPAs affect fishers' livelihoods or gender inequality in resource access are still sporadic. Thirdly, in terms of Response to Climate Change, it is found that terms such as "climate change adaptation" or "ocean warming" rarely appear, even though these threats are crucial to the sustainability of MPAs. Finally, with regard to Technological Innovation, the link between "digital tools" and community participation has not been explored.

In the discipline of Marine Protection Network Policy studies, there have been numerous theories that can form part of the understanding of relationships and dynamics among different stakeholders. Policy networks as a theoretical tool can assist in finding how cooperation among actors results in developing community resilience. This study expands resilience thinking knowledge by pointing out that resilience is not just recovery, but also system change that can be achieved through policy network interactions.

As stated by Fastenrath et al., (2019), success in building a robust system largely relies on how the system manages to modify and adapt to external pressures (Green et al., 2022). On this point, Kang et al., (2023) observe that high-density networks can lead to the adoption of sustainability policies, where core actors within the network can enable information sharing and innovation. Bodin also shares the same view and elaborates on how crucial the integration between hierarchical structures and horizontal networks is in developing more effective decision-making processes in the realm of sustainability and resilience (Hayes & Scott, 2018; Matti & Sandström, 2011).

In addition, policy network theory also presumes that interaction among various actors, including NGOs acting as brokers, plays an important role in shaping new policies (Matti & Sandström, 2013). Research shows how actor coordination can affect the construction of advocacy coalitions founded on collaborative strategies and trust (Parsons, 2018). These results demonstrate that cross-border cooperation in these types of networks is not only necessary to construct novel solutions but also to reinforce local resilience to crises. Overall, the application of policy network theory within the context of East Bintan Island's local resilience not only accounts for a collaborative role among stakeholders but also emphasizes the importance of dynamic mechanisms in decision-making. By highlighting the factors of interaction and adaptation, this study adds to a general framework of social and environmental changes required in progressing towards greater resilience.

MPAs are spatial tools used to preserve the ecological integrity and biodiversity of an area, protecting ecosystem functions, species, and habitats for future generations (J. G. Smith et al., 2023). In line with this, the Minister of Marine Affairs and Fisheries Regulation No. 31/2020 states that "Conservation Areas are areas that have certain characteristics as an ecosystem unit that is protected, conserved, and utilized sustainably". Meanwhile, in Minister of Marine Affairs and Fisheries Regulation number 13 of 2014, MPAs are marine/water areas managed with a zoning system, to realize sustainable management of fish resources and the environment.

Given the importance of MPAs/MPAs to ensure the sustainability of marine ecosystems, the global Sustainable

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Development Goals (SDGs) agenda, as well as the Convention on Biological Diversity (Aichi Target), has set a global agenda for increasing the size of protected areas, with a commitment to reach a target of 30% of the total area of protected areas in the world's waters by 2030 (Muccitelli et al., 2023; Strachan et al., 2022).

Based on Ocean Health Index (OHI) data, the global OHI score for the 2023 assessment is 73. The overall score for Indonesia is 69 out of 100, which is lower than the global average score of 73, with a ranking position of 152 out of 220 regional (https:/oceanhealthindex.org/regions/indonesia). This data warns of the importance of improving the governance of MPAs, which Smith et al. (2023) consider a necessary step to take in order to increase the resilience of marine ecosystems, especially in the face of climate challenges. More interestingly, research on MPA performance evaluation (Meilana et al., 2023) found that although 61% of the study sites were managed at a minimal level and 39% at an optimal level, an evaluation of the effectiveness of MPA management in Indonesia showed that the sites had not yet reached the stage of sustainable management. The globally agreed target of a massive expansion of MPAs to realize 30% of the world's waters by 2030 has resulted in an increased need to learn more about their sustainability and success.

The discourse on the blue economy movement becomes even more interesting when confronted with the issue of environmental degradation in the marine sector, which is a national and global concern. The challenges faced in efforts to expand MPAs can be sorted into two categories. Firstly, the issue of protection against damage caused by overexploitation by humans. Problems that are often faced include overfishing (Darmawan et al., 2022; Yanto et al., 2020), 021, damage to marine and coastal ecosystems due to uncontrolled tourism activities (Apriliani et al., 2009), pollution such as marine debris (Yudiatmaja et al., 2021), ship oil spills, ship oil spills (Kurniawan, 2023), in addition to internal behavioral problems that result in habitat degradation such as coral bombing, fish anesthesia, coral mining (Adriman et al., 2012), marine sand mining, mangrove land conversion (Akbar et al., 2021; Irman & Akbar, 2021) and so on. Second, the widespread and critical impacts of global climate change (Abdillah et al., 2023) threaten marine ecosystems and pose complex challenges to the resilience and sustainability of MPAs (Lopazanski et al., 2023). The intensifying impacts of climate change that are fuelling rising sea surface temperatures, changing current patterns, and ocean acidification due to elevated carbon dioxide levels have destabilized highly vulnerable marine ecosystems. These climate change impacts include shifts in species distributions, habitat-destroying coral bleaching, and threats to the sustainability of marine life and fisheries (J. Smith & Metaxas, 2018). The impacts of climate change on marine systems are expected to be highly dynamic at local and global scales. However, compared to terrestrial ecosystems, we are less prepared to document changes in marine and coastal environments (Ward-Paige et al., 2022)

The expansion of MPAs is the number one of the five priority agendas of the Ministry of Marine Affairs and Fisheries. MPAs are also continuously included in the global sustainable development goals (SDGs) agenda. Concerning this MPAs target, the Decree of the Minister of National Development Planning/Head of the National Development Planning Agency Number 118 of 2023 on the Roadmap for SDGs 2023-2030 has set SDGs Agenda Goal 14, namely "conserve and sustainably use marine and ocean resources for sustainable development". This goal is relevant to the vast waters owned by Indonesia of 325 million hectares, with a conservation area of 23.38 million hectares, 7.19% until 2019. The government targets to increase the area of conservation areas by 10% (32.5 million hectares) of the total area of Indonesian waters by 2030 (kkp.go.id).

Regulations relating to marine protected areas in Indonesia are formed from two nomenclatures. First, Law No. 45 of 2009 on the amendment of Law No. 31 of 2004 on marine and fisheries and Government Regulation No. 60 of 2007 under the name of Marine Protected Areas. Secondly, the nomenclature of Law 1 of 2014 on the amendment of Law 27 of 2007 under the heading of Coastal and Small Island Conservation Areas. Each category is explained in the Ministerial Regulation of Marine and Fisheries number 23 of 2016, number 17 of 2008, and number 30 of 2010 (kkp.go.id accessed 2023).

There are several categorizations of conservation areas as stipulated in Minister of Marine Affairs and Fisheries Regulation Number 31 of 2020 concerning Conservation Area Management, which unifies and simplifies previous regulations such as Minister of Marine Affairs and Fisheries Regulation Number 17 of 2008 concerning Conservation Areas in Coastal Areas and Small Islands, Minister of Marine Affairs and Fisheries Regulation Number 2 of 2009 concerning Procedures for Determining Marine Protected Areas, Minister of Marine Affairs and Fisheries Regulation Number 30 of 2010 concerning Management and Zoning Plans for Marine Protected Areas, and number 47 of 2016 concerning Utilisation of Marine Protected Areas. In Minister of Marine Affairs and Fisheries Regulation Number No. 31 of 2020, conservation area management includes establishment, utilization, management, and evaluation using a zoning system. In addition, there are various other regulatory tools related to marine conservation that become the legal basis for supervision, which include:

1. Regulation of the Minister of Marine Affairs and Fisheries Number 47 of 2016 on the Utilisation of Marine Protected Areas;
2. Regulation of the Minister of Maritime Affairs and Fisheries number 17 of 2014 concerning the Implementation of Fisheries Supervisory Duties;
3. Regulation of the Minister of Marine Affairs and Fisheries number 12 of 2013 on the Supervision of Coastal Areas and Small Islands

Indonesia's vast marine/water area poses several complex challenges. From an institutional perspective, many challenges exist, including Large conservation areas, Limited management of human resources, Insufficient infrastructure, and Limited management funding. These challenges become more severe to handle in areas with archipelagic characteristics such as the Kepulauan Riau Province which is considered relevant to the setting of this research. As an archipelago with geographical characteristics of 96% ocean and 4% land, Kepulauan Riau is among the top 4 out of 11 provinces with a conservation area achievement above 10%. The Riau Islands' achievement rate is 30.71%.

The Riau Islands' (Kepri) commitment to conservation is critical, given its multi-island, ocean-dominated territory that forms the backbone of its economy, particularly in the fisheries and tourism sectors. In a recent effort, the Ministry of Maritime Affairs and Fisheries (KKP) issued Decree No. 18 of 2022 establishing a conservation area in the eastern waters of Bintan

Island, covering 138,661.42 Hectares. This area is divided into three parts including Teluk Sebong (4,500 hectares), Gunung Kijang (23,300 hectares), and Bintan Pesisir (110,700 hectares). The area borders Singapore, is on a fast-growing tourism strip, and is located on a busy sea trade route. In addition, the conservation area faces the South China Sea, which is rich in fisheries resources and marine biodiversity. A key principle of the conservancy is the spillover effect, whereby the growth of fish stocks in the protected area will benefit neighboring areas, enabling sustainable use without damaging the core resources in the conservancy (Directorate General of Marine Spatial Management KKP, 2022).

Thus, policies in MPA management in the eastern area of Bintan Island need to take into account various aspects, ranging from protecting threatened species and regulating human activities to involving local knowledge of the community. With a comprehensive and evidence-based approach, local capacity building and resilience in the area can be achieved sustainably.

METHOD

This study uses qualitative studies to determine the role of policy networks in developing local resilience in the Marine Protected Area (MPA) of East Bintan Island. The selection of informants was conducted utilizing a purposive sampling technique, where informants were selected based on certain qualifications that relate to the research topics (Palinkas et al., 2015). The informants were government authorities, representatives from non-governmental organizations (NGOs), experts, entrepreneurs, and fishermen who were expected to provide in-depth information regarding the MPA policy dynamics and effects of such policies on local resilience.

Information was collected through open-ended interviews designed to capture the opinions and experiences of single informants regarding their role in the policy network, as well as challenges faced in the MPA management context (Maryudi & Fisher, 2020). In addition to interviews, the 'participatory observation' methodology was utilized to achieve actual on-the-ground interactions among stakeholders. In addition to that, policy documents and secondary data from various other relevant institutional reports were further analyzed to provide an extended background. To strengthen the theoretical underpinning and understanding of the research questions, this article also conducted a literature review of 1,009 relevant scientific articles compiled from the Scopus database (February 2025) published between the years 1996 and 2025. Bibliometric analysis was also conducted using Biblioshiny to reveal thematic patterns and conceptual relationship (Wei & Jiang, 2023)

Data analysis employed triangulation techniques, combining findings from interviews, observations, and documents to produce richer and more comprehensive contextual understandings (Gibson, 2017). The approach provides better insight into actors' (government, fishers, NGOs, private sector) roles in constructing MPA policy networks and how their cooperation will improve communities' adaptive capacity to the ecological and economic changes that face them, increasing local resilience.

RESULTS AND DISCUSSION

The Marine Protected Area (MPA) terminology used in relevant policies in Indonesia is closely related to the concept of MPAs. The Indonesian government has adopted the concept of MPAs as part of its efforts to protect and sustainably manage marine resources. In relevant policies and regulations, the term MPA is used to refer to areas designated and managed for conservation purposes, including the preservation of marine ecosystems, species, and their habitats. MPA-related policies in Indonesia include various regulations, programs, and initiatives aimed at improving the effectiveness of marine environmental management and protection. This includes the establishment, monitoring, and management of different types of MPAs such as marine national parks, marine protected areas, and specially regulated zones to protect marine biodiversity.

J. Smith & Metaxas, (2018) argued that MPAs are spatial tools used to preserve the ecological integrity and biodiversity of an area, protecting ecosystem functions, species, and habitats for future generations. Similarly, Chung & Jao, (2022) say that MPAs, a form of area-based management tool, are commonly used to manage marine biodiversity resources for conservation purposes, thus he asserts that the key to conserving the marine environment and resources is the establishment of marine protected areas (MPAs).

Chuenpagdee et al., (2013) used to manage marine biodiversity resources for conservation purposes, thus he asserts that the key to conserving the marine environment and resources is the establishment of marine protected areas (MPAs). (Schéré et al., 2023) that marine protected areas (MPAs) are important but complex conservation tools that can be difficult to organize and manage. The complexity recognized by experts in Marine Protected Areas is highly dependent on governance, which makes it important to continue exploring options for governance approaches. Given the growing perception that the current management of marine resources and habitats is inadequate, there is growing interest in approaches that ensure the viability of marine ecosystems (National Research Council, 2001).

Observing the dynamics in the management of marine protected areas in Bintan based on several previous studies in the same research setting, it is found that the management of conservation areas in the Riau Islands, especially in the MPA of Bintan Island, is quite dynamic. Various problems, findings, and recommendations of previous research can provide an overview of relevant issues in this research. Referring to previous research conducted by Apriliani et al., (2009) Mapur Island in the east of Bintan Island has coral reef potential that can be used for marine tourism, especially for diving and snorkeling activities. This research was conducted to develop a social and ecological-based coral reef rehabilitation strategy to support marine tourism on Mapur Island. In the context and timing of the research, the results showed that the level of coral reef damage on the island was very alarming, with the seabed consisting of coral fragments. Of the 11 sites studied, only 2 were categorized as excellent, 6 as good, and 3 as moderate. The proposed priority strategies involve increasing efforts to conserve coral reef ecosystems as tourist attractions by involving all stakeholders, monitoring the use of fishing gear that damages coral reefs, and increasing cooperation between the government, communities, visitors, and other related parties in managing resources, facilities, infrastructure, and fostering human resources through appropriate programs and activities.

Another study conducted by Adriman et al., (2012) suggested that the management of coral reef ecosystems in the East Bintan Regional Marine Conservation Area is still sectoral and has not considered a multi-sectoral and multi-dimensional approach, which can cause environmental damage and social problems. This research seeks to analyze the index and sustainability status of

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coral reef management in the East Bintan RMCA (Reef Marine Conservation Area) and analyze key factors for the sustainable management of coral reef ecosystems. The results showed that the sustainability status of coral reef management in East Bintan RMCA was moderately sustainable with a multidimensional index of 55.02. In this study, he formulated ten key factors that affect sustainability, namely coral reef condition, protection area, community income, employment in the tourism sector, availability of human resources, government policy, coordination between stakeholders, community compliance, environmental law counseling, and monitoring infrastructure.

Compared to the two studies above, a more recent study with the setting of the Bintan marine MPA area by (Lumbantoruan et al., 2023) from September 2022 to May 2023 at various sampling points in several villages. Research findings as a result of data analysis using the evaluation of the effectiveness of conservation area management (EVIKA) measurement tool indicate that the area has a low percentage of assessment, with input criteria reaching 80.47%, process 53.49%, output 16.92%, and outcome 3.20%. The final percentage of the EVIKA assessment is 43.55%, with an effectiveness status of "Minimum managed" and a rating of "Bronze". Another study was also conducted by (Habibah et al., 2023), which evaluated the effectiveness of seagrass resource conservation management in the Eastern Region of Bintan Island. Using quantitative and qualitative descriptive approaches through questionnaire surveys and FGDs, this study applied the METT (Management Effectiveness Tracking Tools) approach by measuring variables of context, planning, input, process, output, and outcome aspects. The results show that the level of effectiveness of seagrass conservation management in the area falls into the less effective category, with a METT score of 62.59% or a total effectiveness of 87 out of a maximum score of 139. Elements such as context, planning, process, and output were rated less effective.

Some of the research results above illustrate that the dynamics of conservation area governance issues are quite complex. Referring to the empirical studies above, which have a considerable time gap (research years 2009, 2012, and 2023), it is found that the conclusions tend to be the same, which illustrates that the dynamics of MPA management effectiveness are still fluctuating.

Another challenge that is no less important for the management of MPAs in the Riau Islands and Eastern Bintan Waters is related to its context as an archipelago and border area as well as one of the outermost points bordering four countries, namely Singapore, Malaysia, Cambodia, and Vietnam. The vastness of the waters with many islands has an impact on the problem of the span of control and the process of supervision. Overall, the Riau Islands consist of 2,408 large and small islands, 394 of which are inhabited, and 1,350 are named, while 1,058 are unnamed. The number of islands in Bintan Regency consists of 240 large and small islands, of which only 39 are inhabited (https://www.bintankab.go.id/geografis). This condition creates a risk of cross-border conflicts, especially illegal fishing activities, as well as the dumping of ship oil cleanup waste (Kurniawan, 2023) in the middle of the sea, which threatens the stability and sustainability of existing conservation area zones.

The findings and aspects recommended by previous research as well as some of the phenomena observed above illustrate the complexity of problems in the management of Bintan Island MPAs/MPAs. The problems identified indicate complex problems of governance.

The complex issues identified reinforce the importance of adaptive co-management (ACM) with the challenges faced in the MPA governance process. There is a need for inter-agency dialogue to discuss the establishment of effective environmental governance and enforcement of regulations to achieve MPA targets (Muccitelli et al., 2023) (Muccitelli et al., 2023). Engaging stakeholders is critical to understanding which strategies will be effective in motivating the development of more sustainable practices (Bergseth & Day, 2023; Svolkinas et al., 2023).

MPA Policy of Bintan Island

Public policy is not explained by the intentions of one or two main actors but is generated in actor networks where many actors are intertwined in a policy in a systematic way (de Bruijn & ten Heuvelhof, 2004; Kenis & Schneider, 1991; Rhodes & Marsh, 1992). The structure of relationships between actors in the network influences the interactions between actors. For example, actors with a central position in the network may be able to exert more influence in decision-making than actors at the margins of the network. The behavior of actors in the network is further regulated by formal and informal rules that limit and structure the range of possible activities (Ostrom, 1994). In the system, policy actors are located in the policy arena from the agenda, formulation, and implementation, to evaluation and then to the policy change stage. Policy actors have an influence on the problem situation and its development. They include those officially involved in decision-making in a particular field within a public authority.

Indonesia's vast marine/water area poses a number of complex challenges. From an institutional perspective, a number of challenges exist, including Large conservation areas; Limited management of human resources; Insufficient infrastructure; and Limited management funding. These challenges are more difficult to address in regions with archipelagic characteristics, such as the Riau Islands Province, which is considered relevant as a research setting. As an archipelago, Riau Islands has an area of 251,810 km2, with geographical characteristics dominated by the ocean (96% or equivalent to ± 241,215 km2), while the rest by land (4% or equivalent to ± 10,594 km2). Riau Islands is among the top 4 out of 11 provinces with conservation area achievements above 10%. The Riau Islands achievement rate is 30.71%. (kkp.go.id accessed 2023)

The policy history of the establishment of conservation areas in the Bintan Island Region can be observed as follows:

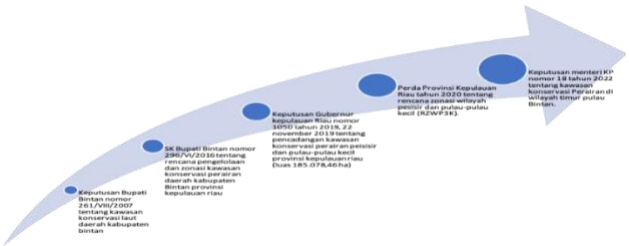

Figure 4. History of Bintan Island Marine Protected Area in Riau Islands Policy
Source. Processed by the authors (2024)

The establishment of MPAs is officially determined by the government through the issuance of regulations. The history of the establishment of MPAs in Bintan Island can be traced through a series of decisions made by the government from the local level to the central government. It began with the issuance of Bintan Regent Decree No. 261 of 2007, which established the Bintan

Regency Regional Marine Conservation Area as the initial basis for institutional marine conservation efforts. This was followed by Bintan Regent Decree 296 of 2016 on the management plan and zoning of the regional marine protected area of Bintan Regency, Riau Islands Province. Recent developments have further emphasized the waters of Bintan Island as a strategic area for MPA development with the establishment of the Minister of Marine Affairs and Fisheries Decree number 18 of 2022 concerning MPAs in the Eastern region of Bintan Island.

The waters of Bintan Island are known for their marine wealth and tourism potential and are a long-standing conservation area. The division of zones in the conservation area of Bintan Island and its area can be observed in the following figure:

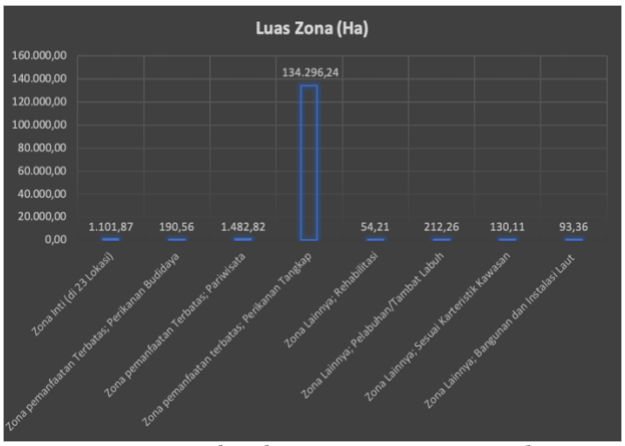

Figure 5. Zone within the Bintan Marine Protected Area
Source: Riau Islands Province Marine Fisheries Service (2022)

The division of zones in marine protected areas (MPAs/MPAs) in the eastern region of Bintan Island in accordance with the categories in the zoning policy consists of, First, the Core Zone spread across 23 water locations with a total area of 1,101.87 hectares. Second, limited utilization zones spread across 29 locations with a total area of 135,969.63 Ha, which are divided into: 1). Aquaculture sub-zone (190.56 Ha), 2). Tourism Sub-zone (1,482.82 Ha), 3). Capture Fisheries Sub-zone (134,296.24 Ha). Third, Other Zones are scattered in 10 locations with a total area of 489.93 Ha which are divided into: 1). Rehabilitation Zone (54.21 Ha), 2). Harbor/Mooring Zone (212.26 Ha), 3). Zone according to the characteristics of the area (130.11 Ha) and 4). Marine Building and Installation Zone (93.36 Ha). Overall, the total area of MPAs/MPAs in the coastal area of Pulu Bintan is 138,561.14 Ha, where the largest zone is in the Capture Fisheries Sub-zone (134,296.24 Ha) or 96.92% of the total area.

MPA expansion efforts and regulations governing MPA management need to be aligned with a commitment to improving governance systems with compatible approaches. Building trust through collaboration, institution building, and social learning enhances efforts to foster ecosystem management and resolve the dual-scale community-environment dilemma. One of the emerging approaches to address this dilemma is *adaptive co-management*. The core features of adaptive co-management include innovative institutional arrangements and incentives across multiple spatial and temporal scales, learning through complexity and change, monitoring and assessment of interventions, the role of power, and opportunities to link science with policy (Armitage et al., 2009).

Policy network studies in the context of MPAs are still quite rare. Conservation is not just a matter of conservation theory but requires compatible policies amidst the dilemma between economic interests and environmental interests. When these two interests collide, the environment is often the dimension that is sacrificed under the pretext of development. Therefore, the policy network built for the region must be strong enough to stand in the middle of these two interests. There is still a lack of popular and critical studies that pay attention to MPAs in the context of policy networks.

Research conducted (Weible, 2005) investigated the extent to which stakeholders in natural resource conflicts interact with actors who share core policy beliefs or are believed to have influence. The results showed that policy network relationships are more influenced by similar policy core beliefs, supporting the Advocacy Coalition Framework (ACF). The study conducted by (Caveen et al., 2013) criticizes the shortcomings of current policy debates regarding Marine Protected Areas (MPAs) and Marine Reserves (MRs), emphasizing that the protection of the marine environment is not only about natural science but also values and views. The article attempts to fill this void by investigating the values behind the natural science of MPAs, using the theories of epistemic communities, advocacy coalitions, and discourse coalitions to explore the role of scientists in influencing MPA policy and the impact of normative conceptualizations within and beyond natural science on these debates. The results show that the epistemic community, which is the most "scientific" and most united in favor of MPAs, has the greatest influence on policymakers. The pro-MPA advocacy coalition, although containing a small proportion of scientists, was confronted by an anti-MPA advocacy coalition that reduced its influence. Meanwhile, the pro-MPA discourse coalition, which contains a small number of scientists, is also faced with a stronger anti-MPA discourse coalition.

Conservation is a science-based endeavor, the execution of which involves a range of actors with different values and interests. This must be tied together through a policy network so that the science and value beliefs can both lead to the ideal goal of marine protected areas. The realization of the ideal goals of MPAs/MPAs is highly dependent on the strength of the policy networks that are built and implemented, where in addition to the strength of science, the commitment, and values that actors believe in will influence policy and decision-making in MPAs/KKPs both nationally and globally. This concern is clearly relevant for Indonesia, which is geographically vast with the characteristics of an archipelagic country that is dominated by sea/water areas.

The Role of Multi-Stakeholder Collaboration in MPA Governance

The task of designing an MPA should follow four sequential steps: (1) evaluate conservation needs at both the local and regional levels, (2) define goals and objectives for establishing MPAs, (3) describe key biological and oceanic features of the region, and (4) identify and select sites that have the highest potential for implementation (National Research Council, 2001).

According to the Convention on Biological Diversity's post-2020 global biodiversity framework, marine conservation activities that aim for area coverage alone are insufficient; therefore, persistent efforts are needed to establish effective marine protected areas (MPAs) (Meilana et al., 2023). A study by (Harker et al., 2022) illustrates the importance of understanding

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the sustainability and success of MPAs in a time of massive expansion. It is clear from this study that even though the number of MPAs has grown dramatically over time, their management effectiveness still needs to be improved, especially in developing countries including Indonesia.

Ocean management depends on several principles of effective governance, such as accountability, legitimacy (strong and collaborative leadership), participation, and transparency, (Dudley & Hockings, 2017; Khuu et al., 2021; Taylor et al., 2013) governance also requires flexibility and adaptability; integration across sectors; transboundary approaches; empowerment of local communities (Dudley & Hockings, 2017; Hooge et al., 2022). The principles of effective governance also include aspects of equity and rights (equality and representation), legitimacy and participation (recognized voice), accountability (communication and clarity), performance (effective management), and appropriate decision-making (Schéré et al., 2023).

Inter-stakeholder collaboration in East Bintan is an important dimension of Marine Protected Area (MPA) governance. Polycentric governance emerges as a form of governance that involves many interconnected actors, including the government, local communities, NGOs, and the private sector. This model facilitates the exchange of essential information and local knowledge so that sustainable fishing practices can be more easily adopted (Clement et al., 2024). This is in line with the findings of Rölfer et al., (2022) who highlighted the challenges in operationalizing resilience at the local level to promote more effective coastal governance.

Dialogue forums such as village meetings and fishermen's group forums, as well as inter-agency workshops in the coastal areas of the Eastern Region of Bintan Island, contribute to reducing potential conflicts over resource use. This finding supports the argument put forward by Prasetyo et al., (2023), that structured forums can ensure that local people's voices are heard in decision-making. This supports the creation of trust among different stakeholders and encourages closer collaboration.

Conditions were identified from several field observations regarding the involvement of stakeholders such as government actors, coastal communities, economic actors in the marine and marine tourism sectors, NGOs, and academics. The coastal communities of Bintan Island have a high economic dependence on the marine sector (dual-scale society-environment dilemma). Traditional fishermen of Bintan Island sometimes establish a symbiosis with toke (fisheries agents) where if they cannot go to sea (whether due to weather or other factors) they can make a loan (debt). The loan is a deposit from the toke to the fishermen where the fishermen will later deposit their catch. This symbiosis is a form of mutual interdependence, but at a certain critical point, it has the potential to become a dilemma. When the marine environmental crisis continues to decline, it is not impossible to trigger ignorant behavior by sharing restrictions in zoning provisions because they have to produce catches for these economic reasons. Therefore, intensive, comprehensive, and integral involvement of fishing communities as local communities, from policy formulation to conservation actions, is essential to mitigate this possibility.

Jozaei et al., (2022) in a study confirmed that integrating socio-eco-resilience elements in coastal governance decision-making can create more responsive and adaptive governance. Therefore, continuous and inclusive collaboration between all stakeholders is necessary to achieve sustainability goals in MPA management. Furthermore, Takeuchi et al., (2014) explains that restoring socio-eco harmony post-disaster can be done through interactions between stakeholders. This points to the importance of creating mechanisms for negotiation and conflict resolution, which are particularly valuable in the context of MPAs to avoid tensions between local economic activities and conservation goals.

The active involvement of communities in policy planning and implementation is necessary to maintain the legitimacy and effectiveness of actions (Khew et al., 2015). In this context, strategic measures are needed to provide equitable space for all stakeholders in the decision-making process in order to enhance socio-ecological resilience. The integration of socio-eco resilience with community education and extension programs is expected to strengthen local understanding of environmental and economic issues while promoting sustainable practices (Paolisso et al., 2019).

Theoretical Implications: Policy Networks as a Bridge between Resilience and Sustainability

Success in creating a resilient system depends on the system's ability to adapt and transform in the face of external pressures (Fastenrath et al., 2019). This perspective is echoed by Walker et al. (Monstadt & Schmidt, 2019), who argue that collaboration between actors can result in new "governance experiments" that overhaul old practices to address urban challenges. Interaction between Network Density and Actor Agency

MPA management in the eastern region of Bintan Island has sufficient potential to realize adaptive co-management with the presence of potential parties to move together. The composition of parties such as the Government (central and local), the Community (NGOs, environmental communities, and Fishermen's Groups), the private sector (especially fisheries and tourism industry players), and academic institutions (universities) reflects the elements of governance in MPA governance in the coastal area of Bintan Island. First, the state element consists of the central government (Ministry of Fisheries and Marine Affairs), the Riau Islands provincial government and related agencies, and the Bintan district government and related agencies. Second, civil society elements include coastal communities, fishermen (fishermen groups), communities that care about the environment, various student-based campus organizations, and even students and NGOs including the Ecology Foundation, Yayasan Konservasi Indonesia, Conservation International, and Seven Clean Seas. Third, private sector elements include tourism businesses in Bintan such as Cempedak Private Island, Nikoi Private Island, Treasure Bay Bintan, and the management of floating resorts (kelong). Fourth, the strategic role of higher education institutions that often make Bintan MPA a research study center, Raja Ali Haji Maritime University, Riau University, IPB, and several others (ecology.or.id).

Collaboration among stakeholders, including NGOs as brokers, plays a significant role in shaping innovative policies. Kang et al., (2023) noted that dense networks can increase the adoption of sustainability and climate change policies, suggesting that the presence of key actors in networks can facilitate information exchange and innovation. This is in line with Bodin's view that underlines the importance of integrating hierarchical structures with horizontal networks in creating more effective decision-making processes in the context of resilience and sustainability.

Challenges in Collaboration and Equal Access

The issue of equitable access in policy networks is an important challenge in achieving resilience and sustainability. The success of policy networks depends on the involvement of all stakeholders, including marginalized groups (Panter-Brick, 2023). Without attention to equitable access, there is a risk that policy decisions may be influenced by dominant voices, resulting in policies that do not reflect the needs of the wider community.

MPA Challenges In addition to the fisheries sector, marine tourism potential is also a mainstay in the coastal areas of Bintan Island. Tourism activities are a challenge in MPA management. Various stakeholders are involved in this sector. In utilizing this tourism potential, various tourism services are offered, such as fishing, and snorkelling, as a marine tourism attraction. Traditional businesses need to be accompanied by trained/educated personnel (certified) and equipped with conservation knowledge. Thus, the potential for damage to coral reefs and disturbance to conservation zones and objects in tourism activities can be avoided.

Professional tourism businesses that rely on the marine charm of Bintan Island as their core or supporting business, such as Lagoy tourist area, Cempedak Private Island, Nikoi Private Island, Treasure Bay Bintan, and floating resort (kelong) managers, pay attention and are actively involved in marine conservation efforts as part of the attractiveness they sell for their business. In addition to catering to tourists, these sector players often collaborate with various foundations (NGOs) and researchers for conservation and research activities. A critical view expressed by informants in the field is that, in addition to various equipment assistance programs, the government needs to continue, together with relevant stakeholders, to focus more on increasing the capacity of trained human resources with a wider scope. The synergy of various elements of the general public, fishermen, and professionals will greatly support the capacity building of conservation area management.

In this context, research by (Wilkin et al., (2019) confirms that social networks are a vital source of support in the face of shocks and crises, enabling better collaboration on policy continuity. When these networks are strong and inclusive, they can serve as mechanisms to disseminate knowledge and democratize decision-making processes. For policy networks to serve as an effective bridge between resilience and sustainability, several recommendations can be considered.
1). Strengthening the Dialogue Forum by establishing a formal dialogue forum to facilitate knowledge exchange between stakeholders.
2). Education and counselling to improve climate change and sustainability-related education among local communities, to encourage the adoption of policies based on rich local knowledge.
3). A Responsive Approach by implementing policies that are responsive and adaptive to community input to create a strong basis for formulating decisions that represent the interests of all stakeholders.

It can thus be seen that policy networks have the potential to act as a bridge between social-ecological resilience and sustainability. It is necessary for stakeholders to work collaboratively by considering the dynamic interactions within the network, as well as paying attention to aspects of equal access in the decision-making process. Only with this approach can the vision of creating resilient and sustainable communities be realized.

Coastal Resilience and the Evolution of Policy Networks

The context of the Bintan Island MPA shows that the resilience of coastal areas is highly dependent on the ability of policy networks to evolve in the face of socio-ecological dynamics. Sou, (2019), expressed the view that community participation in decision-making is key to implementing disaster mitigation and environmental protection policies. On the other hand, Djosetro & Behagel, (2020) through their research emphasized the importance of community leadership in protected area management, which shows that community support and active participation can provide a strong foundation to overcome the challenges of coastal resource use. Thus, policy networks need to be developed into adaptive and inclusive structures, so that they can be responsive to changing needs and challenges faced. However, without an inclusive redistribution of power, policy networks risk becoming a legitimizing tool for the status quo.

Attempts at inclusion in participation processes can create exclusion for disengaged groups, consequently leading to inequities in decision-making (Glimmerveen et al., 2022). Therefore, it is crucial to ensure that all voices are heard and that participatory mechanisms do not only favor certain parties. Furthermore, Mardhiah et al., (2023) point out that the integration of traditional knowledge in adaptive governance requires a balance between formal authority and local norms to achieve equitable sustainability. This suggests the importance of paying attention to power dynamics in decision-making and ensuring the presence of marginalized voices in the process.

In the context of the Bintan Island MPA, an adaptable policy network that engages all stakeholders, while considering equitable redistribution of power, will contribute to the sustainability of coastal resources and the quality of life of communities. Therefore, the transformation agenda towards inclusive and responsive governance should be a priority in coastal area management.

CONCLUSION

The size of the Marine Protected Area (MPA) in the coastal area of Bintan Island (138,561.14 hectares) emphasizes the importance of a strong policy network in MPA management. Although there have been various efforts to expand and regulate MPAs through regulations, the effectiveness of management is highly dependent on the strength of the policy networks that are built and implemented. This study provides in-depth insights into the role of policy networks in the governance of the Marine. PMPAs in East Bintan Island, highlighting the importance of multi-stakeholder collaboration in creating social-ecological resilience and sustainability.

Firstly, the resilience of coastal regions is strongly influenced by the ability of policy networks to adapt and evolve in the face of changing socio-ecological dynamics. Second, collaboration between governments, local communities, NGOs, and the private sector is fundamental to regional resilience. Through structured dialogue forums, stakeholders can share knowledge, reduce conflicts, and create synergies in resource management. However, significant challenges remain, particularly in terms of inclusive redistribution of power. Without equitable access to decision-making processes, policy networks risk becoming legitimizing tools for existing practices, hindering progress toward more equitable governance. The inclusion of all stakeholders, including marginalized groups, in every stage of policy formulation and

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implementation is imperative to ensure that their needs and aspirations are taken into account. Thus, the results of this study not only add to the understanding of MPA governance in East Bintan but also contribute to the literature on sustainable governance, as well as provide practical recommendations for decision-makers and practitioners in the field of coastal and marine resource management.

We are aware of some significant limitations, such as the restrictive geographical scope of the focus on the eastern marine protected areas of Bintan Island to potentially restrict the generalisability of the findings into other contexts. Additionally, the analytical processes used may not necessarily identify the complexity of relations in the policy network. Future research is recommended to study other areas that adopt a longitudinal analysis model and factor in the effects of macro factors, such as central government policies and global climate change, to gain further insights into the interaction between policy networks and local resilience. Additional studies are thus expected to provide more nuanced insights into the dynamics of stakeholder collaboration within the context of resilience and sustainability.

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