

Research Article

Blue Economy and Local Wisdom: Synergy of *Pecalang Segara* in the Indonesia Sustainable Oceans Program (ISOP) Implementation

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Abstract

This study aims to discuss Indonesia's role in optimizing the implementation of the blue economy through (Indonesia Sustainable Oceans Program) ISOP by focusing on synergy based on local wisdom. A literature review is accomplished to gather evidence of the genuine efforts that Indonesia has made through ISOP and the immediate involvement of Pecalang in conserving Bali's Ocean. The blue economy concept provides an opportunity to increase public understanding of the importance of keeping the sea sustainable. On the other hand, the government is expected to provide support through implementing policies for optimal management of the sea and surrounding resources. This role is essential because Indonesia is an archipelagic country that fully utilizes the sea as its primary resource. According to Ministry of Environment and Forestry of Indonesia, at least 14 million tons of plastic still end up in the Indonesian ocean every year, thus it needs a different approach to tackle this issue. A local wisdom-based approach can be a more effective and progressive conservation measure. The author uses a case study on Pecalang Segara as a local protective agent for Bali's marine conservation. Through a qualitative study with descriptive analysis, the authors conclude that the immediate involvement of Pecalang Segara as a local community in implementing ISOP can encourage the formation of a more effective guidance scheme in implementing sustainability from the blue economy concept.

Keywords: Blue Economy; Ocean; Pecalang Segara; Sustainable

Introduction

The United Nations (UN) stated in 2022 that as much as 40% of the world's population lives in coastal areas, and more than 3 billion people use the ocean as their main source of life (UN, 2022). Apart from that, the ocean is also a strategic route for 80% of global trade, which helps to increase trade networks and global

inclusiveness (WEF, 2023). The ocean is conceptualized as providing many benefits and support for alleviating poverty and strengthening people empowerment through food security. However, the oceans, which should play role in providing many benefits to humanity, are often threatened due to human actions that seek to exploit economic interests as the expense of the blue environment.

Pollution, the acidification and warming of sea water caused by chemical pollutants, and the collapse of fisheries are all consequences of the enormous use of marine resources. These types of activities have the potential to harm marine resources in an assortment of countries (Time Magazine, 2022). Indonesia relies on the marine economy as a country with a maritime identity, with three quarters of its area being sea, and as the second largest producer of the fisheries sector. Indonesia has a strategic interest in and role in sustaining maritime security because it is one of the primary sources of future economic sustainability in Indonesia (Kaczan & de Aquino, 2021). Without maritime stability, Indonesia will be unable to achieve inclusive growth, particularly through the blue economy sector.

The blue economy is an intriguing concept that has emerged as a suitable guide for society in harnessing marine resources. The World Bank defines the blue economy as a long-term activity that uses marine resources to increase economic growth, improve people's quality of life, and create jobs, all while safeguarding marine ecosystems (UN, 2023). This concept is obviously needed in Indonesia as a basic guide for policy on utilizing marine resources, which is one of their main sources of revenue. According to the Blue Economy Cooperative Research Centre (CRC), it is critical for many parties, both developed and developing countries, as well as other non-state actors, to recognize that the blue economy plays a critical role in achieving economic inclusiveness in relation to sustainable targets, or SDGs (Sustainable Development Goals) (CRC, 2022).

Governance in global oceanography has been carried out through numerous international governance initiatives known as the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF). However, this governance is limited to the action of the state actors in maintaining the oceanic sector known as the Coral Triangle. It is not regarded to be an extensive kind of partnership, Indonesia is positively collaborating with the World Bank in creating a working mechanism for Indonesia's Sustainable Oceans Program (ISOP) as a cooperation program to promote international commitments on ocean utilization in order to support international commitments regarding the blue economy. The ISOP policy exists especially within Indonesia's framework to improve knowledge, raise awareness, and promote coordination in order to inform policies and plans for sustainable ocean management in Indonesia, minimize waste from the oceans, and strengthen coastal resources. ISOP policy focuses on four main studies, namely supporting sustainable fisheries and coastal livelihoods, building healthy coastal ecosystems, reducing marine pollution, and strengthening policies and institutions in the blue economy concept by involving not only state actors but also epistemic communities, non-profit organizations, and donor agencies (World Bank, 2022).

As a result, this study will be focused on how Indonesia may use the ISOP cooperation framework as the main basis for supporting the successful implementation of the blue economy in Indonesia. Given that the sea is central to Indonesia's identity and prosperity, a significant focus on how the blue economy concept can become the primary guide for harnessing the blue economy is required. The authors employ the idea of Pecalang Segara (Guardian of the Ocean) in local Balinese culture as a unique viewpoint in seeing the blue economy concept broadly, which is consistent with the Indonesian ISOP policy, in focusing on the study of the blue economy through this research. Therefore, this article will try to answer the issue of to what extent Pecalang Segara has already implemented the ISOP policy.

Literature Review

Many studies on the blue economy have previously been published. These previous studies have attempted to highlight the importance of the idea of the blue economy in state policy in order to emphasize global commitment to the notion of sustainable development. In terms of economics, the concept of anthropocentrism, or humans at the centre of anything, has pushed human conduct to be free and independent in consuming natural resources to the greatest extent feasible without regard for environmental concerns. This circumstance eventually became one of the driving forces behind the development of the blue economy concept as the primary foundation for humans to wisely use marine resources. This is due to the fact that harm to the ecosystem will have a significant impact on other components, such as the global economic system.

Nasution (2022) attempts to underline in the study he presents that healthy oceans are Indonesia's major identity in creating its economy. Indonesia's identity as an archipelagic country dominated by the sea necessitates the Indonesian government's intelligent and sustainable use of marine resources. In this scenario, the authors attempt to investigate how Indonesia might benefit from the blue economy concept through the fishing sector. Indonesia is one of the world's leading fisheries producers. By promoting the concept of blue economy, the authors believe that government rules based on blue economy will aid in correctly defining the Indonesian fishing sector.

On the different view, Bari (2017) explores the prospects and obstacles associated with applying the blue economy in South Asian regions, including India and Bangladesh. Consistent with the findings of (Nasution, 2022), Bari's (Bari, 2017) research emphatically asserts that the principles of the blue economy are essential for South Asian countries to judiciously harness marine resources. The blue economy is crucial in influencing many countries' policies toward prudent use of marine resources, as inspired by international agreements. In this situation, the authors find that wise use, as defined by the blue economy, will actually support future increases in state income without losing marine resources for future generations. Countries like India and Bangladesh, for example, have excellent potential to use the blue economy scheme as the primary guide in developing maritime industrial strategies. However, the author does not explain properly the obstacles that India and Bangladesh confront in adopting the blue economy in their respective countries.

The following study is by Martinez-Vazquez et al. (2021) blue economy is a notion that has a strong connection to maritime resources, which play an essential role in driving the maritime economy. In their research, the authors depart from the problem's condition that the blue economy is a notion that has a strong connection to maritime resources, which play an essential role in driving the maritime economy. In their research, the authors associate the blue economy concept with the circular economy idea. Whereas the blue economy aims to foster economic growth, a better quality of life, and inclusion without jeopardizing the ocean's environmental sustainability. The authors believe that the concept of the blue economy is always related to the idea of a circular economy, which is about how to use issues for as long as possible. This concept eventually led to the author's view that the blue economy will help stimulate the attainment of sustainable development, which is driven by the blue economy concept.

In reference to several previously mentioned studies, the authors intend to concentrate on a specific study concerning the blue economy, but with a focus on aspects distinct from those explored in prior research. For instance, the study by Nasution, (2022) predominantly centers on the opportunities and challenges of applying the blue economy in Indonesia, yet it falls short of presenting a realistic portrayal of how the blue economy can be effectively implemented in the Indonesian context. Similarly, in the study by Bari (2017), the author does not clearly articulate the concepts and policies that could be employed through the blue economy framework in Indonesia. On the other hand, the subsequent study by (Martínez-Vázquez et al., 2021) is noteworthy for establishing a connection between the blue economy and the circular economy. This

connection serves as a foundation for proposing policies that state actors should adopt to promote sustainable development.

In addition to aiming to conduct a unique study, the authors also build on arguments from prior studies that the blue economy plays an important role in promoting the success of sustainable development. Because the governance of maritime activity and the blue economy is still heavily reliant on the top-down policy frameworks that have limited intersectionality with local values. As a result, the authors will concentrate on researching how Pecalang Segara, as a local wisdom, might collaborate in attempts to adopt ISOP policy in order to boost the blue economy. Pecalang Segara is defined as a 'Guardian of the Ocean' by the Balinese people, whose role it is to maintain the health and purity of the sea and is offered by the authors in their research as an alternative perspective in looking at the concept of the blue economy. Aside from that, the authors present the ISOP policy, which is the result of a partnership between Indonesia and the World Bank, as a national policy platform that is consistent with Indonesia's commitment to the blue economy. The authors eventually attempt to give a distinct study on how Pecalang Segara might become a notion that is in line with ISOP policy in supporting the development of the blue economy in Indonesia.

Methods

This study employs qualitative research methods of the descriptive-analytic form. To obtain primary and secondary data, the authors use methods for gathering information, such as library studies. The authors received primary data from the Ministry of Trade of the Republic of Indonesia, the Ministry of Maritime Affairs of the Republic of Indonesia, the World Bank, the United Nations, and the OECD. The authors acquired secondary data from second reference sources such as books, journals, online and offline news portals, and other scientific sources whose legitimacy can be verified. In this study, the authors combine primary and secondary data collection as an instance of data triangulation, or an attempt to assess the validity of the author's data. Following the data gathering process, the authors will subsequently conduct a descriptive analysis study elucidating the role of Pecalang Segara as a local wisdom in promoting ISOP policy in harmony with the principles of the blue economy.

Blue Economy

The term 'blue economy,' also known as 'marine economy.' Refers to economic activities that occur on or around the ocean or sea. The World Bank defines the blue economy as "the responsible use of marine assets for the betterment of the economy, lives, and the ecological health of marine ecosystems (World Bank, 2022). This concept encompasses various activities commonly associated with the blue economy, such as maritime shipping, fisheries and aquaculture, coastal tourism, renewable energy, water desalination, undersea cable installation, extractive industry and deep-sea mining, marine resources, and biotechnology. The global value of the blue economy is currently estimated to exceed \$1.5 trillion annually, providing over 30 million jobs and serving as a significant protein source for more than 3 billion people (LSE, 2023). Many experts argue that the blue economy's impact extends beyond that of the 'green economy,' representing a broader transformation with lower carbon emissions. The Organization for Economic Cooperation and Development (OECD) anticipates that the maritime economy will double to \$3 trillion by 2030 (OECD, 2016).

The blue economy is intricately linked to and promotes what is perceived as a circular economy (CE), grounded in the principles of sustainable development. For instance, sustainable development goals (SDGs) Target 14, under 'Life Under Water', seeks to sustainably conserve and utilize oceans, seas, and marine resources (UNDP, 2023). Marine governance and the blue economy pose significant complexities and can be challenging to implement, potentially leading to a fragmented approach to sharing marine resources among countries and hindering a comprehensive understanding of the blue economy's environmental impact. Consequently, the notion of the blue economy has evolved as an alternative to the prevailing linear economy, aligning well with

the principles advocated by the circular economy (Alexandru & Tasnadi, 2014). In this model, ensuring that materials and resources endure for as long as possible is the overarching aim of minimizing waste (Simpson, 2018).

Result and Analysis

What Does the Sustainable Oceans Program in Indonesia (ISOP) entail?

Indonesia is an archipelagic country surrounded by oceans, so it places great importance on preserving the sea and its surroundings as one of the main supports for the lives of its citizens. A series of actions from the government, coastal communities, NGOs and international cooperation were carried out towards marine sustainability in Indonesia. One of the international collaborations mentioned previously is ISOP (Indonesia Sustainable Oceans Program)—an ocean sustainability program between the Indonesian Government, in this case the Ministry of Maritime Affairs and Fisheries, and the World Bank. Indonesia has been carrying out cooperation in environmental preservation, especially marine affairs, with the support of various parties for a long time. In 2004-2011, the World Bank and the Asian Development Bank (ADB) provided assistance worth USD 57,38 million for the Coral Reef Rehabilitation and Management Program (COREMAP I and II) (World Bank, 2023b). This assistance shows the attention of Indonesia and other countries to the importance of preserving the environment, especially the sea. Currently the World Bank and the Indonesian Government together with NGOs are focusing on sustainable marine conservation through ISOP as one of the fulfill of SDGs 14, namely life under the sea. The 14th SDGs goal is about preserving and utilizing oceans, seas and marine resources in a sustainable manner for the future of human existence and life on earth.

The World Bank is continuing its quarter-century partnership with the government to improve the management of Indonesia's marine protected areas and priority fisheries, as well as to expand sustainable economic possibilities for coastal people (World Bank, 2023a). Indonesia's Sustainable Oceans Program (ISOP) is a continuation of sustainable marine conservation efforts. Indonesia's Sustainable Oceans Program (ISOP) seeks to enhance knowledge, raise awareness, and develop collaboration in order to inform policies and plans for managing Indonesia's oceans in sustainable manner, reducing marine waste, and strengthening coastal resources. ISOP estimates that 70% of Indonesians live in coastal areas and rely on the ocean for incomes and nourishment (more than half of dietary protein comes from seafood), but these communities are among the poorest in the country. Finally, Indonesia's ocean economy (the sum of all ocean-related activities) is worth approximately \$256 billion every year, accounting for more than one-quarter of the national economy—a precious resource in need of long-term management and research. Marine habitats provide considerable economic and social benefits. Coral reefs, for example, generate more than \$3 billion in tourism revenue each year, while habitats like mangroves and seagrass beds serve as fish nurseries, coastal protection, and other ecosystem services. Indonesia is the world's second-largest contributor of plastic waste—between 490 and 860 thousand tons of plastic leak into the sea each year, and this must be addressed urgently. ISOP collaborates with the Indonesian government, local communities, academia, NGOs, and donors to develop knowledge, build capacity, and finance on-ground investments in four areas: 1) support sustainable fisheries and coastal livelihoods; 2) build healthy coastal and marine ecosystems; 3) reduce marine pollution; and 4) strengthen policy and institutions (World Bank, 2022).

Through four main focuses, ISOP wants better infrastructure to reduce post-harvest losses (up to 30% of the total catch) and reduce waste, make Indonesia the second largest producer and fisheries industry in the world employing more than 7 million people, and improve yield management fisheries that could add \$US 3-5 billion to the fisheries sector's annual profits. ISOP was initiated through the Coral Reef Rehabilitation and Management Program Coral Triangle Initiative (COREMAP-CTI) activities from 2014 to 2022 as a continuation of the COREMAP I and II programs. COREMAP-CTI prioritizes investment in coral research, monitoring, and marine conservation. Coral reefs, particularly coastal ecosystems, require maintenance and, if not managed,

have the potential to destroy Indonesia's ocean economy. Another action from ISOP is Oceans for Prosperity or 'Laut untuk Kesejahteraan/LAUTRA.' World Bank grants \$210 million as trust fund—seek to enhance the sustainable management of selected marine protected areas and coral reef fisheries, dan improve access to economic opportunities for local communities in target areas. The project will support 20 selected marine protected areas (MPAs) and their adjacent communities throughout 11 provinces, improving management of select MPAs (encompassing 8.3 million hectares) and coral reef fisheries; improving the economic opportunities of local communities and women in sustainable fisheries, tourism, and aquaculture; and building government capacity to mobilize blue financing to address critical long-term financing gaps. The selected places are located in the eastern half of Indonesia, a region with the lowest economic welfare scores and the highest degree of marine biodiversity in Indonesia (World Bank, 2022).

The problem of rising sea temperatures is also a concern for ISOP. The need to maintain profitable and sustainable fisheries in the context of climate change is widely recognized. Indonesia's government is working to create a climate-resilient marine and coastal sector by investing in infrastructure, technology, capacity building, and governance. The Ministry of National Development Planning's (Bappenas) List of Priority Locations and Climate Resilient Actions, the upgraded Nationally Determined Contribution (NDC), and the Climate Resilient Development Policy 2020-2045 all details strategies and actions. Resilience to climate change is being addressed by the Ministry of Marine Affairs and Fisheries (MMAF) (World Bank, 2023a). In the World Bank report, climate change will greatly affect Indonesia's fisheries sector because it is estimated that marine species will experience a long-term decline of 20-30% if emissions remain high. Apart from the need for action to reduce emissions, Indonesia also needs to improve its fisheries governance in terms of fishing and storage because excessive fishing will affect the sustainability of Indonesia's seas.

ISOP is here to provide sustainable changes to Indonesia's maritime governance. This requires cooperation from all parties, including the state, donors, NGOs, and the community, especially coastal communities, to support sustainable marine programs. Pecalang Segara as a traditional coastal community can be a supporting team in protecting the sea and coral reefs from human activities that have the potential to cause damage to biodiversity in the ocean. Pecalang Segara will immediately become a direct supporter on the coast of the sea which ISOP also hopes will be a form of protection by the Indonesian people.

The Significance of Pecalang Segara in Balinese Traditional Wisdom

For the coastal communities of Bali, the sea and its contents are the primary source of livelihood. Based on data from the Bali Province Maritime and Fisheries Service, there are more than 25,000 fishermen in Bali. The average fisheries production is 133,858 tons per year, with the highest number of fish catches in Jembrana Regency. Apart from pursuing their profession as fishermen, many coastal communities in Bali also work in the marine tourism sector, for example, by becoming surfing guides, selling food, providing massage services, and renting tents. On the eastern coast of Bali, on average, many people are salt farmers. Balinese salt farming products have now become one of the leading export commodities (BPS RI, 2022).

The natural beauty and marine wealth of Bali are essential for most people in Bali. At least this is the basis for how to view Bali based on the three (3) main components of Bali, namely Balinese nature, Balinese manners/people, and Balinese culture. To maintain harmony between the three components, the Balinese people adhere to the *Tri Hita Karana philosophy*, namely three causes/paths to happiness or harmony. There are three (3) basic philosophies in *Tri Hita Karana*, namely *Parahyangan*, *Pawongan*, and *Pabelasan*. *Parahyangan* means a harmonious relationship between humans and God. *Pawongan* means harmonious relationships between humans. *Paringan* is the harmonious relationship between humans and the universe, so the *Pabelasan* philosophy in *Tri Hita Karana* is used as a guideline for the Balinese people. It can still maintain the sustainability and balance of nature.

However, reality shows that there has been an increase in the volume of rubbish found at several sea points in Bali. In 2022, a pile of plastic waste was discovered in the Bali Strait, most of which was plastic waste. The

Bali Strait plays a crucial role as a sea transportation route and food source for the surrounding community. Apart from that, piling up rubbish will undoubtedly reduce the function of the ocean, namely as a producer of oxygen and absorber of carbon emissions. The beauty of the Bali Sea in several areas which have become leading tourist attractions has become a frightening threat. In the end, tourists will be reluctant to travel to beaches with seas full of rubbish, even though beach tourism is the main focus of tourism in Bali.

Efforts to preserve the oceans are the duty of all parties. The cleanliness and beauty of the sea should be the contribution of all parties to ensure sustainable life, especially for coastal communities. All community and government activities, both in economic and social aspects, can, as far as possible, improve the welfare of society as a whole. According to (Sutamihardja, 2004) there are at least six efforts that can be made to achieve the goals and objectives of sustainable development, one of which is safeguarding or securing the preservation of natural resources and the existing environment and preventing ecosystem disturbances in order to ensure the quality of life, which remains suitable for future generations. To achieve this effort, collaboration between sectors is critical.

In Bali, the social system is regulated by customary agreements in an institution called Pakraman Village and Dinas Village. For the Balinese people, the existence of this institution is a forum for dividing community functions into traditional and official activities. For example, there is a group of people who have the task of being ceremonial leaders, implementing traditional activities and village security functions, which have become known as Pecalang. Pecalang is an organization in traditional communities that maintains village peace and security in traditional, religious, and daily activities. Pecalang is a traditional Balinese security task force that has the authority to maintain regional security and order both at the Banjar Pakraman level and the Pakraman Village area (Setiabudi et al., 2015). The existence of Pecalang in Bali has a clear legal basis, especially in Law No. 2 of 2002 concerning the Indonesian National Police and in the Bali Province Regional Regulation No. 3 of 2001 concerning Pakraman Village. So that it has the legality to carry out tasks related to security, this unique concept has been expanded further with the existence of Pecalang Segara in several coastal areas in North Bali, one of which is Pemuteran Beach which is in Buleleng Regency. Pecalang immediately has a particular task to protect the sea and coral reefs from human activities that have the potential to cause damage to biodiversity in the ocean. These Pecalang will take turns on guard every day. Going around on a fast boat is like going on sea patrol. Since then, local fishermen do not dare just to catch any fish because there are pecalang immediately (Kusumo, 2023). If there are people who commit violations intentionally, they will be subject to social sanctions given directly by Pakraman Village. However, Pecalang Segara is not just a guardian of the ocean. In a broader aspect, Pecalang Segara also carries out educational and empowerment functions. Pecalang Segara is also tasked with providing outreach to the community about the function of Pecalang Segara within the community. This becomes a recognition for society to determine legitimate social actions. The existence of Pecalang Segara also enables community empowerment activities to make everyone a pioneer in protecting the sea and the surrounding environment. In the end, the presence of Pecalang Segara can also regulate or control the behavior of community members so that they follow *awig-awig* or regulations that have been established regarding the balance of the marine ecosystem and its surroundings. To ensure that the rules that have been set are obeyed and implemented by the community, active participation is needed from every component of society, which is usually disseminated comprehensively in community social meetings at the village level.

Pemuteran Beach is an example of how the community has institutionalized Pecalang Segara with its function of protecting the marine ecosystem based on local wisdom. The role and function of Pecalang Segara are significant because it was formed, regulated, and run by local communities so that they have a comprehensive understanding of what is needed to maintain the ecosystem in the North Bali marine area. Pecalang Segara is an implementation of the Pabelasan concept in *Tri Hita Karana*. Seeing that much of the damage to the balance of the ocean cannot be done with ordinary steps, sometimes firmness is needed in legal aspects to take action against all types of potential activities that cause damage to the marine ecosystem. The presence of Pecalang Segara as guardian of the ocean embodies the *palemahan concept* in *Tri Hita Karana*. The existence

of the sea and its ecosystem for the Balinese people cannot be separated from the belief structure of its people. For the Balinese Hindu community, the sea is a sacred area that provides many human benefits. The Balinese Hindu community believes that the sea is the abode of the God Baruna as a manifestation of God who has the title of God of Water, ruler of the seas and oceans (Suarka et al., 2024). Spiritually, the sea is a place to hold various religious ceremonies as a form of gratitude for marine products that are useful for society. Balancing the functions of the sea and its ecosystem becomes essential for every component of society to carry out. The presence of Pecalang Segara then became an example of the implementation of the beliefs and philosophy of the Balinese people regarding the existence of the ocean. Society will finally understand the deep meaning of the ocean so that every human activity in the ocean can create an atmosphere of peace and harmony between humans and the universe so that human awareness of protecting the environment will increase and the state of nature will become balanced again as before.

The Collaborative Efforts of Pecalang Segara in Advancing the Blue Economy

The consequence of using nature for tourism and other economic activities is disrupting the balance of the ecosystem, resulting in ecological pollution. The Bali Sea is famous for its high tourism activities, such as tourism that combines sailing and boating activities with holiday activities. However, these activities often produce waste, ultimately disrupting the ocean ecosystem's balance and its surroundings. In this case, community behaviour is carried out primarily by traders, visitors, and communities around the coastal area. Thirty-three thousand tons of plastic waste flow down these waterways into rivers and the sea, polluting Bali's fragile marine ecosystem. A lot of plastic waste then gets stuck and covers coral reefs, so the photosynthesis process of these marine animals will be disrupted. Ultimately, the coral reef ecosystem in Bali's seas was damaged. However, damage to coral reefs is also often caused by the actions of irresponsible individuals due to fishing, anchor dumping, and sedimentation itself. In fact, in several coastal areas in Bali, for example, Tulamben, Nusa Penida, and Pemuteran, the beautiful coral reefs are desirable diving tourism destinations. If we pay attention to the functioning of coral reefs, it can be divided into three functions: sustainability, tourism, and economics. From its sustainability function, coral reefs can be used to breed various marine biota such as fish, shrimp, and shellfish. The latter biota can develop well in coral reefs because it provides a food supply so that these biota can easily be found in coral reefs that are in good condition and still beautiful. Referring to this, its economic function can be seen from the activities of fishermen who depend on fishing for their livelihoods, such as fishing and coral reef tourism.

The function of the ocean and economic activity cannot be separated, so good management is necessary to maintain ocean balance. So, to answer this challenge, a new concept was introduced called the blue economy. The term 'blue economy' refers to economic activity related to oceans and seas. According to the World Bank, the blue economy is the 'sustainable utilization of marine resources that advances economies, lives, and ocean ecosystem health.' Marine transportation, aquaculture and fisheries, tourism along the coast, clean energy, desalination of water, undersea wiring, seabed mineral extraction and deep ocean mineral extraction, marine genetic assets, and biotechnology are some of the activities usually associated with the blue economy (LSE, 2024). A blue economy is a low-carbon, efficient, and clean economy based on the principles of sharing, circularity, collaboration, solidarity, resiliency, opportunity, and interdependence (UNEP, 2015). This concept aligns with sustainable development goals, which offer an inclusive development concept but prioritize environmental aspects. The aim is for every community's economic activity to have a long-term impact so that the main actors in maintaining resources are humans. So, in the economic, social and environmental dimensions, sustainable development related to the ocean is a vital component of the blue economy concept, including the existence of Pecalang Segara as part of the ecosystem of the coastal communities of North Bali.

Indonesia itself has committed to supporting the development of the blue economy through the formation of the Blue Economy Development Framework for Indonesia's Economic Transformation. The Blue Economy Development Framework focuses on the following relevant sectors: capture fisheries and seafood processing; shipping and ports; marine manufacturing; offshore petroleum and natural gas (shallow water); marine

business activities and tourism; marine aquaculture; ocean renewable energy; deep water and ultra-deep water oil and gas; marine and seabed mining; marine biotechnology (Bappenas RI, 2021). This commitment framework is a step to promote sustainable management of marine resources and increase investment. Another aspect is also to build the capacity of local communities. This framework ultimately aligns intending to establish Pecalang Segara at the village level, namely to preserve the sea. Pecalang Segara is a social entity formed with local wisdom but with a great vision and mission. The presence of Pecalang Segara is coherently in line with the economic goals of the coastal communities of North Bali to develop the potential of existing waters in the economic sector (Wacika et al., 2022).

The Pecalang Segara play a crucial role in supporting the development of coral reef ecotourism and blue economy. As stewards of coastal and marine resources, their primary responsibility is to conduct regular sea patrols aimed at preventing illegal activities such as coral reef theft, over-exploitation, and destructive fishing practices, including fish bombing. These activities pose serious threats to the ecological integrity of coral reef ecosystems, which are foundational to sustainable ecotourism. By maintaining surveillance and enforcing customary marine regulations, the Pecalang Segara help ensure that these ecosystems remain intact and resilient. Their involvement reflects a locally grounded approach to marine conservation, combining traditional knowledge and community governance with contemporary environmental concerns. In regions such as North Bali—particularly in ecotourism hubs like Geger Beach and Pemuteran—the presence of Pecalang Segara has proven instrumental in safeguarding coral reefs and promoting responsible tourism (Wacika et al., 2022). Their contribution highlights the importance of integrating indigenous and community-based management systems in broader marine conservation and sustainable tourism strategies.

The synergy of the Pecalang Segara concept and the blue economy must be realized optimally so that in managing it. It is necessary to think about the welfare of the Pecalang Segara, how to maintain its sustainability, and how the central government can respond to this effort—first, the importance of Pecalang Segara cadre formation. So, education is essential to instil in the younger generation the importance of the figure of Pecalang Segara in the future. This is a form of a robust ecosystem approach actors aligned with blue economy principles to form a transformational response to marine and coastal activities. It is second, providing support from the central government for the Pecalang Segara initiative. A combined approach integrating stakeholders' interests to protect marine and coastal resources is essential for other stakeholders to carry out vital ecosystem development planning. The aim of collaboration between sectors and full support from the government is to ensure fairer and more inclusive access. Third, every component of society needs to know the concept of Pecalang Segara as a form of marine monitoring and surveillance effort that plays an essential role in measuring the availability of resource capacity in the ocean, such as fish and coral reefs. So, the monitoring function is one of Pecalang Segara's safeguarding obligations.

The development strategy and blue economy align with the sustainable development goals, SDGs 14. This is in line with the objectives of the national marine development policy stated in the 2005-2025 National Long-Term Development Plan (RPJPN) in the seventh mission, namely realizing Indonesia as an archipelagic country that is independent, advanced, strong, and based on national interests through sustainable marine economic development that is environmentally friendly (Nasution, 2022). So, strengthening the federal and local sectors is very important to maintain the basic foundations of Indonesian maritime affairs, including Bali. The existence of Pecalang Segara is the basic foundation initiated by the local community to support the achievement of the goals of the blue economy. The synergy of these three elements, namely ecological, economic, and social conditions, will also support measurable optimization of coastal tourism management to increase fishermen's income and the welfare of coastal communities, including an increase in regional revenue on the coast. Even though the obstacles or challenges currently faced in maintaining the existence of Pecalang Segara lie in the cadre formation pattern, at least understanding and a sense of belonging have been passed down from generation to generation through the social system at the local level.

Obstacles and Suggestions for Executing the ISOP Policy

Indonesia's Sustainable Ocean Program is taking an integrated approach to the blue economy through the equitable and sustainable use of coastal and marine resources (World Bank, 2023c).

As one of the world's largest archipelagic nations, Indonesia faces a complex set of marine and coastal management challenges. In this context, The Pecalang—a community-based marine protection unit rooted in Balinese traditional wisdom—can play a strategic role as local agents of change and enforcement in supporting the Indonesian Government to overcome the challenges. Below are the key challenges that hinder the successful implementation of ISOP, followed by suggestions and the relevance of Pecalang Segara in addressing them.

Pollution and Climate Change

Pollution has become an increasing threat to marine habitats and biota in recent decades. Plastics in particular are a big problem for coastal and marine environments. Indonesia is the second largest producer of plastic waste in the world after China. In many areas, there is little or no municipal waste management system, resulting in high levels of plastic pollutants entering the marine environment. These pollutants are often ingested by marine species (such as turtles, whales, and seabirds), causing disease and death. Additionally, when plastic is physically destroyed, the resulting microplastics enter the marine food chain and create ongoing challenges for the health of marine biota and humans as consumers of marine biota. Not only plastic and household waste, carbon emissions must also be reduced because they damage the world's climate, including sea water ecosystems (Issifu et al., 2022). Climate change will cause a decline in marine species and threaten land as a result of rising sea levels.

Over Exploitation of Fisheries and Marine Products

The increasingly high and excessive level of marine extraction without sustainability causes the depletion of marine resources. This raises concerns for future food security as the world population grows. Indonesia itself is increasing in population every year, which reflects the need for food from the sea will also increase (ENVPK, 2023). Great needs without marine conservation will threaten the future of Indonesian society. Fisheries governance must be immediately improved, especially in marine sustainability, such as improving coral reefs as fish homes, cleaning the oceans from rubbish, and changing consumption patterns to be wiser.

Limited and Traditional Equipment for Fisheries

Limited fishing equipment and the use of traditional methods have a significant impact, especially on the environment and sustainability of fish resources. Traditional fishing equipment tends to be less efficient and can damage marine habitats, increase the risk of unselective fishing, and potentially threaten the survival of some fish species (Salam, 2018). Limited traditional equipment can also have an impact on catches that are not optimal, thereby hampering the potential of fish resources that can be utilized. To overcome this problem, it is important to consider the introduction of modern technology in fishing equipment. Government and community support in procuring new equipment, as well as education and training for fishermen, can be an important step in achieving sustainability of fish resources. Apart from that, this can also improve the welfare of fishermen. Therefore, joint efforts to integrate modern technology into fishing practices can be a sustainable solution and have a positive impact on the environment and fishermen's lives.

Law Enforcement and Sustainable Ocean Policy

The central government is responsible for managing the coastal and marine environment through enacting relevant laws, policies and regulations and by implementing applicable management regimes and encouraging law enforcement. However, since the enactment of Law No. 23/2014, the responsibility for coastal

and marine management is no longer in the hands of the central government alone. However, for practical management purposes, provincial governments are expected to collaborate closely with and delegate some level of responsibility to district governments. This is important because considering the large geographic area covered by most provinces in Indonesia, the most effective level of government to support coastal and marine resource management is at the district and village level, where communities directly depend on and have an influence on the state of marine areas and their fisheries (California Environmental Associates, 2018). Supervision and law enforcement are also important, the ocean is very wide and it is very difficult to carry out supervision and enforcement. The large number of dangerous fishing violations will cause marine ecosystems to become increasingly damaged. If the oceans are damaged, it will be increasingly difficult for fish catchers to get fish, which will cause poverty to increase because fishing cannot provide results that can meet living needs.

Based on the challenges above, the Indonesian Government must do several things to overcome problems related to the four main focuses of ISOP. Regarding pollution and climate change, the Government can invest in and improve municipal waste management systems to reduce the amount of plastic entering the marine environment; Develop and enforce policies to reduce carbon emissions including encouraging renewable energy sources, regulating industrial emissions, and encouraging sustainable transportation practices; Increasing public awareness regarding the impact of pollution and climate change on marine ecosystems; and collaborate with other countries and international organizations to address global environmental problems by sharing best practices, participating in joint research initiatives, and adopting international standards for environmental conservation.

Implement and enforce sustainable fisheries management practices to prevent overfishing such as setting catch limits, protecting critical habitat, and encouraging responsible fishing techniques. The government can involve local communities in making decisions on fisheries management such as Pecalang Segara. Encourage community-based initiatives for marine conservation, such as the establishment of marine protected areas and sustainable fishing practices. The government needs to conduct research and monitoring programs to assess the health of marine ecosystems and the impact of fishing activities. Use scientific data to inform policy making and adjust management strategies. This research can be used for food diversification. And also encourage diversification of food sources to reduce dependence on marine products. This may involve supporting alternative protein sources and adopting agricultural practices that improve food security.

Increase the capacity of law enforcement agencies at local, provincial and national levels by providing training and resources. This includes equipping personnel with the skills and tools necessary for effective monitoring and enforcement. Community Empowerment is needed—empowering local communities to actively participate in enforcing marine conservation laws (Wijanarko, 2022). This can be achieved through community-based monitoring programs and partnerships between communities and law enforcement agencies. Pecalang Segara can immediately become a marine protection support team. The existence of Pecalang Segara can be community driven in protecting beaches and sea coasts from acts of destruction. The Regional Government needs to increase the capacity of Pecalang Segara as the front guard in protecting beaches and coral reefs at sea through training and providing guard equipment such as ships. Protecting the ocean, especially beaches and coral reefs, will have a positive impact on fishermen and coastal communities, namely the sustainability of their livelihoods in the future. The Pecalang Segara action in the sea north of Bali can initiate coastal communities throughout Indonesia to do the same for the sustainable future of Indonesia's oceans. Blue economy in terms of maritime economic growth which is expected to be created through community and community action such as that carried out by Pecalang immediately. Pecalang will immediately raise public awareness of the importance of protecting nature, especially the ocean, not only for seafood safety but also tourism will be protected in accordance with the goals of sustainable marine development. By Integrating traditional knowledge and modern sustainability principles, Pecalang Segara can be transformed into key enablers of ISOP—serving not only as protectors of marine resources but also as educators, mediators, and partners in sustainable development.

Effective coordination among the central government, provincial governments, and district governments is crucial for the successful implementation and enforcement of marine conservation policies (Nurhidayah, 2011). And then clarify roles and responsibilities to avoid gaps in management and law enforcement. This coordination ensures that policies are consistently applied, resources are allocated efficiently, and local contexts are taken into account. Monitoring and enforcing laws at sea is difficult, but the government can use technology, such as satellite monitoring and data analysis, to enhance surveillance and law enforcement capabilities across the vast marine environment. The government together with society and related communities have a shared responsibility to protect marine life. Awareness and cooperation regarding the importance of the ocean for the future is the main capital towards a sustainable ocean. Marine economic growth will increase along with ocean conservation. The Indonesian government can take significant steps so that the four main focuses of ISOP can be achieved, namely ocean sustainability for a better future.

Conclusion

The Indonesian government realizes that the sea is Indonesia's identity and source of prosperity. The Indonesian oceans can be economically utilized, both for tourism and fisheries, which generate large amounts of state income. Indonesia's oceans not only provide jobs and food but also support economic growth, regulate climate and provide oxygen—home to biodiversity that supports the prosperity of coastal and urban communities. Sustainable marine management is very important for the future of Indonesia and even the world. Protecting the ocean is not only the government's task but also the responsibility of the community, including coastal communities, fishermen and tourists who come. Pecalang Segara is immediately present as a traditional community that supports the preservation of oceans and coasts from acts of destruction. Pecalang Segara in the North Bali area plays a vital role, and this organization already has a clear structure that the local traditional village supports. This is a form of implementation of responsibility by all components in maintaining marine and coastal balance. Concerning the blue economy, this is a tangible manifestation of how community-driven the situation is and simultaneously becomes a solver of problems. Apart from that, in the context of implementing ISOP, the government can utilize funding from the World Bank and other institutions with the same goal of building a blue economy while trying to achieve the four main goals. The challenge of realizing sustainable oceans is indeed very complex, but these efforts must continue so that Indonesia's marine biota can be maintained.

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