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**Sustainable Tourism and Housing Development for Panggang Island, Seribu Islands Jakarta: Learning from Maldives' Sustainable Tourism Development**

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**Abstract**

*In 2016, Indonesia's tourism sector contributed 4 per cent of the Indonesian Gross Domestic Product (GDP). By 2019, the Indonesian Government wants to increase the tourism contribution to 8 per cent of GDP, requiring 20 million tourist visits. Ten "New Bali" destinations have been developed by President Jokowi, including the Seribu Islands Regency. Seribu Islands, located in Jakarta Capital Region, has various potentials and problems, such as economic disparity, rising seawater levels, declining fisheries production, limited water resources, and environmental pollution. Some Neighborhood Units (Rukun Warga) in the Seribu Islands are slums, including Panggang Island. Therefore, an Integrated Kampung Improvement (Muhammad Husni Thamrin Plus Program) was proposed. This study is prepared to identify potential concepts for spatial rezoning of Panggang Island, integrating sustainable tourism and housing neighbourhood redevelopment. The research problems are how can the community create a healthier and safer home, how can the sustainable 'tourist lodge' model in Panggang Island, and what concept of spatial rezoning of Panggang Island can be proposed. To understand the integration of tourism and residential development, we conducted Case Study Research (CSR) to learn from the Maldives Islands and implemented a qualitative approach of Strength, Weaknesses, Opportunities, and Threats (SWOT) analysis for Panggang Island. Based on the SWOT, we propose a rezoning concept for sustainable Panggang Island, integrating potential tourism zones, new fisher's housing zones, polder infrastructures, utilities, and green zones. Further, in the COVID-19 Era, an additional review on personal tourism was conducted to propose sustainable tourism activities on the Panggang Island while reducing the spread of COVID-19.*

**Keywords:** *Climate change, Panggang Island, Seribu Islands, sustainable tourism, Maldives Tourism, COVID-safe tourism.*

**Abstrak**

Pada 2016, sektor pariwisata Indonesia menyumbang 4 persen dari Produk Domestik Bruto (PDB) Indonesia. Pada tahun 2019 pemerintah Indonesia berkeinginan meningkatkan kontribusi sektor pariwisata menjadi 8 persen dari PDB dan membutuhkan kunjungan 20 juta wisatawan. Sepuluh destinasi "Bali Baru" telah dikembangkan Presiden Jokowi, termasuk Kabupaten Kepulauan Seribu. Kepulauan Seribu, yang terletak di Wilayah Ibu Kota Jakarta memiliki berbagai potensi dan permasalahan, seperti kesenjangan ekonomi, kenaikan muka air laut, produksi perikanan yang menurun, sumber daya air yang terbatas, dan pencemaran lingkungan. Beberapa Rukun Warga di Kepulauan Seribu tergolong kumuh, termasuk di Pulau Panggang. Oleh karena itu, diusulkan Perbaikan Kampung Terpadu (Program Muhammad Husni Thamrin Plus). Studi ini disusun untuk mengidentifikasi konsep-konsep potensial untuk rezonasi spasial Pulau Panggang, mengintegrasikan pariwisata berkelanjutan, dan pembangunan kembali lingkungan perumahannya. Rumusan masalah penelitian adalah bagaimana masyarakat dapat menciptakan rumah yang lebih sehat dan aman, bagaimana model 'pondok wisata' yang berkelanjutan di Pulau

Panggang, dan konsep penataan ruang Pulau Panggang yang dapat diusulkan. Untuk memahami integrasi pengembangan pariwisata dan perumahan, kami melakukan *Case Study Research (CSR)* untuk mempelajari dari Kepulauan Maladewa dan menerapkan pendekatan kualitatif berupa analisis *Strength, Weakness, Opportunities, and Threats (SWOT)* untuk Pulau Panggang. Berdasarkan SWOT, kami mengusulkan konsep *rezoning* untuk Pulau Panggang yang berkelanjutan, mengintegrasikan *zona* wisata potensial, *zona* perumahan nelayan baru, infrastruktur *polder*, utilitas, dan *zona* hijau. Selanjutnya, di Era COVID-19, kajian tambahan tentang wisata pribadi dilakukan untuk mengusulkan kegiatan pariwisata berkelanjutan di Pulau Panggang sekaligus mengurangi penyebaran COVID-19.

**Kata kunci:** Perubahan iklim, Pulau Panggang, Kepulauan Seribu, pariwisata berkelanjutan, Pariwisata Maladewa, *COVID-safe tourism*.

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## Introduction

In 2016, Indonesia's tourism sector contributed 4 per cent of the Indonesian Gross Domestic Product (GDP). By 2019, the Indonesian Government wants to achieve 8 per cent of GDP, requiring 20 million tourists. The Government is improving online promotional (marketing) campaigns abroad to achieve this target. There are 10 "New Bali" destinations, including the Seribu Islands regency in Jakarta (Kementerian Pariwisata dan Ekonomi Kreatif Indonesia, 2018; The Jakarta Post., 2017, April 18).

Seribu Islands is an administrative Regency in Jakarta Special Capital Region. Seribu Islands cover 105 coral islands with an 8.7 sq. km land area. The Regency is inhabited by 20,000 people, spread across eleven islands including Untung Jawa Island, Pari Island, Lancang Island, Tidung Besar Island, Tidung Kecil Island, Pramuka Island, Panggang Island, Harapan Island, Kelapa Island, and Sebira Island. There are several tourist destinations, such as Bidadari Island, Onrust Island, Kotok Besar Island, Puteri Island, Matahari Island, and Sepa Island. The Administrative District Seribu Islands are situated in the Seribu Islands Marine National Park (Taman Nasional Kepulauan Seribu/ TNKS). Meanwhile, the

Administrative Regency of the Seribu Islands has been allocated for maritime culture and tourism (Biro Pusat Statistik Kabupaten Administrasi Kepulauan Seribu, 2009).

On the other hand, there are problems faced by the Regency, such as the social disparity between Jakarta and the Seribu Islands, increasing climate-change-related disasters (bad weather, tides, the rise in sea level), the decline of the fishery (the primary economic activity); limited water resources, increased pollution and destruction of natural areas, and little residents welfare. The population density of the Seribu Islands could be categorized as high based on the current standard of settlement. Conversely, it was not supported by the housing and infrastructure availability. Therefore, 7 Slum Neighbourhood Units (RW) in Seribu Islands, including 6.30 hectares, are inhabited by 448 households or 2,292 persons. The Slum Neighbourhood Unit Assessment was based on ten parameters: population density, building layout arrangement, building construction, ventilation, building density, roads, and drainage conditions, water consumption, wastewater discharge, and inadequate waste management (Biro Pusat Statistik Provinsi DKI Jakarta, 2015).

Jakarta Provincial Government has proposed a concept Integrated

Kampung Improvement (Muhammad Husni Thamrin Plus Program) based on Peraturan Gubernur Provinsi Daerah Khusus Ibukota Jakarta Nomor 190 Tahun 2009 tentang Pelaksanaan Perbaikan Lingkungan Permukiman (MHT Plus) Di Kota Administrasi dan Kabupaten Kepulauan Seribu [*Jakarta Special Region Governor Regulation No 190 Year 2009, on the Implementation of Residential Neighbourhood Unit Improvement Program (MHT Plus) in Administrative Townships and Seribu Islands Administrative Regency*]. The approach of the program was the integrated replanning of the areas, including:

- Aspects of physical environment improvement
- Aspects of social empowerment
- Aspects of economic empowerment.

Panggang Island is an island with two medium-slum-level Neighbourhood Units (RW) because of the irregular housing layout and rapid population growth. Also, there were fewer healthy habits such as trash dumping on the beach, bathing, washing, and toileting directly into the sea without waste treatment. Most island houses did not meet healthy home standards due to a lack of ventilation and sunlight and inadequate building construction. On the other hand, the potential Tourism development created travelers' needs and spatial use changes on Panggang Island. Based on this fact, A SWOT analysis and spatial replanning concept of Panggang Island in the Muhammad Husni Thamrin Plus Program are proposed. For an accurate SWOT Analysis, case study research is conducted to evaluate the Maldives Islands because of similar maritime-based tourism and coral reefs island typology.

The research problem of the study is described as follows:

- How can the community create a healthier and safer home for the fishers?
- How can the community make a 'tourist lodging' model that Neighborhood Unit Association can manage on Panggang Island?
- What is the proposed spatial replanning/ rezoning to improve the quality of Panggang Island?

The purpose of the study is:

- To identify spatial rezoning of Panggang Island with the integration of sustainable tourism in the neighbourhood redevelopment concept.

## Literature Review

### Literature Review on Sustainable Island Development

The word "development" is often associated only with physical development. On the other hand, development goals comprise broader issues than the physical. Todaro & Smith (2003) prescribe the development goals, which are:

- To improve the provision and distribution of basic human needs such as health, shelter, food, and protection.
- To raise the living standard through better income, more working opportunities, well education, and attention to human values and culture, improves well-being and raises self-confidence individually and nationally.
- To broaden the choices of social-economic benefits for residents and nations by improving them to be independent of others and neighboring countries.

It can be concluded that the construction of the Seribu Islands should also involve the participation of citizens in decision-making, not just in the only physical development.

Economic – social – sustainable development is also in line with "The World Commission on Environment and Development: Our Common Future" report in 1987, which recommended the importance of Sustainable Development that does not satisfy the current requirements while jeopardizing outcomes' capacity to meet their own. Recognizing the limit of Natural Resources, the WCED report suggested that the development pay attention to the limitations (energy, materials, water, and soil). However, technology can reduce the negative impacts of development (The World Commission on Environment and Development (WCED), 1987). The dependency between the Natural System and Economic System is described by Economic Framework-based Natural Resources (Natural Resources Economy Framework) by Kneese, Ayres & D'Arge (1970). In this framework, the Natural System provides raw materials, accepts pollution, and provides a place for the economic system. Without considering the natural conditions, the development will lead to exhaustion of the resources or a disaster – natural disaster occurrence. On the other hand, these externalities will significantly affect the economic system. Because of that, an investment to improve environmental conditions is needed (Thampapillai & Ruth, 2019).

The theories show how strong the association between the Natural System and the Economic System is. In Panggang Island, it will be more visible because of the limited island

environment. It can be concluded that the assessment of potential and threats of the development (including social, economic, and environmental) is needed to solve this development. The dangers should be answered with the MHT Plus and other programs in the Seribu Islands. According to Whittaker and Fernández-Palacios in *Island Biogeography*, islands can be categorized as Oceanic Islands (Islands in the Sea) and Continentals Shelf Islands (Offshore Islands in the Continental Plate) (Whittaker & Fernández-Palacios, 2007). Furthermore, the Seribu Islands were connected to Java and Sumatra in the past.

Darwin stated that islands formed by coral reefs are located in the ocean with a sea depth of less than 100 m - 300 m (Darwin, 2020). The location is caused by coral reefs' temperature requirement of between 23 ° C and 29 ° C. Therefore, they are primarily located in the tropics and subtropics in the Indo-Pacific Ocean, the western Atlantic Ocean, and the Caribbean Sea. The islands can be described in three stages of formation. i.e., fringing reefs, barrier reefs, and atolls. Because of the global warming threatening the reefs, the islands will become threatened also.

Whittaker and Fernández-Palacios also warned about the threat of sea-level changes on the islands because of seawater volume change and melting of the ice cap (Whittaker & Fernández-Palacios, 2007). The water availability of the islands affects ecological conditions and activities - human activities (Menard, 1986). Some of the islands' volcanoes usually have clean water lakes. Besides that, groundwater reserves are stored in the porous rock layer. However, the main problem is

the Island's water resources - the Island is limited (Menard, 1986).

Moreover, the Island in the Indonesian region has varied biodiversity because of the spread of geological phenomena and fauna. The diversity of biodiversity on the unique islands was influenced by the Oriental and Australian zoogeographic regions (Carlquist et al., 1965). Therefore, those islands have to be conserved. To understand the tourism concept to be developed in the Seribu Islands, we need a comparative case study to understand the impact of the tourism development in the islands. Therefore, the Maldives are considered an excellent close case study.

#### **Literature Review on Tourism Development in the Maldives**

The Republic of the Maldives consists of 1.196 coral reefs spreading over 90.000 km<sup>2</sup> in the Indian Ocean, located 500 km southwest of India. The archipelago consists of 20 atolls administration groups. Of 196 inhabited islands, 89 were developed into tourist resorts, while the rest were developed for other economic purposes (Amira, 2009). The islands are relatively small (1 to 2 km<sup>2</sup>) and have low topography (1-1.8 m above sea level). There are no hills or rivers, but small lakes and swamps are available. Maldives has a humid tropical climate with temperatures between 23 ° and 31 ° C throughout the year (Amira, 2009). The increase in sea level is the biggest challenge in the country. It was noted that a 20 - cm - increase in seawater happened within the last ten years. It is estimated that sea-level rise in the Maldives will reach 60 cm in 2100. In 2008, the Maldives government expressed plans to purchase land and relocate in the future. The relocation fund will be collected from the

Tourism Sector profit. The Maldives is also planning an action plan to fight global warming by reducing carbon gas production (Amira, 2009).

Maldivian population reached 298.968 (in 2006), spread over 196 islands. There is a contrasting difference between the several islands' population densities. Male, 'the capital of Maldives, is resided by 1/3 of the total population. Meanwhile, three islands have a population of more than 5,000 people. Lastly, 142 islands with fewer than 1,000 residents and 76 islands with less than 500 people (Amira, 2009). So this led to a disparity in development between the islands and emerging of social conflicts (Amira, 2009). The concentrated population caused massive pressure on natural resources and economic resources. Male 'and the densely populated islands faced slum settlements, lack of clean water supply, groundwater pollution, and waste issues (United Nations Environment Programme (UNEP)., 2002). As a result, the Male and the Resorts were forced to rely on bottled water and water desalination for clean water supply. On the other hand, the more impoverished community in the islands utilized rainwater and groundwater collection (Ghina, 2003).

Because of the solid waste problem of Male' Island, an artificial solid waste dumping was created in Thilafalhu, a lagoon which is 7 km away, in 1990. Solid waste was sorted and transported using dump trucks and vessels from the Island. Cans and steel parts were sent to India. However, hazardous materials such as batteries and electronic waste were not separated and created pollution. The Maldives also suffered severe damage from the

tsunami in the Indian Ocean. Only nine islands survived the tidal attack., while 55 islands suffered severe infrastructure damage, 14 islands were abandoned, and six were destroyed. Twenty-one Resort Island was abandoned because of the devastation. Total loss reached U.S. \$ 470 million, or 62% of GDP, and 108 people died (Amira, 2009).

The development of Tourism in the Maldives began in 1972. The five development stages followed it. The first stage occurred from 1972 to 1978. The growth happened without planning, and 13 modest resorts were built with a capacity of 1,300 beds near the Male International Airport. At that time, the resort facilities were designed with simple conditions, supported by speed boat transportation. The tourism workforce was limited at that time.

The second phase occurred between 1979 and 1988. It started with the opening of 41 Resorts, supported by a network of charter planes with discounted tariffs. Most of the resorts increased their capacity and were supported by foreign investment (Ministry of Tourism and Civil Aviation/ MTCA., 2007a). The First Tourism Master Plan (FTMP) was prepared in 1983. FTMP was the basis of sustainable tourism development in the Maldives and emphasized the importance of environmental protection and integration of tourism in the Maldives National Economic Social Development. Resort development of the second stage had followed restrictions on buildable space and building height, according to the existing natural vegetation on the islands. They also had to be built considering coral reefs' environmental management and protection. Some resorts were required to provide quality

services and adequate facilities. Regulations also restricted Resorts' built-up area not to exceed 20% of the existing island area (Ministry of Tourism Arts & Culture Republic of Maldives, 2013).

The third stage of the Maldives' Tourism development occurred between 1989 and 1997. In that time, 16 new Resorts were constructed with 4,920 beds. The result was supported by the transport and technology development, also the best and most innovative quality service. The Faculty of Hospitality and Tourism Studies (FHTS) under the Maldives College of Higher Education played an essential role in the improvement of Tourism service quality. However, the shortage of skilled human resources happened, attracting foreign labor into the tourism industry (MTCA., 2007a). The fourth stage of the Maldives' Tourism development occurred between 1998 and 2001. The Second Tourism Master Plan (STMP) was prepared in that stage, causing decentralization of regional tourism Male and distributing welfare to the community in various atoll islands in the North and South (MTCA., 2007a). In the fourth stage, numerous Resorts with an international reputation invested in the Maldives with a variety of new services such as Spa. Resorts improved the service quality and provided a wider choice of accommodation ranging from resorts, hotels, guest houses, safari boats, and yachts (MTCA., 2007a).

The third stage occurred between 2002 and 2008. The development was governed by the Third Tourism Master Plan 2007 - 2011 (TTMP) in 2007. The Master Plan outlined the purpose of 'taking tourism to the people within the broader framework of sustainable development in the economic,

environmental, and social spectra." As supported by the Government's policy, the purpose is to restrict the recruitment of foreign workers to 50% at each resort. So in 2006, there were 11.095 foreign workers from 22.000 the labor force in the tourism sector. In 2006, it was recorded as 89 resorts leased by the Government, comprising 68 resorts owned by local companies, 14 lodges to a joint-venture, and seven foreign-invested resorts. Moreover, the total bed capacity reached 20.505. Every island resort must provide electricity, clean water, sewage treatment, and waste management [incinerators, compactors, and bottle crushers] (Ministry of Tourism Arts & Culture Republic of the Maldives, 2013).

On the other hand, environmental destruction was found in the Maldives because of those islands. Development exceeded the ecological carrying capacity. Therefore, a Guideline for the Islands Spatial Planning based on Environmental Carrying Capacity. Buildings are only allowed at 20% of the Islands to maintain island nature. Two-story buildings are only permitted if there is sufficient vegetation for cover. The buildings had to be setback within a five-meter buffer from the vegetation boundary. Bungalows on the water are only allowed to create the Resort's unique atmosphere. Each space built on the water or lagoon must be compensated by green on the land. Because of the beaches' charm of the Maldives, each room has a 5 m opening towards the beach, and 68% area of the Hotel is used for Guest rooms. The remaining 20% of the Islands must be used for public facilities such as jetties, reception, and restaurants (Brown et al., 1995).

Additionally, twelve percent should be planned for open spaces. Lastly, the Ministry of Tourism decides beaches' capacity depending on land availability, layout, and design of the Resort (Brown et al., 1995). Maldives' environmentally friendly developmental approach can be an excellent example for the Seribu Islands. Based on the literature review, a framework is proposed for the Tourism Planning of Panggang Island, Seribu Islands.

## Methods

Case Study Research is selected as the appropriate method for collecting potential data, such as documentation, archival records, and physical artifacts collection; interviews; recording and direct observation; participant observation. Three data types are collected from the Seribu Islands and the Maldives Islands such as documentation of previous studies and government reports, interviews with selected residents of the Panggang Islands, and direct observation (Yin, 2014).

SWOT Analysis (Strengths, Weaknesses, Opportunities, and Threats Analysis) Method is used to check whether the organization and its environment are following plans and find important issues for strategy development, identification of problems and solutions, and quantitative analysis of the situation when the data is incomplete and based on various experts' knowledge. Further, an Integrated Comprehensive - Ecological – based - Spatial Planning was needed. It could be described as: "The planning that considers the condition of biodiversity (ecological condition), the carrying capacity of the

environment (physical condition) as well as socio-economic conditions affecting the region. Later, other infrastructure such as water management, mass transportation, waste management and waste, energy conservation, and others must be integrated. So, it should include the participation of stakeholders in the spatial planning" (Tanuwidjaja, & Malone-Lee, 2009).

Because of the Panggang Island condition, a simplified evaluation was suggested, which included:

1. Case Study Research of Maldives Islands
2. Conducting an inventory and analysis of:
  - Previous studies on the Seribu Islands and Panggang Island,
  - Community Action Plan for Integrated Kampong Development Program in Panggang Island,
  - Minimum service standards (SPM) and other criteria set by national and international organizations related to environmental improvement programs,
3. Rapid assessments involving community representatives on the condition of the infrastructure in Panggang Island,
4. Holding Focus group discussions relating to assessment, involving all Governmental Stakeholders in Seribu Islands Regency and Community Representatives.

## Results and Discussion

### Analysis of Panggang Island

Panggang Island is part of the Panggang Village. The island topography varies between 1 and 1.5 m ASL. Furthermore, a five-km-long-

beach of Panggang Island consists of white sands, mangroves, and shipyards. The Panggang Island's Residents' livelihood comprised of three professions, i.e., Fishermen (76.97%), Private Sector employees (9.92%), and Civil Servants (8.5%). Additionally, there are 9% of small-and-medium-scale business persons. Panggang Island fishers sell the caught fishes in the Muara Angke or Muara Baru, in Jakarta. Then, some fish catches are sold to Island Residents. The sales results are directly spent on daily consumer goods and housing materials. Besides that, there is grouper and milkfish aquaculture with a cage system offshore of West Panggang Island.

One significant problem in Panggang Island is limited land supply and not supporting population growth. The little land further caused slum settlement, with little open space and narrow alleys. However, there are still greening elements in the area. Panggang Island had grown from 6 Ha to 9 Ha because of the unsustainable landfill process, causing dirty and shabby residential areas. The drainage system is not available and creates water inundations. Therefore, the drainage and infiltration design is needed. Clean water supply for residents of the Island is supplied from several sources, i.e., wells, rainwater collection, and RO (Reverse Osmosis).

Most of the Island residents do not have latrines and septic tanks. People still use communal toilets in sub-neighborhood units (RT) or at the seaside. The solid waste of the Panggang Island community reaches 396.3 cubic meters per day. Residents dump waste in front of the house and are later transported by sanitation workers to a temporary dumping site.

Additionally, waste also is used for illegal reclamation. MHT Plus program has been implemented on Panggang Island since 2010. It benefitted Panggang Island's community, such as the construction and repair of footpaths, the construction of communal septic tanks, and sewer improvements. However, the MHT Plus program has not been implemented integratively with Panggang Island development. Therefore, a SWOT analysis is needed for the integrated development of Panggang Island.

It can be concluded that the anglers' homes need repairs and integration with the development of Panggang Island. Due to complex problems in the Panggang Island and the Seribu Islands, a SWOT analysis was conducted, producing Table 1 and further recommendations in Table 2.

**Table 1. SWOT for the Seribu Islands**

| <b>Strengths</b>   |
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| <ul style="list-style-type: none"> <li>• Shallow waters around the Island support aquaculture activity.</li> <li>• Accessibility is quite good with piers and the alleys.</li> <li>• Population is dominated by approximately 40% productive age (15-40 years)</li> <li>• High self-help spirit of residents</li> <li>• Community Organisations for Integrated Kampung Improvement have been formed</li> <li>• Availability of commercial facilities</li> <li>• The educational facilities were provided, including the primary education, intermediate education, and libraries</li> <li>• The presence of Worship places, health, and sports facilities</li> <li>• Existing Cooperative for cages fishers and financial services for economic empowerment is the presence</li> </ul> |
| <b>Weaknesses</b>  |
| <ul style="list-style-type: none"> <li>• Activity aquaculture and capture fisheries are poorly developed</li> <li>• The area of each Island is small and with a low carrying capacity</li> <li>• Flat topography with a height of 1-2 m above sea level and are vulnerable to sea-level rise</li> </ul>  |

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- Limitations of water resource
  - In the west season (December to March), sea currents are strong, and high waves and strong winds are present
  - Regional fisheries have experienced overfishing
  - The community (approximately 60% of fishermen) is below the line of well-being and lacks business capital
  - Consumerism makes saving habits challenging to do
  - The population growth of 3% per year
  - Frequency and capacity of services of sea transportation to DKI Jakarta are still low
  - Limited resources Human Resources (60% of people are below Primary School)
  - Low people's awareness of the environmental protection
  - Dense and slum settlement (40% of the total area of the Panggang Island or 2292 people living in slum housing)
  - Absence of Polder System which may reduce flooding, tidal, and tsunami threat
  - Limited electricity, telephone, garbage disposal, drainage, toilets, and wastewater treatments
  - Damage to coral reefs reached 50%
  - Seribu Island was an endemic area of malaria

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**Opportunities**

- The existence of a high - economic - value for biological resources for aquaculture activities such as seaweed, shellfish, demersal fish, and crab
- Program MHT Plus and Other Program Development Multi-Years
- Rehabilitation for Settlements and Ecosystem
- Slum Neighbourhood Unit Improvement Program
- Healthy Friday Movement
- Community Services Improvement
- Special Areas / Featured Area Redevelopment
- Potential investors in the Sea-Farming and Tourism field
- CSR programs of Private Parties in Jakarta or operating ones in Seribu Islands

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**Threats**

- Conflicts of Jurisdiction due to Statement of the Seribu Islands region as a National Park area
  - The decline of foreign tourists and local visits to Seribu Islands
  - Climate change causes sea level rising and extreme weather threatening Seribu Islands
-

- Annual demand for housing as many as 13 units annually (assuming a population growth of 3% per year)
- Reverse Osmosis Supply made by PU was inadequate and too expensive
- Waste from mainland Jakarta, land-based residential, Resort Islands in Seribu Islands
- Liquid waste from Jakarta Bay and oil waste from Seribu Islands reduced the seawater quality

Source: Author's analysis

- Action Plan that has not materialized
- Simple Financial Management Training for Community and Economic Cooperative Association Management
- Environmental Education on the importance for the People
- Procurement Infrastructure Water, Electricity, Telephone, Solid Waste, Drainage, Bathing Washing and Toilets (MCK), and Waste Water Treatment Plan (WWTP)

Source: Author's analysis

**Table 2. Strategies based on SWOT Analysis for the Seribu Islands**

**Strategy S-T (Facing Threats)**

- Evaluate the feasibility of Sea-Farming affected by severe solid and liquid waste pollution
- Develop a more explicit Main Organisation Task (TUPOKSI) Seribu Islands National Marine Park (TNKS) management and Seribu Islands Regency
- Promotion of Tourism together with the Provincial Government of Jakarta
- Cooperation in Solid and Liquid Waste Management from the mainland with Jakarta Provincial Government

**Strategy S-O (Strength Exploitation)**

- Evaluation of Regional Spatial Planning based on Sustainable Ecotourism
- Investment and Planning for Integrated Sea-Farming
- Investment and Planning for Integrated Tourism (Eco-tourism) involving the Seribu Islands' local workforce
- Integrated Islands Redevelopment (starting with MHT Plus)
- Skills Training for Sea-Farming and Ecotourism
- Establishment of Fishermen Group for Ships or Cages Credit
- Develop a clearer Main Organisation Task (TUPOKSI) for MHT Plus Program

**Strategy W-T (Avoiding Threats)**

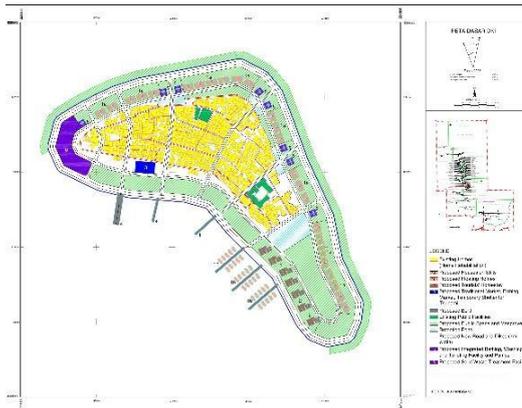
- Design for the Settlements on Stilts for inhabited Islands
- Relocation of residents to the mainland or potentially habitable other islands
- Law Enforcement
- Prevention of hazards (fire, tidal, etc.)

**Strategy W-O (Looking Weakness)**

- Cooperation with the Private Party (with CSR program) to answer a Community

Responding to COVID-19, we also propose local digital tourism in line with Zulli (2018) with the utilization of Instagram to increase the local economy. Farazis (2019) explores the digital application for raising cultural heritage awareness in digital interaction. These recommendations align with the 2020 - 2024 Ministry of Tourism and Creative Economy Strategic Plan (Kementerian Pariwisata dan Ekonomi Kreatif, 2020).

Additional suggestions from Sharma et al. (2021) for limited tourism activities with selected tourists can be utilized. This recommendation aligns with Koščak and O'Rourke (2021) regarding ethical and responsible tourism. The Indonesian Ministry of Tourism and Creative Economics has released the strategies for adaptation, innovation, and collaboration to recover the Indonesian tourism sector, which covers Cleanliness, Health, Safety, and Environment Sustainability (Sekretariat Kabinet Republik Indonesia, 2020).



**Figure 1. Proposed Replanning of Panggang Island following the SWOT Analysis**  
Source: Tanuwidjaja, Mustakim, 2022



**Figure 2. Proposed Fishers' Houses**  
Source: Tanuwidjaja, Mustakim, 2022



**Figure 3. Proposed Tourists Lodges**  
Source: Tanuwidjaja, Mustakim, 2022

## Conclusion

The Seribu Islands have a disparity problem with Jakarta mainland and are severely affected by climate change. Therefore, the Muhammad Husni Thamrin Plus Program concept is needed for an integrated solution for Panggang Island. On the other hand, the high potential of tourism demand

drives the need for an integrated spatial replanning concept of Panggang Island. Based on the Maldives Islands' tourism development, SWOT Analysis Method is conducted for more sustainable tourism development on the Island. Therefore, a rezoning is proposed to integrate the sustainable tourists' lodging and other structure and infrastructure improvement.

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