

Ecoport Structures And Ecosystem Services For Japan And Indonesia In Highly Urbanized Bays

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Abstract.

The study in this research is useful to evaluate some of the problems found in an international or national port, especially between ports in Japan and Indonesia using sustainable methods, such as in the case of the Japanese region where the ecosystem services provided by green port structures in Japanese bays are very influential on urbanization changes, especially in Osaka Bay so that the focus of this research is to compare the ecosystem services provided by structures in Ecoports in Osaka Bay, Japan, with those in Cigading Bay, Indonesia. Through a literature review, relevant secondary data was collected, screened, and analyzed so that the results showed key differences between Japan and Indonesia in the context of sustainable ecoport development, including differences in biodiversity policies and corporate management approaches. So that in the future various challenges in achieving a sustainable port between the two countries can be achieved, such as waste management which requires long-term prioritization in Indonesia or an ecosystem approach as in Japan. Indeed, community involvement is also considered important in the development of Ecoports to achieve sustainability, which could also be a development in further research so that a balanced approach is needed that integrates sustainable development in the environmental, social and economic dimensions to achieve successful Ecoport development.

Keywords : Ecoport, Ecosystem Services, Japan, Indonesia, Sustainability

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I. Introduction

Geographically, Japan consists of islands stretching from north to south with a limited land area so that the sea for the Japanese region plays an important role in history, economy, and culture because almost 70% of Japan's territory is covered by the sea [1]. So that sea transportation becomes one of the most important transportation networks for the shipping industry, fishing, coastal tourism, and mining of marine resources is also the backbone of this country's economy [2]. Not only Japan as an archipelagic country, Indonesia is also called the largest Maritime Country, so That Indonesia has a vast sea area and a long coastline, no wonder for the maritime and marine sector to be very strategic for Indonesia for various reasons including economic, environmental, socio-cultural, legal, and security [3]. Nonetheless, compared to the land sector, this sector still receives limited attention.

Greenport or green port is a concept that has developed in recent years to encourage ports to become more environmentally sound and sustainable [4] Ports play an important role in the supply chain supporting the economy globally but undeniably have a significant negative impact on the environment such as greenhouse gas emissions, air and water pollution, and waste [5] Several studies have reviewed the strategies and policies of *Greenport* implementation in various countries and identified critical success factors [6] However, faced with challenges in *Greenport* implementation, there are still some obstacles, especially related to costs, technology, and human resource capacity [7]. In line with that, further research is needed in developing a practical and sustainable *Greenport* framework, as in other *Greenport* implementation concepts derived from *Partnerships in Environmental Management for the Seas of East Asia* (PEMSEA), where in its development PEMSEA has made a reference related to port safety, health and port environment or better known as the *Port Safety, Health and Environmental Management (PSHEM) code* [19]. The *PSHEM Code* is addressed to port authorities and companies as guidelines in running port businesses which are non-binding / voluntary. The *PSHEM Code* sets out the requirements for an effective management system for port safety, health and environment so as to enable an organization to develop and implement policies and objectives that take into account legal aspects and information about hazards associated with various port activities which have a significant risk or impact on safety, health and the environment [8].

The port itself is a place centered on marine economic activity, so that its existence is able to facilitate the flow of loading and unloading of goods and passenger services with a level of comfort, safety and competitive costs [9] The study in this comparative research evaluates several problems found in an international and national port, such as the problems that exist in the case of Japan where ecosystem services provided by green port

structures in highly urbanized Japanese bays, especially in Osaka Bay. For Japan, the area around the port, which was once treated as an industrial area with limited public access, has actually been transformed through land use change into a high-value urban area that provides extensive public access to the sea [10].

II. Methodology

The method used is using literature studies. Literature searches are carried out to obtain secondary data related to research topics [11]. Some of the sources used for literature studies include books, scientific journals, articles, theses, theses, and other relevant sources related to research topics [12]. Researchers conducted secondary data searches related to research topics through various sources available online such as online scientific databases, digital libraries, libraries, and other sources [13]. After the data is collected, the researcher selects and reviews the data obtained to be processed and analyzed in accordance with the topic under study [14]. The following data is an overview of the research map conducted between the differences in Japan and Indonesia.



Source : Internet 2024
Fig 2.1. Location Map of Japan

Some descriptions of Osaka Bay contained in secondary data include the following Osaka Bay is located in the southwestern part of Honshu Island, Japan. Osaka Bay consists of Osaka Bay and Ise Bay. Osaka Bay has experienced severe environmental degradation since the 1960s-1970s due to industrial and urban growth in the vicinity [15] The main pollution in Osaka Bay is domestic and industrial wastewater, as well as sediments containing heavy metals and chlorinated organic compounds. These conditions have adverse effects on the marine ecosystem, such as reduced biodiversity [16].

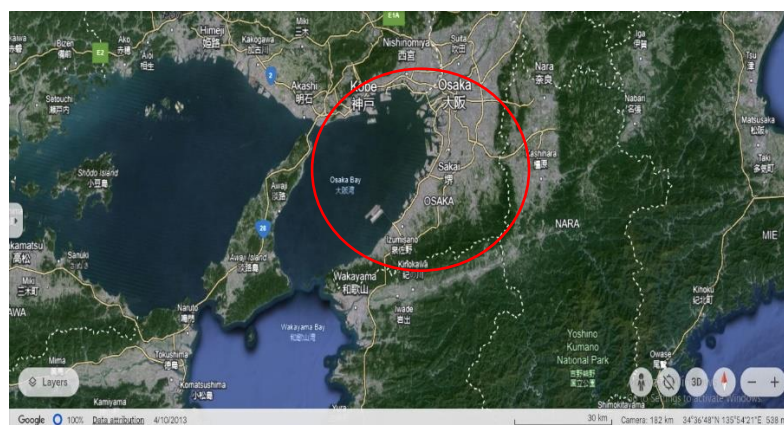


Fig 2.2. Osaka Bay Location Map

As for comparative research using existing data in cases found in Indonesia, from data for comparison using secondary data where the map shows an overview of the conditions at Cigading Port in Indonesia, where Cigading Bay is included in the Banten region.

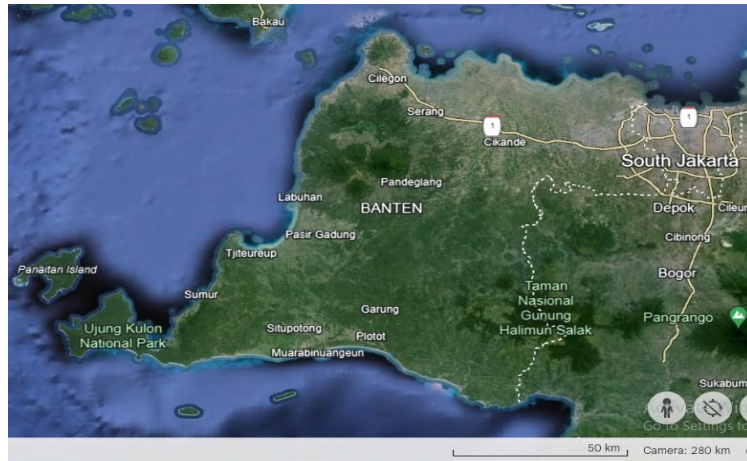


Fig 2.3. Ciding Bay, Banten

Cigading Port is one of the largest bulk ports in Indonesia managed by PT Krakatau Bandar Samudera. Initially Cigading Port only served cargo belonging to PT Krakatau Steel. Cigading Port has the advantage of depth (-20 m LWS), a supporting logistics network, as well as the length of the dock and port facilities [17] Cigading Port located in Cilegon, Banten has a strategic position because it is close to the ALKI 1 International Shipping lane. In addition, Cigading Port has a hinterland in the form of industrial and residential areas in Banten and West Java [18].

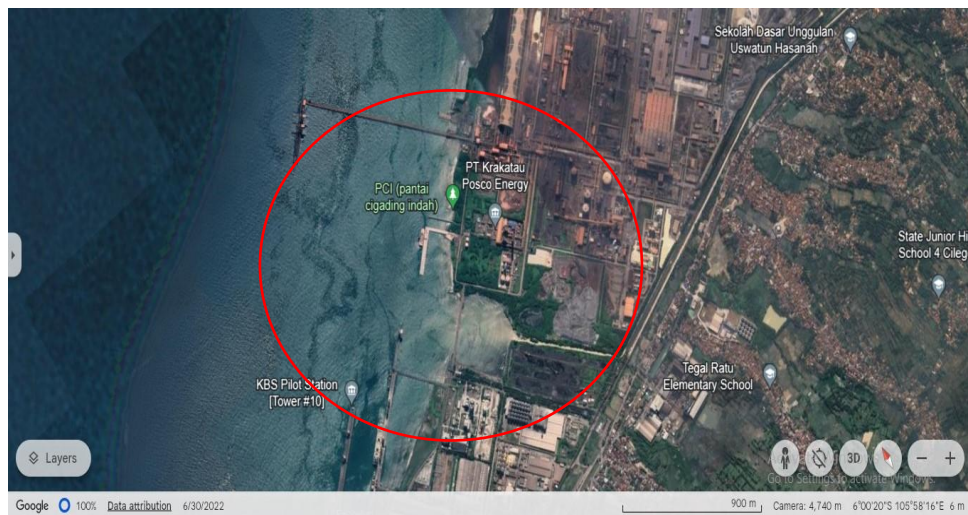


Fig 2.4. Cigading Port, Banten

This literature study method is intended to obtain an overview of previous knowledge related to the research topic where in this study two comparison journals are used between the *Greenport* problems found in Japan and a problem that occurs in Indonesia in the application of the *Greenport* itself to select the study site in this case, defined and assessed ecosystem services found in Japan are very thoughtful especially for living things in the port environment, to collect and analyze data clearly explained and scientifically plausible by using natural areas as benchmarks will increase the validity of the comparison. This study highlights the importance of habitat conservation, restoration, and creation in harbor areas to improve ecosystem services.

This study provides information on various environmental improvement projects in Osaka Bay, as well as research on ecosystem restoration, habitat preservation, and coastal engineering. The research in Osaka Bay also discusses ecosystem service assessment, blue carbon emissions, and coral reef restoration so that for future purposes there is development in the management part of the project to restore coastal ecosystems within Osaka Bay. The Osaka Bay study emphasizes the need to evaluate management strategies to optimize coral reef ecosystem services and includes references to relevant studies and guidelines.

III. Discussion And Results

This study compared the ecosystem services provided by green harbor structures with those provided by natural tidal marshes. The results show that while green harbor structures in bays in Japan, especially in this study in Osaka Bay, are highly affected by urbanization, which has the potential to provide a variety of ecosystem services such as conducting human-related activities directly so that with regard to the environment around the bay, appropriate management objectives are needed to maintain their value.

Overall quality The article is well written and comprehensively evaluates the ecosystem services provided by different types of eco-port structures and natural tidal flats in two highly urbanized bays in Japan. In terms of relevance, this topic is highly relevant because green infrastructure projects in harbors are an important area of coastal area management, and assessing the ecosystem service benefits of such projects is essential for effective planning and management. In Japan, the area around the harbor, which used to be treated as an industrial area with limited public access, has now been transformed by various land use changes into a valuable urban area that provides broad access to the public [19].

The identification of sustainability issues from requires attention where its implications by discussing trade-offs and management strategies can improve project design and maintain the long-term value of services so that it can be explained in this coastal environmental conservation and future improvement projects with increasing awareness of the decline of ecosystem services and the need for it to be corrected is the existing management has led to a shift in the management system so that an ecosystem-based approach to coastal and marine management and conservation is needed [20] while for Innovation in this current study applies the ecosystem services framework in an in-depth evaluation of the green port structure, thus further adding to the application of this concept. Overall, this research article presents a valuable case study application and offers practical, science-based guidance for coastal managers and engineers involved in green harbor development projects.

In the case study found in Japan, precisely in Osaka Bay, the emphasis is also on things that are incidental to facilities, educational programs are also important things that must be displayed at the research site for the benefit of future research development, as well as to improve the educational environment [21]. Although there are data limitations, further criticism of assumptions or alternative viewpoints can strengthen the analysis in this research.

Based on the previous research, several important points were obtained about the positive and negative aspects of green port structures in Osaka Bay in Japan with a high level of urbanization problems, a positive view of the discussion located in Osaka Bay, Japan where this research provides deep insight into the ecosystem services provided by green port structures in Osaka Bay in highly urbanized Japan so that it provides deep insight into the ecosystem services provided by green port structures in Osaka Bay, Japan in the future.

This research also highlights several aspects including the importance of habitat conservation, restoration, and creation in harbor areas to improve ecosystem services while for the references provided in the journal cover a wide range of topics related to coastal engineering, ecosystem services, blue carbon, and environmental management in Port/Coastal areas, while in this research highlights although species conservation may initially be lower, eco-port structures provide habitats that have the potential to restore diversity around the harbor.

For the discussion in terms of criticism in this study, it was found that the trade-offs between conservation and human use must be carefully balanced in less restrictive eco-port structures to maintain biodiversity and accessibility for sustainability scores, which include trends that may weaken services in the future if problems such as erosion, habitat quality, and pollution are not addressed, while highly urbanized ports experience strong pressures that may hinder the recovery and maintenance of ecosystem functions in eco-port structures. Problems with data availability in the future may affect the assessment of certain services such as research, requiring alternative evaluation approaches. Overall, this journal makes a valuable contribution to the understanding of the importance of green port structures and ecosystem services in highly urbanized environments, although some technical aspects and data may require further attention.

The existence of concrete suggestions such as the preparation of *Greenport* standards and feasibility studies for container terminal development can be a guide for other ports in adopting the *Greenport* concept. However, not only in terms of positive aspects, there are several negative aspects contained in this research where there is no clear mention of how the results of the analysis can be implemented practically in the field. As for the discussion of potential obstacles or challenges that may be faced in developing Greenport at Cigading Port, it is not explained and there is no mention of whether there is involvement of related parties, such as local communities or local governments, in the Greenport development process.

Related to this research is focused on one bay taken in the Japanese region where Osaka Bay [23] has similarities with the Cigading Bay area in Banten Province [24] among the similarities as follows, the average depth of Osaka Bay in Japan is about 30 meters, while the average depth of Cigading Bay is about 25-30 meters. Both are relatively shallow. The area of Osaka Bay waters with a depth of less than 10 meters is 140 km². While the shallow water area of Cigading Bay reaches 130-150 km² [25]. The maximum depth of Osaka Bay is 45 meters, while the maximum depth of Cigading Bay is 40-45 meters. So the maximum depth range is relatively the same [26], most of the waters in Osaka Bay and in Cigading Bay have a depth of less than 20 meters, which is about 60-70% of their total area. Seabed formations in Osaka Bay and Cigading Bay are dominated by sediments in the form of sand and mud, with some rocky areas, for depths with shallowness of both bays allow for marine biological activities rich in marine resources, such as aquaculture and marine tourism.

There are some key differences to be expected between the green port structures discussed in this Japanese case study for the main case of green ports in Indonesia, as well as Osaka Bay in Japan. Osaka Bay itself is an area known for its high urbanization and development on the vast coastal area stretched out for port activities as well as the community, with its dense population conditions, reaching millions of people, making the ports in the vicinity a busy center of activity so that the region also faces serious challenges related to environmental issues where eutrophication and poor water quality issues are a major concern because the impact of abundant industrial and domestic wastewater is serious in the treatment approach for sustainability.

The conditions in nature as well as the region of Indonesia may be different. Although large ports also exist, the level of urbanization is likely to be lower compared to Osaka Bay. The population distribution around these ports will also be different as Indonesia faces unique environmental challenges, one of which is the lack of effective waste management, making this a long-term priority that needs to be seriously addressed. Another difference lies in the port management approach as in Japan, habitat conservation and restoration programs and building codes have been implemented. They also have strict documents and requirements in terms of the environment while in Indonesia the port management strategy is still in the development stage and has not yet reached a clear goal.

In the research conducted in Japan, ecosystem services were evaluated with a focus on environmental aspects. However, in Indonesia, the research emphasized long-term and medium-term financial strategies, and the importance of improving the financial performance of companies through environmental policies and regulations. In terms of culture and history, Indonesia has rich and unique values. Research in Indonesia might consider this aspect more, as well as the social values associated with ports. Education and culture are key in introducing the importance of environmental improvement to society.

Thus, although there are some differences between Osaka Bay in Japan and ports in Indonesia, in terms of urbanization, environmental conditions, population, management approaches, and research conducted, both have challenges and potentials that need to be considered to achieve sustainable port management and have a positive impact on the environment and surrounding communities. There are differences in regulations between Indonesia and Japan regarding green port development. In Japan, regulations focus more on biodiversity policies and habitat conservation around ports. In Indonesia, regulations may focus more on the operational, financial and environmental aspects of green port development. This difference reflects the different contexts and priorities in green port development between the two countries.

As for Indonesia, the management of the greenport itself is regulated in Law Number 17 of 2008 concerning Shipping: This regulation regulates the port as a place of government and business activities, including port management that takes into account safety, health and the environment. While for Indonesian Government Regulation Number 69 of 2009 concerning Ports there are Regulations which provide definitions and regulations regarding ports, including requirements for shipping safety and security facilities and port support activities and among the regulations in Indonesia based on the Port Safety, Health and Environmental Management (PSHEM) Code This regulation was developed by the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) and provides guidelines for port authorities and companies in running port businesses with regard to safety, health and the environment.

As for Japanese regulations related to the greenport itself, it is listed in the Environmental Impact Assessment (EIA) Law: This regulation requires the implementation of an environmental impact assessment before construction or changes to port structures are carried out in this assessment covering aspects of ecology, biodiversity, and impacts on the environment. Biodiversity-related regulations and policies: Japan has regulations

and policies that focus on preserving biodiversity in the vicinity of ports, including the protection of marine ecosystems and habitat conservation. Furthermore, regulations which use the Greenport Initiative for the Japanese government encourage the development of green ports through initiatives such as the use of renewable energy, reduction of greenhouse gas emissions, and environmentally friendly waste management.

However, despite the differences in green port management, Indonesia and Japan have similarities in terms of engagement, as both countries are involved in international cooperation on sustainable port management. For example, Indonesia and Japan are involved in regional initiatives such as Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), which aims to promote environmentally friendly port management. Despite their differences or similarities, Indonesia and Japan have regulations related to port waste handling, both of which recognize the importance of effective waste management to achieve green port sustainability. Both Indonesia and Japan may have regulations and policies governing port waste handling, although the implementation may differ.

V. Conclusions

There are key differences between Japan and Indonesia in the context of green port development, including differences in biodiversity policies and management approaches. In Japan, green port development emphasizes habitat conservation and ecosystem restoration but the challenges in achieving green port sustainability also differ between Japan and Indonesia. In Indonesia, one of the main challenges is waste management, which requires long-term prioritization, while Japan has been prioritizing waste pollution management for longer. The case study of green port development in Osaka Bay, Japan shows that although not yet optimal, green port structures have the potential to improve service approaches to ecosystems with proper habitat conservation. In this research, the development of green ports in Cigading Port, Indonesia still emphasizes on the balance between operational, financial, and environmental aspects to achieve sustainability has not emphasized from the Social aspect to the Community. However, it should also be noted that the challenges and involvement of stakeholders in general are very important such as community involvement in green port development in both countries, for the future further research is needed with a balanced approach to support the success of green port development.

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