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MORALITY BEFORE KNOWLEDGE

Waterbird habitat utilization in coastal reclamation landscapes

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ABSTRACT

Background: Coastal areas are habitats for various living creatures. One type of creature that inhabits coastal areas is water birds. The northern coast of Jakarta has undergone reclamation. This activity has had various positive and negative impacts. One impact of reclamation is the creation of new habitats for water birds. This study aims to examine the impact of reclamation on the distribution patterns of water birds in the northern coastal area of Jakarta. **Methods**: The research methods used were direct observation and literature study. The case study location for this research is the reclaimed wetland at Marina Ancol Beach, North Jakarta. Direct observation was conducted by visiting the observation site. The types of birds found at the observation site were recorded on worksheets and documented. Observations were conducted in the morning from 6:00 a.m. to 10:00 a.m. In addition, bird activity at the observation site was also recorded and documented. **Findings:** The results of this research show that there are nine species of birds found in the new area. The area is dominated by mudflats. **Conclusion**: These wetlands can be an advantage despite all the losses caused by reclamation and can be used for ecotourism if the habitat is well preserved. **Novelty/Originality of this article:** This study offers a new perspective by highlighting the formation of new habitats for waterbirds as a result of reclamation on the North Coast of Jakarta, which has rarely been studied before, and emphasizes the ecological and ecotourism potential of reclaimed wetlands.

KEYWORDS: birdwatching; waterfowl; ecotourism; mudflats; reclamation.

1. Introduction

Reclamation is an effort to create new land in order to meet land needs by filling coastal areas. The purpose of reclamation is to increase economic, social, and environmental benefits by adding a certain amount of land. However, there are many positive and negative impacts resulting from reclamation activities. These impacts can be seen from economic, social, and environmental aspects. The impacts caused by reclamation when viewed from an environmental perspective include the threat of urban flooding, changes in the ecosystem, changes in the landscape, and the loss of wildlife around the reclamation area. However, in addition to the negative impacts, there are also positive impacts from reclamation activities. Reclamation areas can add new areas that can create a new ecosystem if the reclamation area is utilized properly, such as creating green areas around the reclamation area.

One of the areas that will be developed for reclamation is the Jakarta Bay area. The Jakarta Bay area is located north of Jakarta Special Capital Region/*Daerah Keistimewaan*

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Ibukota (DKI) Jakarta, which is a shallow sea area. Jakarta Bay is the estuary of thirteen tributaries that flow through the city of Jakarta. In addition, the Jakarta Bay area is also a coastline that borders directly with the city of Jakarta and includes tourist areas such as Taman Impian Jaya Ancol and the Thousand Islands National Park. Many people in the Jakarta Bay area work as fishermen, fish auction workers, and port workers. Reclamation activities can have an impact on biodiversity around the reclamation area. Biota affected by reclamation include phytoplankton, zooplankton, benthos, nekton, and terrestrial fauna living around the reclamation area.

The ecosystem in the Jakarta Bay reclamation area does not only involve humans. Various biotic and abiotic factors are also involved. One of the living creatures involved in the ecosystem in the Jakarta Bay area is water birds. Water birds are a type of bird that is ecologically dependent on wetlands (Noor, 1999). The wetlands referred to are peatlands, swamps, ponds, rice fields, lakes, and mangroves. Waterbirds have a body shape that is suited to their habitat, which is in aquatic areas. Thus, waterbirds have the ability to survive in aquatic environments. Waterbirds depend on aquatic areas and wetlands for their survival. The ecosystem found in wetlands greatly affects the life of water birds. If the ecosystem in the area is disturbed, the life of water birds will also be disturbed. Water areas are used by water birds to carry out their activities such as breeding, foraging, and sheltering. The types of water birds commonly found in mangrove areas are not always the same as those living in forests due to the unique characteristics of mangrove areas (Noor, 1999). This is because birds inhabiting aquatic areas have specific physical characteristics. In addition, birds living in aquatic areas tend to migrate during certain seasons to warm themselves.

2. Methods

The research will be conducted in the Marina Ancol Beach area located in North Jakarta. This area is the result of an expansion of the North Jakarta area. The observation point will be located within the Marina residential area and directly adjacent to the Ancol marina speedboat port. During the observation period, the weather at the observation point was cloudy to clear. The seawater that flooded the research area in the morning receded. The reason for choosing this location as the observation point is the large number of water birds seen and the open landscape, which supports the observation. In addition, this area is crossed by birds migrating from the southern hemisphere to the north.

Data collection was conducted from October to January. Data collection was carried out in the morning from 6:00 a.m. to 9:00 a.m. and in the afternoon from 4:00 p.m. to 6:00 p.m. These times were chosen because they are the most appropriate times for bird watching. Bird activity is highest during these times. Data collection was carried out using direct observation methods (Bibby et al., 2000).

Observations during the migration period are needed to see what birds pass through the observation point. The types of birds that passed through the observation point before the reclamation project was carried out are compared with the types of migratory birds that passed through the observation point after the reclamation. The results of these observations are expected to be taken into consideration by the government in determining the direction and objectives of reclamation in Jakarta Bay.

3. Results and Discussion

Based on observations in the field, there were eight species of water birds sighted. These birds were the Little Egret (*Egretta alba*), Great Egret (*Egretta granzetta*), Night Heron (*Nycticorax nycticorax*), Common Sandpiper (*Actitis apolosius*), Purple Heron (*Ardeola speciosa*), Black-crowned Night Heron, White-breasted Waterhen (*Trenon vernans*), River Kingfisher (*Todirhampus chlorys*), and Java Sparrow. Meanwhile, literature studies indicate that the Christmas frigatebird (*Fregata andrewsi*), which is now rare, is found in the area. The presence of waterbirds on the north coast of Jakarta is due to the

availability of their habitat requirements in the area, including mangrove forests and Rambut Island. Various other factors contributing to the presence of water birds in the reclamation area include the abundant availability of food for water birds. Water birds such as the great egret, little egret, and blekok are seen eating blanak fish in the area.

The presence of vacant land in the reclamation area causes seawater to stagnate and enter the area. The wetlands are now overgrown with aquatic plants such as katang-katang (*Ipomea pescaprae*), putut trees (*Bruguira* sp.), butterfly trees (*Bauhinia purpurea*), and perepat (*Sonneratia alba*). Some of these trees are also used as perching places for several birds such as the Punai Gading (*Trenon vernans*), cucuk kutilang (*Pygnonotus aurigaster*), and blekok (*Ardeola spesiosa*). This man-made area has also brought about ecological changes in the northern coastal area of Jakarta. Water birds from the southern hemisphere that migrate north pass through Jakarta, making this area a place to rest. One of the migratory birds that stop in this area is the Christmas Cikalang bird. These water birds migrate during certain months, such as October to January.

Table 1. Types of water birds on the North Coast of Jakarta

No	Scientific Name	Local Name	Conservation Status
1	Little Egret	*Egretta alba*	Least Concern
2	Great Egret	*Egretta garzetta*	Least Concern
3	Purple Heron	*Ardeola speciosa*	Least Concern
4	Night Heron	*Nycticorax nycticorax*	Least Concern
5	Common Sandpiper	*Actitis hypoleucos*	Least Concern
6	Black-crowned Night Heron	*Phalacrocorax sulcirostris*	Least Concern
7	White-breasted Waterhen	*Treron vernans*	Least Concern
8	River Kingfisher	*Todirhamphus chloris*	Least Concern
9	Java Sparrow	*Geopelia striata*	Least Concern

Based on data collected in the field, the types of avifauna found in the Jakarta Bay area are commonly found species. These species do not include animals that migrate from Australia to East Asia via the Jakarta Bay area. The Jakarta Bay area is visited by various types of avifauna because the conditions in this area are conducive to the life of avifauna. One of the supporting ecosystems is the Jakarta Bay area, which is not far from Rambut Island. The Rambut Island area is a wildlife sanctuary that is home to many species of avifauna. The vegetation in this area provides an ideal resting place for water birds. Rambut Island is not far from the Thousand Islands National Park. Various species of migratory water birds also often rest in this area. The presence of mangrove communities on Rambut Island has an impact on the survival of avifauna. Mangroves are used as breeding grounds for various types of fish and marine animals that are prey for water birds.

The presence of mangrove communities also provides nesting sites for various water birds. Various water birds such as little egrets, great egrets, and rice field blekok are often seen resting on mangrove trees. Birds such as great egrets, little egrets, and rice field blekok wait and follow their prey, but birds such as river kingfishers immediately fly and point their beaks into the water to prey on fish. This makes the presence of mangrove trees very important for water birds.

3.1 Reclamation in Jakarta Bay and its impact on water birds

The reclamation of Jakarta Bay has brought about changes to the physical conditions of the bay. These changes have had both negative and positive impacts on the environmental quality of Jakarta Bay. In addition to directly affecting life in the areas surrounding the reclamation site, these impacts also affect the ecological system of the Jakarta Bay area. The reclamation method has also brought about significant changes to social, economic, and ecological life. The most noticeable ecological impact is the change in currents and the displacement of some fish habitats in Jakarta Bay. Various types of fish found in Jakarta Bay have moved, affecting the water birds that inhabit the bay area. Various water birds that

prey on fish will find it increasingly difficult to find them, so they are likely to move to areas where there are more fish.

The population of water birds migrating from north to south may decline due to the deterioration of the quality of their habitat. The habitat of water birds in this area is mudflats. The emergence of new land in Jakarta Bay has caused changes in the currents passing through the bay and formed new land. This land forms mud from sedimentation. The mud becomes a new habitat for waterbirds, especially migratory birds. The presence of several new species also affects the population of migratory birds. Heavy metals polluting the waters of Jakarta Bay also pose a threat to the sustainability of the ecosystem in the region. Due to the presence of these heavy metals, the Jakarta Provincial Government cultivates green mussels (*Pena viridis*) to accumulate these heavy metals. Green mussels are also a food source for waterbirds. One of the causes threatening the habitat of water birds in Jakarta Bay is the increasing economic activity in Jakarta and the growing population of Jakarta. Habitat loss is a serious threat to water birds. One of the most likely scenarios is that migratory birds will choose other locations to rest.

3.2 New land for ecosystems

Jakarta Bay is not the only water area visited by migratory birds. Other areas frequently visited by migratory birds are Gembong and Muara Karang. Both areas are often visited by water birds because their habitats suit the needs of water birds. According to Winara (2016), water birds that live in mudflat ecosystems migrate from threatened mudflats to new mudflats. The Gembong and Muara Karang estuary areas are among the areas that have experienced habitat degradation. The presence of various types of water birds means that the Gembong estuary is unable to accommodate large numbers of water birds because it is not proportional to the size of the area. Therefore, water birds need other areas to stop over.

The presence of new land in Jakarta Bay has become a new option for waterbirds to make this area their new habitat. During the observation, several species of waterbirds were seen flying towards Ancol Beach and its surroundings. Then, at 7:00 a.m., various species of waterbirds approached the mudflat area, which has become a new habitat for waterbirds. Some of the birds observed were species that prefer mudflats as a place to forage for food. One such species is the Common Sandpiper (*Actitis apolosius*). This bird inhabits mudflat ecosystems. During the winter, Common Sandpipers fly to warmer regions. Indonesia, with its tropical climate, is ideal for Common Sandpipers.

As new land, the presence of waterbirds indicates that mudflats in reclaimed areas can create new habitats for waterbirds. The function of mudflats as providers of ecosystem services for waterbirds is as follows: shelter, feeding grounds, and resting places (Masero et al., 2000). Waterbirds use mudflats as shelter from birds of prey. The ecosystem in mudflat areas is greatly influenced by the ebb and flow of the tide. At night, when the tide is low, various crustaceans come out of their burrows and forage in the mudflats. In the morning, waterbirds approach the mudflats to prey on these crabs. According to Masero et al. (2000), waterbirds are seen feeding in several areas such as mudflats, beaches, natural swamps, and fish ponds. In the reclamation area in Jakarta Bay, the feeding area is the mudflats. Other areas such as beaches and fish ponds have been disturbed by the large presence of humans. To increase and attract more species of waterbirds to this area, various efforts are needed to improve the environmental quality of the mudflats. These efforts require various procedures from the area managers and the government.

One effort that can be made by the government is to restore the mangrove area located on the north coast of Jakarta. The total area of mangrove forest in Jakarta is 430.5 ha, and 30% of the total area, or 129.135 ha, still needs to be rehabilitated (Jakarta Environment Agency, 2016). Mangrove areas have an ecological function for water birds, providing them with shelter, feeding grounds, and breeding (nesting) sites. The presence of water birds in mangrove areas can be an indicator of biodiversity in mangrove areas. Indirectly, mangrove areas have high economic value. Mangrove areas can be used for ecotourism. In addition, with the creation of the Reclamation Island, mangrove areas can be made to function as

erosion barriers. Mangrove areas located on the North Coast of Jakarta are the Indah Kapuk Beach/*Pantai Indah Kapuk (PIK)* Nature Park, Muara Angke Wildlife Reserve, Rambut Island Nature Reserve, and the Pantai Indah Kapuk mangrove ecotourism area.

3.3 The value of ecotourism for reclamation

The reclamation area being developed by the government has received mixed responses from the public. The reclamation project will have various positive and negative impacts. The negative impacts will outweigh the positive ones, increasing the cost compared to the benefits. One of the negative impacts will be damage to the environment surrounding the reclamation area. To increase the benefits of the reclamation project, the government must assess the social, economic, and environmental aspects of the project. Therefore, ecotourism is the most appropriate solution to this problem. The presence of a new habitat for water birds can be an attraction for the residents of Jakarta. Various types of water birds can become objects of environmentally-friendly and educational tourism for tourists. These tourism activities can be packaged with an activity called birdwatching.

Fig. 1. Several water birds in the reclamation area

Bird watching is one of the fastest growing tourism activities and has become a trend in developed countries. This is due to the decline in prices and equipment for bird watching (Maldonado, 2018). The government can make bird watching a form of alternative tourism. Activities that can be developed from this activity include competitions, book publishing, and festivals (Maldonado, 2018). Ecotourism activities can be unique to an area that has natural tourist attractions. These activities can spur economic, social, and cultural growth. In addition, the tourist attractions offered through birdwatching activities are very unique, and there are rarely such tourist attractions in the Jakarta area.

Birds with high conservation status can be a special attraction for tourists because they can observe species that are rarely seen. Based on interviews and literature studies, the Christmas frigatebird (*Fregatta andrewsi*) is found in the Jakarta Bay area and has a Critically Endangered conservation status. This bird is native to Christmas Island and migrates through Jakarta Bay. Tourism activities that rely on bird watching as the main activity are referred to as avitourism (Callaghan, 2018). Avitourism has been growing in recent years (Steven et al., 2015).Tourists are willing to pay any amount to see rare species (Angulo & Courchamp, 2009). The rarer and more elusive a bird species is, the higher its economic value.

Tourists interpret “rare” in many ways. Birds seen outside their natural range are also considered rare species encounters. The northern coast of Jakarta is one of the migration routes for birds from the southern hemisphere to the northern hemisphere, so the possibility of encountering bird species outside their natural range is very high. The creation of new habitats in the northern coastal area of Jakarta could attract migratory birds from other migration routes to the area. This could happen if the reclamation area is created to closely resemble the natural habitat of water birds, namely by planting mangrove trees,

maintaining mudflats, and protecting seawater from pollution. The target audience of tourists visiting the reclamation area must also be carefully considered to avoid negative impacts on the environment.

4. Conclusions

Reclamation in Jakarta Bay has a complex impact on the environment, especially on the existence of water birds. Although reclamation activities cause various negative impacts such as changes in ocean currents, loss of natural habitat, and decline in ecosystem quality, the results of this study show that the formation of new land from the sedimentation process actually creates new habitats in the form of mudflats that can be utilized by water birds, especially migratory species. The presence of vegetation such as mangroves and other coastal plants also supports the life of waterbirds as a place to perch, forage, and breed. In addition to its ecological function, the reclaimed area also has the potential to be developed into a birdwatching-based ecotourism area. This activity can be an alternative form of educational and environmentally friendly tourism in Jakarta, as well as providing additional economic value for the community. With proper management, such as mangrove rehabilitation, water quality maintenance, and control of human activities, the reclaimed area in Jakarta Bay can serve a dual purpose as a new habitat for water birds and a sustainable ecotourism destination.

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Author Contribution
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