Original Article

Management Evaluation of the Parangtritis Sand Dunes Tourist Attraction Using the DPSIR Approach

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ABSTRACT

The Parangtritis Sand Dunes, an important geoheritage area, serves as a natural shield against tsunamis, a rainwater catchment area, and a unique habitat for biodiversity. However, uncontrolled land use change threatens its sustainability. This study uses the DPSIR framework to analyze land use dynamics and propose sustainable management strategies. The results show that inappropriate afforestation policies, infrastructure development, and tourism activities disrupt the aeolin process, thereby reducing the area of sand dunes in the core zone. Some of these things degrade the function of the sand dune ecosystem. Recommendations include enforcing zoning regulations, rerouting tourism jeeps, and educating the community.

INTRODUCTION

Parangtritis is one of Indonesia's coastal areas known for its ecological uniqueness and high environmental value. The region is particularly famous for its sand dunes, a rare aeolian landform, which also serves as a natural buffer against threats such as tsunamis, coastal erosion, and sea level rise (Dahm, 2005). The Parangtritis sand dunes also function as a habitat for distinctive flora and fauna, a catchment area, and a prominent tourism destination with significant economic value for the local community. Due to its ecological, economic, and cultural significance, this area has been designated as a geoheritage site in the Special Region of Yogyakarta (DIY).

However, the existence of the Parangtritis sand dunes is under serious threat due to uncontrolled land use changes. Human activities such as infrastructure development, tourism, afforestation incompatible with the natural ecosystem, and land conversion for aquaculture or settlements have disrupted the ecological balance of the region (Pye & Tsoar, 2009). Research by

Dartoyo (2013) revealed a drastic decline in the dune area, from 456 hectares in 1974 to only 41 hectares in 2013. This reduction indicates that the management of the area remains far from optimal. Moreover, the loss of this ecosystem not only contributes to environmental degradation but also diminishes the natural tourism appeal that supports the local economy, even though ecotourism has the potential to boost income and entrepreneurial opportunities for the community (Pertiwi et al., 2017).

The degradation of the dune area also affects the aeolian process—sand transportation by wind—which is crucial in shaping and maintaining the characteristic dune morphology. Unregulated vegetation planting, road construction, and tourism activities such as jeep tours in core zones have disrupted this process, leading to the degradation of geomorphic features such as barchan dunes (Muhammad, 2018; Nuraini, 2016). Consequently, the ecological functions of the area have significantly weakened, particularly in its role of protecting the coastal zone from natural threats like erosion and tsunamis. These changes also create socio-economic pressures on local communities dependent on tourism and natural resources.

The sand dunes serve essential functions as a conservation area, a natural tsunami barrier, an air catchment zone, and a habitat for dune-specific flora and fauna. However, their existence is now endangered due to declining area, primarily caused by land-use changes. Each year, the land use in the Parangtritis sand dune area shifts, resulting in a continued reduction in dune area (Putri & Wicaksono, 2021). The declining extent of the dunes indicates that current management practices are suboptimal. This area is often underestimated in value, despite being a critical, unique, and irreplaceable asset in Yogyakarta (Martinez et al., 2004).

Signs of environmental degradation in the Parangtritis sand dunes can be traced to the disruption of natural processes. The dunes are formed through the interaction of three natural processes: fluvial, marine, and aeolian. These processes have been increasingly disturbed by human intervention. Sand mining in rivers by local communities and upstream check dam construction policies have indirectly reduced sediment supply, including sand, to downstream areas (Susmayadi, 2010). Tourism development in the surrounding region also significantly affects sand transport processes. Observations show higher deflation rates during the day (average 2.42 g/m^1/s^{-1}) than at night (average 0.03 g/m^1/s^{-1}). Each sampling location exhibits different deflation characteristics and transported material properties, with grain sizes ranging from 0.318 mm to 0.395 mm, predominantly medium-textured sand. The roundness and sphericity of sediment particles are measured on scales of 0.5 and 0.7, respectively (Malawani et al., 2019).

Several anthropogenic activities have been identified in the research area, such as settlements, agriculture, aquaculture, and coastal forest cultivation. Among these, coastal forest cultivation poses the greatest threat to the aeolian processes of the Parangtritis sand dunes. Apart from vegetation density, sand transport remains a key factor influencing dune formation (Sunarto, 2014). To understand and address these issues, the Driving Force–Pressure–State–Impact–Response (DPSIR) framework offers an effective analytical tool. DPSIR facilitates the identification of cause-effect relationships between human activities and environmental changes through its five components: driving forces, pressures, state, impacts, and responses. This framework has been widely used in sustainable natural resource management, including in coastal regions (Smeets & Weterings, 1999). Furthermore, it offers data-driven solutions to support strategic decision-making. By integrating ecological, social, and economic data, DPSIR provides a comprehensive understanding of the challenges and opportunities in managing coastal areas.

The novelty of this research lies in the in-depth interviews conducted with various stakeholders, including experts on Parangtritis dunes, the head of Parangtritis Geomaritime Science Park (PGSP), the head of the Bantul Regency Tourism Office, and academics, as well as a comprehensive literature review. These steps lead to a more thorough DPSIR-based assessment.

In the context of the Parangtritis sand dunes, DPSIR analysis offers a holistic perspective on land-use change dynamics and identifies strategic solutions for conservation. This study aims to analyze land-use dynamics in the Parangtritis sand dunes using the DPSIR framework to develop sustainable management recommendations. It also seeks to identify relevant strategies to mitigate environmental pressures, enhance community participation, and support the continued ecological and economic functions of the area. By understanding the driving factors and impacts of land-use change, this research is expected to make a valuable contribution to the preservation of the dunes as a geoheritage and ecological asset of Indonesia, while supporting sustainable coastal development.

LITERATURE REVIEW

An analytical approach that can be used to examine the dynamics of sand dune area changes and their evaluation is the DPSIR method, which stands for Driving Force – Pressure – State – Impact – Response. DPSIR is a framework for organizing information and data related to environmental conditions. This concept was first introduced and developed by the European Environmental Agency (EEA) in 1999 (Wijaya & Mutia, 2016). The DPSIR approach can be applied to all ecosystems, including both aquatic and terrestrial systems (Gari et al., 2015).

This methodology aims to generate sustainable development indicators within three categories: Pressure (P), State (S), and Response (R). The PSR framework is based on a causal relationship: human activities place pressure on the environment, altering the quality and quantity of available resources (state). Adaptive, preventive, and mitigation actions are then taken by society in response to these changes (Brunhara et al., 2023). This conceptual approach is widely used to analyze environmental issues by establishing cause-effect relationships between anthropogenic activities and their environmental, resource-based, and socio-economic consequences (Huong et al., 2021; Mell, 2020). It also aims to help policymakers better understand relevant information. The model provides a descriptive and comprehensive understanding of a system and facilitates the process of intervention and policy formulation through the development of appropriate indicators (Wijaya & Mutia, 2016; Brunhara et al., 2023). DPSIR is also a useful tool for identifying policy directions that support sustainable use, as it integrates multiple factors (Mosaffaie et al., 2021).

Sampath et al. (2022) refined the DPSIR framework for long-term sand dune management in New Zealand by analyzing each indicator of the DPSIR framework over several key periods for planning. Their findings reinforced the paradigm shift from stabilizing sand dunes prior to the end of the 20th century to restoring previously stabilized dunes in order to enhance native biodiversity — an effort that must be examined within the context of rising sea levels in this century.

In recent years, the DPSIR approach has also been applied to various systems, including fisheries management (Martins et al., 2012), urban ecological resilience (Zhao et al., 2021), sustainable rural development efficiency (Khan et al., 2021), and microplastic pollution (Miranda et al., 2019). Several studies have focused on sustainable sandy beach management based on environmental protection and ecological balance, while also enhancing recreational beach quality.

In the study by Huong et al. (2021), DPSIR was used to identify major environmental issues in sandy beaches in Vietnam, including the degradation of natural landscapes surrounding the beaches and broader environmental deterioration. The research also revealed the significant impact of tourism development linked to urbanization and land reclamation on coastal environmental degradation (Huong et al., 2021; Xu et al., 2018), as coastal areas often hold considerable ecological and recreational value (de Sousa-Felix et al., 2017). Sekovski et al. (2012) used the DPSIR model to assess the role of large coastal cities in environmental degradation and climate change.

These various previous studies on the DPSIR framework provide a strong foundation for the present study to evaluate the management of Parangtritis Sand Dunes using the DPSIR model.

METHOD

Research Location

This research was conducted in Gumuk Pasir Parangtritis, Bantul Regency, DIY Province in 2023. The research map can be seen in Figure 1.

Research Approach

Qualitative research methods were used to analyze DPSIR (Driver – Pressure – State – Impact – Response). According to Mujio (2016) and Wang et al. (2018), DPSIR is used by local governments to obtain information about the environmental situation of an area and determine effective policies. Meanwhile, in this study, DPSIR aims to study the dynamics of the Parangtritis Sand Dune.

Research Procedure

The DPSIR analysis was conducted through semi-structured interviews. These interviews were carried out to collect data related to Driving Force, Pressure, State, Impact, and Response concerning the dynamics of land use change in the Parangtritis Sand Dunes. Land use refers to all forms of human intervention with land to fulfill their life needs (Buana et al., 2015). A snowball sampling method was applied in this study, where samples were obtained through a rolling process from one respondent to another, similar to a snowball effect (Nurdiani, 2014).
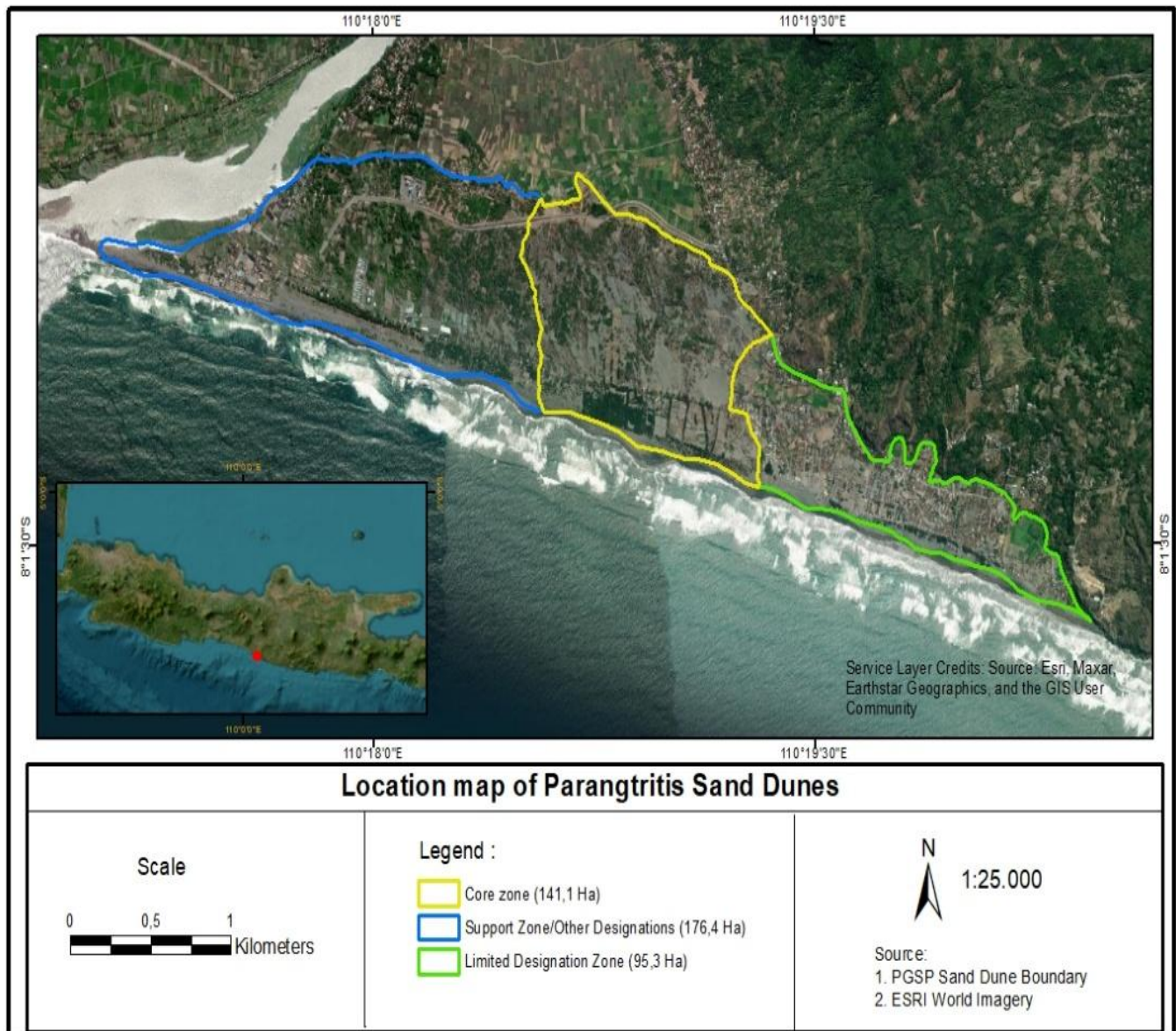
Figure 1. Map of the Research Location

Data Collection Instruments

This interview is conducted by asking direct and in-depth questions to someone who is an expert or key informant. Moleong (2015) explained that key informants are individuals who are able to provide information about the situation and conditions of the research background, as well as understand the problems to be studied. The researcher conducted the first interview with an expert at the Parangtritis Geomaritime Science Park (PGSP), namely with the initials NS. After that, it continued to the chairman of PGSP with the initials PM, the management of the Parangtritis Sand Hill by the head of the Bantul Regency Tourism Office with the initials KHP, and the concept of sustainable tourism in the Parangtritis Sand Hill with the initials DW.
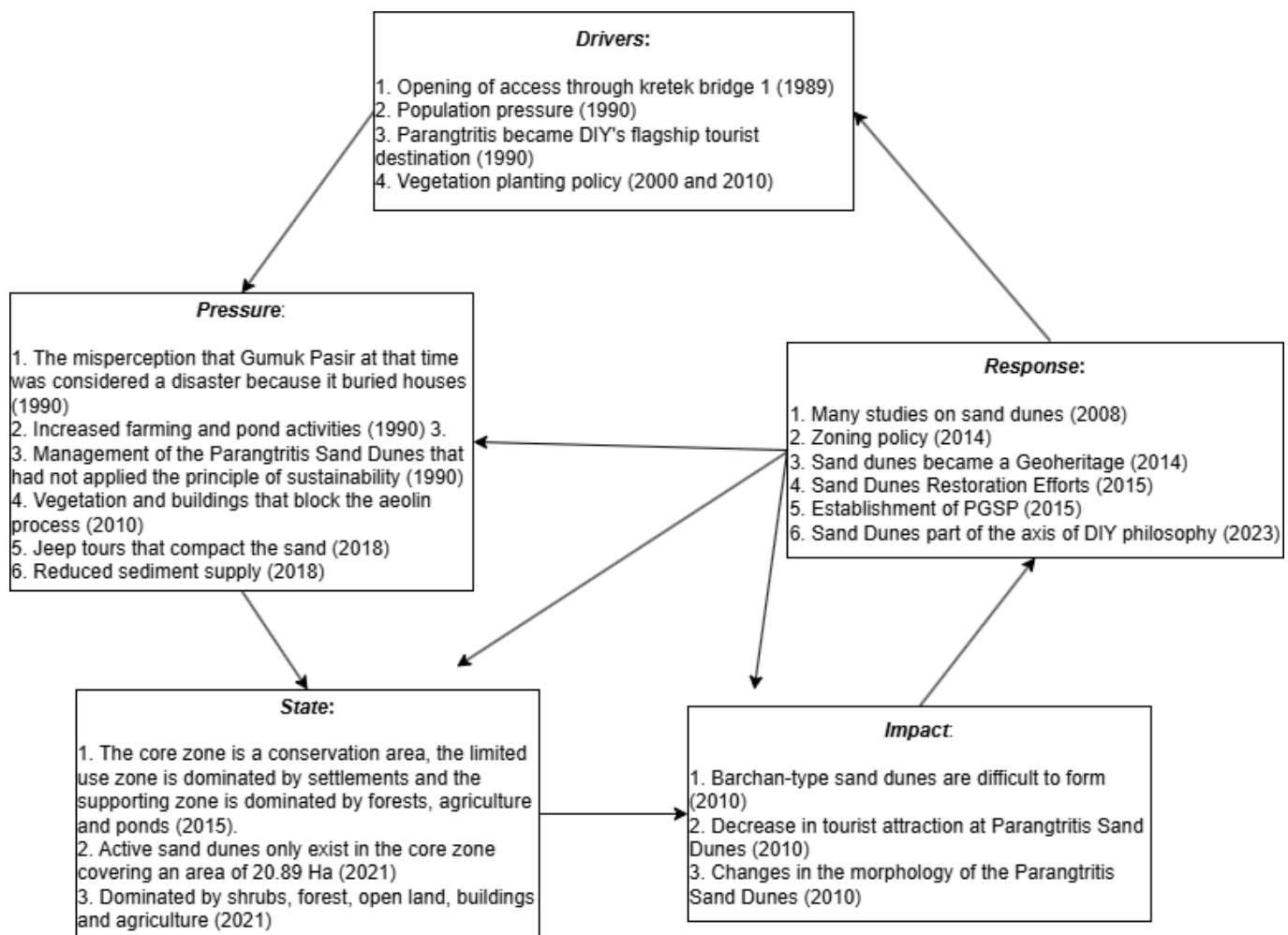
Figure 2. Analysis framework of DPSIR in Gumuk Pasir Parangtritis

Data Analysis

The results of descriptive analysis based on interviews with key informants were used to construct the DPSIR. The following are the indicators used in each component in the DPSIR analysis (Bramantio, 2023) for the management of the decline in the area of the Parangtritis Sand Hill in Yogyakarta:

1. Driving Forces (Pendorong Factor)
   • Open access to the Parangtritis Sand Dune.
   • Population growth in Gumuk Pasir Parangtritis.
   • Parangtritis Coast is a leading tourist attraction in DIY.
   • Policies that do not consider the sustainability aspects of the Parangtritis Sand Dune.
2. Pressures (Tekanan)
   • Public perception of Parangtritis Sand Dunes.
   • Uncontrolled tourism activities in Gumuk Pasir Parangtritis.

• Sand and stone mining so as to reduce the material that reaches the Parangtritis Sand Dune.
• Vegetation and buildings that interfere with the aeolina process.
• The development of agricultural activities, ponds and plantations in the Parangtritis Sand Hill.
• Management of Parangtritis Sand Dunes.

3. State (Keadaan)
   • The area of the Parangtritis Sand Dune.
   • Land use in Gumuk Pasir Parangtritis.
   • Zone division in Gumuk Pasir Parangtritis.
4. Impacts
   • Threatened with the loss of the Parangtritis Sand Dune as a unique landscape and there is only one in Indonesia.
   • Decrease in the tourist attraction of Gumuk Pasir Parangtritis.
5. Responses

- The establishment of PGSP and the Settlement of the Parangtrtis Sand Hill.
- Zoning Policy in Gumuk Pasir Parangtrtis.
- A special feature of the Sand Hills.
- Efforts to preserve the Parangtritis Sand Hill

RESULTS AND DISCUSSIONS

The DPSIR Analytical Framework in the Parangtritis Sand Dunes begins with the *driving forces* stage, which is identified as the primary trigger of problems and pressures on natural processes and various human-influenced activities (Hendriarianti et al., 2022). The *pressures* stage refers to secondary issues and challenges at the Parangtritis Sand Dunes, which arise as a consequence of human activities (Omann et al., 2009).

The next stage, *state*, describes the current environmental condition influenced by emerging issues and problems (Pradana et al., 2023). The following stage, *impact*, is defined as the effects resulting from the identified driving forces and pressures occurring in the Parangtritis Sand Dunes. The final stage, *responses*, includes social, technological, or engineering solutions that need to be implemented by governments, academics, or the community (Newton & Weichselgartner, 2014). The DPSIR analytical framework for the Parangtritis Sand Dunes is illustrated in Figure 2.

Driving Forces Analysis

Initially, human activities in the Parangtritis Sand Dunes were limited to ritual practices by the Yogyakarta Palace as a form of homage to the ruler of the southern coast. Over time, residents began to settle in the Parangtritis Sand Dunes, although the population remained relatively small. Population growth in the area accelerated significantly after the construction of transportation infrastructure in the 1980s. Previously, the main and connecting roads consisted only of stones and soil, but they were eventually paved. In 1989, the construction of the Kretek I Bridge—crossing the Opak River—connected the Parangtritis Sand Dunes to the outside world. Before this development, access was limited to simple bamboo bridges and boats for crossing.

This situation aligns with Firdaus et al. (2023), who emphasized the importance of adequate public infrastructure in fulfilling the needs of local communities.

Population growth in Parangtritis Village has been relatively stable, with neither a significant increase nor decrease. Between 2002 and 2018, the population grew slightly. A decline occurred starting in 2019, followed by another increase up to 2022. Based on this trend, it can be inferred that the population of Parangtritis Village is not expected to grow rapidly in the future. The detailed pattern of population growth in Parangtritis Village is presented in Figure 3.
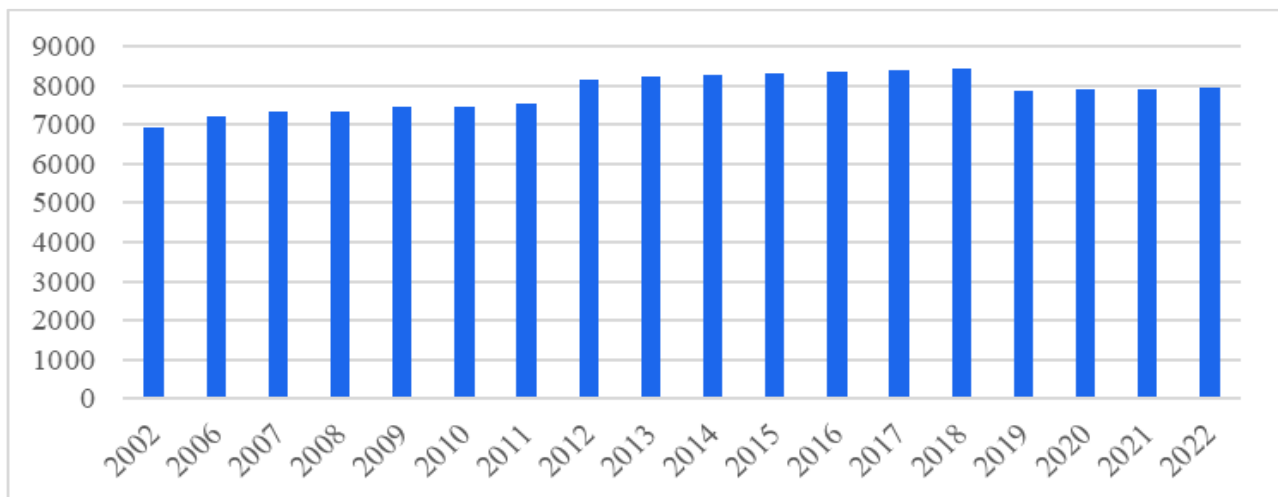

Figure 3. Population Growth Pattern in Parangtritis Village (Source: BPS Bantul Regency, 2023)

Obstacles from transportation facilities have disappeared so that the existence of the Kretek 1 bridge makes it easier to access the sand dunes. Since then, the Parangtritis Sand Hill and Parangtritis Coast began to develop as tourist destinations. This is in accordance with the research results of Ardiansyah & Julianto (2023) and Pongsitanan et al. (2021) which show that infrastructure improvements can increase tourist satisfaction and the number of visits to these locations. However, rapid population growth, economic activity, and the construction of facilities and infrastructure such as houses can affect the quality of the environment (Federigi et al., 2022; Huong et al., 2021), because it causes urbanogenink and is the main trigger for the reduction of

the area of the Parangtritis Sand Dunes. In 1992, the Environment Agency considered the Parangtritis Sand Hill as a critical land, so it was necessary to carry out reforestation by planting plants, especially shrimp cypress trees, shrimp cypress was chosen because it can grow well in sandy soil and has aesthetic value.

The year 2010 was the first year that the planting of one billion trees began. In the first year, the Ministry of Forestry managed to plant 1.39 billion trees, while in 2011 with the same program, 1.7 billion trees were planted. In 2011, in Parangtritis Village, Special Allocation Fund (DAK) activities in the forestry sector were carried out in the form of coastal forestry. Data listed on the notice board in the field shows that the plants planted for coastal forestry are 7,850 cypress stems, 1,000 acacia stems and 1,150 pandan stems (Sunarto, 2014). Sea fir has been widely used to stabilize coastal sand dunes, withstand wind, control erosion, improve local microclimate, protect against tsunami and tidal wave threats, and to meet the timber needs of communities (Nurahmah & Harjadi, 2007).

Pressure Analysis

One of the major pressures contributing to the shrinking area of the sand dunes and their conversion into other land uses is the community's misperception of the sand dunes. In 1990, many active dunes still existed. These dunes often buried residents' houses due to aeolian processes. As a result, the local community began to perceive the sand dunes as a natural disaster and responded by extensively planting trees and other vegetation around their homes. Vegetation and buildings began to obstruct the aeolian processes, particularly from 2010 onward. However, projections for 2031 indicate that the area of markets, office buildings, and agricultural land will not decrease (Bramantio et al., 2024). In addition, agricultural activities such as the use of fertilizers and pesticides have become pressures (Elliott et al., 2017) that interfere with aeolian dynamics. Agricultural commodities such as chili peppers and cassava are commonly cultivated in the supporting vegetation zones. Other community activities near the sand dunes include shrimp and milkfish aquaculture. Most fish ponds are located in the supporting zone and some in the restricted zone, while one pond remains in the core zone.

These findings align with Sudjana et al. (2024), who stated that natural landscape changes can be influenced by anthropogenic factors such as the development of residential areas, factories, and agricultural land. However, this condition contradicts the argument of Duong et al. (2024), who strongly emphasize the importance of local community participation in ensuring sustainable conservation efforts.

Tourism activities in the Parangtritis Sand Dunes also pose a significant pressure. These include sandboarding and jeep tours, which take visitors from the beach across the dunes to enjoy the scenery, engage in photography, and produce films or videos. Among these, the jeep tours—popular since 2018—have caused the most damage to the sand dunes. The vehicles compact the sand, making aeolian processes more difficult. Jeeps often enter the core zone, disturbing the formation of barchan dune embryos when they cross over them. An appropriate solution would be to prohibit jeep entry into the core zone of the sand dunes and to establish designated jeep tracks outside of this protected area.

The next pressure is the reduced amount of sediment from the volcano because many people mined in 2018, especially in the upper and middle parts of the Opak River so that there are fewer people who reach the coast of Parangtritis. Moreover, there are several individuals who have mined sand directly in the Parangtritis Sand Hill, even though this is against the law in accordance with article 158 of Law Number 4 of 2009 concerning Mineral and Coal Mining. The regulation affirms that it is prohibited to take, harvest, and mine sand, rocks, and other minerals around the sand dunes.

The Parangtritis Sand Hill is currently managed by the Bantul Regency Tourism Office, but in its implementation the local community has a more dominant management role so that this community activity will greatly suppress or change the land use of the Parangtritis Sand Hill in the future. The management of the community in the sand dunes is divided per Rukun Tetangga (RT) which extends from south to north, so that each RT has a beach. This community-based management has not been managed properly. The community dominated the management from 1990. This can be seen from the existence of permanent buildings made by the community in the core zone of Gumuk Pasir Parangtritis, even though only semi-permanent buildings are allowed. According to Hamzah & Mohamad (2012) and Kunjuraman et al. (2022), in addition to being leadership and well-organized, the community also needs to collaborate with the government and the tourism industry to achieve successful ecotourism.

Figure 4. Condition of Parangtritis Sand Dune

State Analysis

Gumuk Pasir Parangtritis is currently managed by the Bantul Regency tourism office, PGSP as the research center of Gumuk Pasir Parangtritis and the Provincial Government of Yogyakarta as a stakeholder in Gumuk Pasir Parangtritis. In 2015, a sand dune zoning was made, which is divided into three zones, namely the supporting zone, the core zone, and the limited designation zone with the purpose of the core zone as a place for sand dune conservation. Based on aerial photos in 2021, Parangtritis Sand Hill has a total area of 412 hectares which is divided into three zones, namely the supporting zone, the core zone and the limited use zone. Active sand dunes with an area of only 20.08 Ha are found in the core zone which is a zone devoted to sand dune conservation (Damayanti et al., 2022).

Land use in the Parangtritis Sand Dunes is dominated by shrublands, forests, open lands, buildings, and agricultural areas (Figure 4). In 2020, the sand dune area temporarily expanded due to the cutting of *Casuarina equisetifolia* (cemara udang) trees. However, this effort was ineffective because the trees were not uprooted, allowing them to regrow. Although conservation efforts have been initiated, they have not yet been optimal. According to Permana et al. (2024), the involvement of academics is crucial in raising public awareness about the importance of environmental conservation. Meanwhile, Aina et al. (2024) emphasized the role of Islamic teaching integrated through non-governmental organizations in addressing current environmental issues.

The decline in the functional area of the sand dunes and the growing presence of aeolian process inhibitors, such as vegetation and buildings, have resulted in the loss of the aesthetic value of the barchan dunes—an iconic feature of the Parangtritis Sand Dunes (Nuraini et al., 2016). The term "sand dunes" refers specifically to active dunes, where aeolian processes still occur. These can be identified from aerial imagery by wave-like patterns on the sand, which indicate ongoing aeolian activity. At present, aeolian processes are mostly observed in the core zone and to a lesser extent in the restricted-use zone. In contrast, no such processes are observed in the supporting zone due to the excessive presence of vegetation.

The land uses that most significantly disrupt aeolian processes in the Parangtritis Sand Dunes are buildings, vegetation, and aquaculture ponds. According to Putro & Prasetiyowati (2020), these three factors contribute the most to land cover changes. Buildings and vegetation block and obstruct wind flow and sand movement, even though wind is a key factor in dune formation (Nuraini et al., 2016). Moreover, aquaculture ponds compact the sand, turning them into sediment

traps that prevent wind-driven sand transport. Elliott et al. (2016) found that the removal of salt marsh areas for port development or the conversion of mangrove forests into shrimp ponds reduces the natural energy absorption functions of these ecosystems, ultimately increasing the risk of coastal flooding.

Impact Analysis

The impact of the reduction of the area of the Parangtritis Sand Dunes due to conversion to other land uses and the large number of land uses that inhibit the *aeolin process* is difficult or even the loss of the shape of the barchan in the Parangtritis Sand Dune starting in 2010 (Damayanti et al., 2022). The barchan-shaped Sand Gumuk is a uniqueness of the Parangtritis Sand Gum, which is the only one in Yogyakarta. This of course also resulted in a decrease in the tourist attraction of the Parangtritis Sand Hill in 2010 (Astuti et al., 2015), so that visitors are less interested in the Parangtritis Sand Hill either for recreation or educational tourism. Especially in the sand dunes, during the day, it is very hot, so many visitors come to the sand dunes only in the morning or evening.

The next impact is the change in the morphology of the Sand Dune due to the change in land use that occurs intensively, this has an impact on the development of the sand dune morphology in 2010. In line with the results of the research of de Sousa-Felix et al. (2017), erosion occurs in coastal areas resulting in changes that result in a decrease in coastal profile, degradation of deserts and mangroves, damage or destruction of pedestrian infrastructure infrastructure. These impacts include weakening the strength of wind gusts so that the sand dunes are more sloping because the wind turbulence is eroding, so that deflation holes are formed behind the vegetation (Nuraini et al., 2016). Changes in the morphology of sand dunes can also trap sand material and change the properties of the sand surface.

Response Analysis

The response to the reduction of the area of the parangtritis sand dunes due to conversion to other land uses and the many land uses that hinder the *aeolin process* have come from various parties, both from academia, the government and the community. In 2015, PGSP was established, which was previously called the Gumuk Pasir Museum, the first head of PGSP began to pioneer not to plant vegetation and to do more conservation in the sand dunes (Damayanti et al., 2022). At that time, there was also a lot of research on the Parangtritis Sand Hill by academics which began to be many in 2008, there was also the use of *sand traps* to see the dominant sand movement in the Parangtritis Sand Hill, namely the creeping type.

The next response was the formation of the determination of sand dune zoning in 2014, this zoning was based on the *aeolin* process which was quite high in the middle and also did not have too much land use in the form of buildings and agriculture compared to the supporting zone and limited use (Damayanti et al., 2022). At that time the core zone still had buildings but it had begun to be ordered and efforts to restore the sand dunes began in 2015, so that currently what is allowed are semi-permanent buildings to support tourism such as toilets, stalls and prayer rooms.

The next response was that the Parangtritis Sand Hill was designated as a DIY earth heritage in 2014. Quoting Putra (2018), getting recognition as a Global Geopark Network (GGN) will provide benefits to protect and develop the earth's heritage at the global level. The next plan in 2024 is an assessment from the Ministry of Energy and Mineral Resources (EMR) to upgrade the status of the sand dunes to a UNESCO world heritage site. Gumuk Pasir has also been designated as one of the philosophical axes in Yogyakarta Province in 2023, so it is necessary to maintain its sustainability. The next response is sand dune restoration activities, especially in the core zone, such as the translocation of settlements and ponds (Laily, 2018), tree cutting in the core zone, and the prohibition of the erection of permanent buildings in the core zone (Iswari et al., 2023). In line with the research of Sampath et al. (2022) which carried out restrictions imposed for vegetation clearing, land disturbance, and cultivation adjacent to water bodies in coastal areas in coastal areas in response to sand dune management.

CONCLUSION

The results of the DPSIR analysis show that the wrong policy in the past, namely reforestation, caused a decrease in area and loss of the shape of the barchan in the Parangtritis Pasir Gum. Some of the land uses that interfere with the aeolin process are vegetation, buildings and ponds. Tourism activities that interfere with the aeolin process are jeep tours that enter the core zone of the Parangtritis Sand Gum. A sustainable management plan is needed to overcome this problem, namely the enforcement of land use rules according to the zoning system that has been created. Making jeep tour routes that do not enter the core zone, road closures that pass

through the core zone and educating the community to jointly protect the Parangtritis Sand Hill. The limitation of this study is that the interviewed informant is an expert and a core figure, not covering all levels of society and *stakeholders.* So that the recommendation for the next research is to involve more various parties.

Conflict of interest The author has no competing interests to declare that are relevant to the content of this article.

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