

## Threats to Sustainable Tourism in National Parks: Case Studies from Indonesia and South Africa

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### Abstract

This study reviews the environmental threats to sustainable tourism of national parks, as shown through five case studies of national parks in Indonesia and South Africa. A qualitative approach with the literature study method is employed in this study. The national parks selected are related to the similarity in the ecosystem, position, and age relative to other national parks. The study results show ten threats to sustainable tourism: biodiversity loss, invasive species, outward invasion, infrastructure development, behavioral change, climate change, water scarcity, forest fire, diseases, and poaching. Issues unique to Indonesia are outward invasion, infrastructure development, and behavioral change, while issues unique to South Africa are water scarcity, diseases, and forest fire. Older national parks tend to have problems with invasive species, while boundary-based national parks have more problems with illegal hunting (poaching). Savannah-based national parks are faced with biodiversity loss. National parks need to focus more on these physical threats to improve their sustainable tourism agenda. This research contributes to the Life Cycle Model of sustainable national parks tourism by highlighting possible paths in the model followed by national parks in Indonesia and South Africa.

**Keywords:** Sustainable tourism; national park; Indonesia; South Africa

### Introduction

National parks in developing countries need funding to fight a massive decline in biodiversity, both due to uncontrolled development and climate change (Mukanjari et al., 2021). One of the essential sources of this financing comes from sustainable tourism (Chen et al., 2021). This income can strengthen ecosystem services and stimulate social and economic development, lift poverty, and have a return impact on tourism development itself (Phongchiewboon et al., 2020). Sustainable tourism is defined as tourism that respects the environment and seeks to reduce energy and consumption of regional resources (Cardinali et al., 2020). Sustainable tourism is based on economic, social, and environmental pillars, as are other sustainable discourses (Mihalic et al., 2021). With the obligation to balance these three things, sustainable tourism becomes a complex program and requires various supporting factors.

The implementation of sustainable tourism is essential and relevant to national parks because they are both conservation-oriented. Developing sustainable tourism in national parks

in developing countries faces problems such as the value of ecosystem services offered to tourists (Yee et al., 2021) and accessibility challenges (Chikuta et al., 2021).

Many studies have focused on the issue of inhibiting factors for sustainable tourism in national parks (Yee et al., 2021; Chikuta et al., 2021). However, most of this research focuses on barriers to economic and social pillars such as tourism management and marketing (Pahrudin et al., 2022). The role of the environmental management factor itself is still getting less attention (Lozano-Oyola et al., 2019), even though this is precisely the area where the national park is most competent (Pourmohammad et al., 2020; Calkoen et al., 2020). Moreover, it is known that revenues from sustainable tourism in national parks are often directed at increasing tourist satisfaction rather than for environmental management (Oleśniewicz et al., 2020; Rhama, 2020). In line with this, the current research focuses on the environmental management of sustainable tourism in national parks.

Research shows that little progress has been made in implementing sustainable tourism worldwide and in South Africa. This lack of progress is reinforced by the lack of appropriate frameworks and management planning, including approaches supporting sustainable tourism implementation (Glen & Mearns, 2020). This study explains and compares the efforts made by the five national parks in Indonesia and South Africa, two developing countries, in managing, maintaining, and enhancing sustainable tourism. This research is limited to five national parks with similar characteristics. The national parks from Indonesia are Baluran, Kayan Mentarang, and Komodo, while Kruger and Kgalagadi are from South Africa. Baluran was chosen because it has the same savannah ecosystem as Africa, so it is often referred to as Africa van Java. Baluran is the only national park in Indonesia with that characteristic. Kayan Mentarang and Kgalagadi are both positioned on the country border. Kgalagadi is on the border between South Africa and Botswana, while Kayan Mentarang is on the border between Indonesia and Malaysia. Komodo is the oldest national park in Indonesia, like Kruger in South Africa. Similarities between national parks under study are based on similarities in ecosystems, age, and geographic position, not based on standard conservation management approaches.

### **Theoretical framework**

The Tourism Area Life Cycle (TALC) theory has the assumption that the development of sustainable tourism is based on a cumulative amount and an increase in available time based on cycles (R. W. Butler, 1980). From a social science perspective, the TALC theory can be used in observing and evaluating the sustainable tourism view (Hawkins & Mann, 2007). Butler initiated this theory in 1980 which then experienced developments afterward. Based on the TALC theory, the development of the area and its life refers to a cycle that is shown in a cycle consisting of six stages, namely exploration, engagement, development, consolidation, stagnation, and critical point. In the first stage, when a destination has been found, designated, and opened to the public (exploration), the surrounding community will be more enthusiastic because they can improve their economy and have the facilities or infrastructure to develop their area.

With this enthusiasm, the community began to enter the engagement stage to start the development stage. However, over time the euphoria and enthusiasm that appeared at the beginning began to disappear and evaporate so that it harmed tourist destinations (Ionnides, 2008). Furthermore, tourism destinations will experience stagnation because many people then feel disrupted, which in the end, various factors that may appear can lead to positive rejuvenation or negative decline.

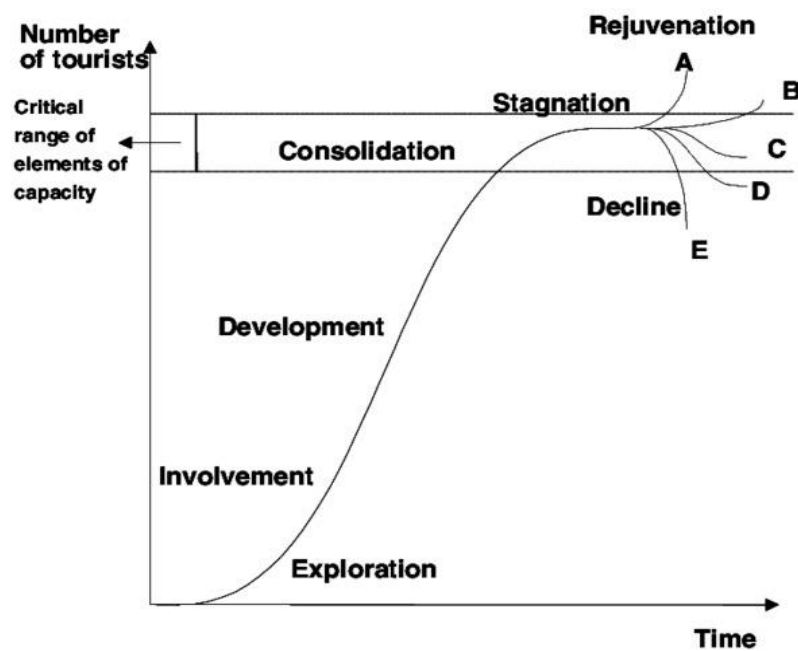


Figure 1. Tourism Area Life Cycle Theory  
 Source: Butler (2004)

Martin (2010) proposed a broader model with the four patterns shown in Figure 2. The four variations and developments of the model include changes and mutation models from the input and output of the TALC model (Brouder & Eriksson, 2013).

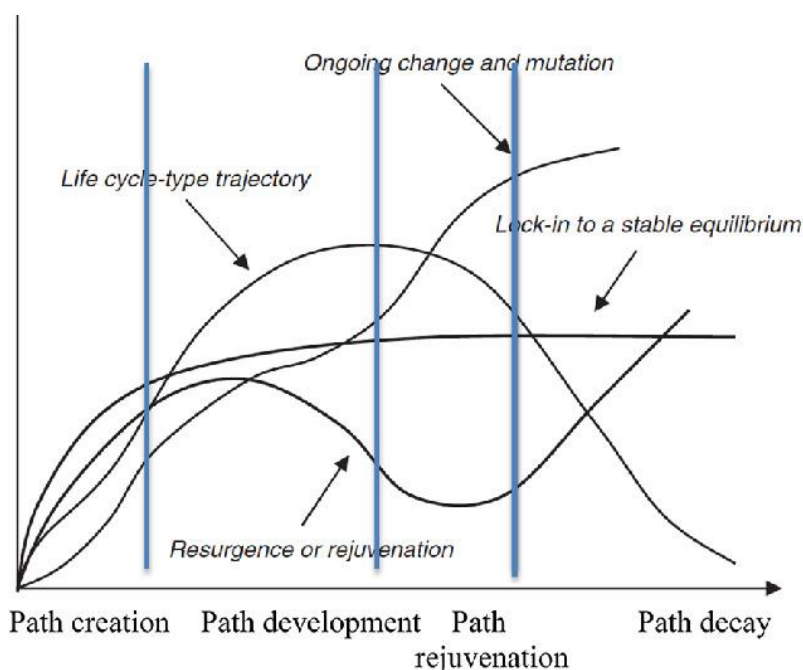


Figure 2. Martin's Life Cycle Model  
 Source: Martin (2010)

In this study, TALC will be applied to interpret the results. As the TALC suggests, destinations tend to have one of the four life cycle patterns: resurgence or rejuvenation, life-cycle type trajectory, ongoing change and mutation, and lock into a stable equilibrium. Each of the

national parks studied could follow any of this trajectory. Using this theoretical framework, we argued that the barriers from the environmental management context might pose a deviation from the better path, from which the judgment of the sustainability of such tourism arises.

## Methods

This study uses a qualitative approach with a literature study method. This research uses a qualitative method because it allows researchers to obtain rich information from the literature and allows the researchers to explain and compare the efforts made by the five national parks in Indonesia and South Africa to manage, enhance, and maintain sustainable tourism. The secondary data was selected in four steps: (1) literature search, (2) study selection, (3) study evaluation, and (4) evidence synthesis (Gough et al., 2012). In the first stage, we used the name of the national park and "sustainable tourism" as the search terms. We conducted electronic searches in the Google Scholar database without constraining the time range. The literature search was performed in July 2020 and renewed in June 2022. We also visited government and transnational organization websites to search for reports related to the development of the national parks studied. In stage 2, we interrogate each study's title and abstract information to ensure the data contains the problems and solutions of the problems relevant to sustainable tourism. In stage 3, we read the full-text information and extracted the problems and solutions mentioned in the title and abstract. Finally, in stage 4, we synthesized the evidence using narrative synthesis (Popay et al., 2006), suitable for data from multiple studies with different methods or research questions. Narrative synthesis uses thematic and content identifiers. For this study, thematic identifiers include the tourism life cycle in the national park. The content identifiers correspond to the obstacles and the policy addressing the obstacles.

## Results and discussion

### *Sustainable tourism in Indonesia*

National parks in Indonesia carry out activities and management based on the regulations in force in Conservation Areas in Indonesia, as stated in Table 1.

Table 1. Regulations in Force in Conservation Areas in Indonesia

Regulations	Years	About
Law No. 5	1990	Conservation of Biological Natural Resources and Their Ecosystems.
Law No. 24	1992	Spatial Planning.
Law No. 5	1994	Ratification of the United Nations Convention on Biological Diversity
Law No. 23	1997	Environmental Management.
Law No. 41	1999	Forestry.
Law No. 7	2004	Water Resources.
Law No. 25	2004	The National Development Planning System.
Law No. 32	2004	Regional Government.
PP (Government Regulation) No. 7	1999	Preservation of Plant and Animal Species.
PP No. 8	1999	The Utilization of Wild Plants and Animals.
PP No. 68	1998	Nature Reserve Areas and Nature Conservation Areas.
PP No. 18	1994	Natural Tourism Exploitation in Utilization Zones of National Parks, Grand Forest Parks, and Nature Tourism Parks.
PP No. 13	1994	Hunting for Hunting Animals.
PP No. 41	2006	Permits to Conduct Research and Development Activities of Foreign Universities, Foreign Research and Development Institutes, Foreign Business Entities, and Foreigners.

Source: Author, processed data

National parks in Indonesia are generally found to have improved over time. The first report and research on sustainable tourism were conducted by Iiyama and Susanti (2004), who

explained the condition of sustainable tourism in Kayan Mentarang National Park. Laapo et al. (2009) describe the improvement of conditions in the Togean Islands National Park. In addition, Merapi and Komodo National Parks also experienced improvements, followed by improvements to Bromo-Tengger-Semeru, Baluran, Mount Ciremai, and Mount Halimun National Parks.

### ***Sustainable tourism in Baluran National Park***

Baluran National Park is a preserved natural area with various native ecosystems and biological resources. Baluran National Park uses a zoning system for tourism, recreation, supporting culture, research, science, and education (Baluran National Park, 2021). The geographical location of Baluran National Park is bordered by the Madura Strait in the north, Bali Strait in the east, villages in the south, and the Kelokoran river in the southwest (Baluran National Park, 2021).

The management of Baluran national park is carried out based on the principles and concepts of conservation of the wealth of living natural resources and their ecosystems, following Law No. 5 of 1990 concerning Conservation of Biological Natural Resources and Their Ecosystems (KSDAHE) and Law No. 14 of 1999 on Forestry. The management carried out by Baluran national park administrators to achieve sustainable tourism is based on the three concepts, namely:

#### *a. Life support system protection*

The protection of the life support system is meant to protect all-natural wealth, biodiversity, and ecosystems around the area that function as life support for humans in particular and nature itself. Protection is carried out not to cause damage but to achieve and maintain sustainable tourism.

#### *b. Preservation of the diversity of plant and animal species and their ecosystems*

National park areas, grand forest parks, and natural tourism parks are managed with efforts to preserve biodiversity to continue to exist sustainably. Efforts to preserve the park are carried out with a zoning management system and several other activities such as protection and security, inventory of area potential, research and development in supporting management, and fostering animal habitats and populations.

#### *c. Sustainable use of living natural resources and their ecosystems*

The sustainable use of biological resources and ecosystems in Baluran National Park is carried out to preserve the existence and encourage the conservation function of the conservation area. In general, activities for the sustainable use of biological resources and ecosystems in Baluran National Park are carried out through: research and development, science and education, making films or video clips, making photographs for commercial purposes, expeditions, development, and utilization of environmental services, nature tourism.

Tourism in Baluran started in 2015, with the prairie biome as the main attraction. Five studies discuss this Baluran national park. Siswanto and Moeljadi (2015) found that the role of the surrounding community in tourism development is still not optimal because it is not directly involved in management and management activities. The research explains the problems faced by sustainable tourism in Baluran national park, namely human resource problems, especially the role of the surrounding community, lack of community support, lack of contribution and coordination from other stakeholders involved, and lack of support in attracting tourists.

Five years later, in the study of Purnomo et al. (2020), it is stated that the development of sustainable tourism in Baluran national park is on the right track. Where the surrounding community is massively and continuously involved with a population that tends to be stable, the community is also involved in decision-making. In addition, by increasing community

involvement, they also gain economic benefits that play a role in achieving and assessing sustainable tourism.

However, an environmental issue faced today by Baluran is the invasive species. A recent study found that the community uses 22% of the Baluran area to herd their livestock. The grazing field is larger than the 8% designated park area remarked as traditional zones. The survey found 2,170 cows and 1,156 goats grazing in the area. 72% of cows and 51% of goats grazing the field are owned by people outside the park rather than the local community (Pudyatmoko et al., 2018). The researchers proposed that the farmers used as caretakers and trained to use the available resources sustainably. The shift in land use needs to be taken since the population of the Baluran megafauna, Javan banteng (*Bos javanicus*) already declined (Pudyatmoko, 2019).

Using the tagline "Little Africa van Java," the existence of cows and goats grazing in the savanna seems unproductive. However, processed cow's milk produced in the buffer village is the primary source of villagers' income from tourism activities. This product is still in their infancy, and the product is only sold by the compilation of orders (Purnomo et al., 2020). Hence, more flexibility in milk production and product diversity is needed to shift Baluran from "Little Africa with cows" to the pure "mini Africa."

Another invasive species is *Vachellia nilotica* trees. The trees have been deemed the source of biodiversity decline in the savannah since 1969. Despite this, no environmentally safe method to control the trees. Zahra (2019) introduces four strategies: physical destruction by uprooting the trunk, chemical destruction using biochar, biological control with competitors, native predators, and microorganisms, and social interventions such as education, utilization, volunteering, collaboration, and ranger training.

There was a hypothesis that the park has an overpopulation of long-tailed macaques (*Macaca fascicularis*). Tourists are pretty fond of meeting these animals, giving them food, and taking pictures of them. However, a survey by Hansen et al. (2019) found that the population is still under control. The invasion of the monkeys to the nearby villages is due to resource abundance. Overpopulation is not on the monkey's side but the community's side.

### ***Sustainable tourism in Kayan Mentarang National Park***

Kayan Mentarang National Park (KMNP) is the largest conservation area on the island of Borneo and is one of the largest conservation areas in the Asia Pacific. KMNP is located in Malinau and Nunukan districts (KSDAE, 2021). The sub-districts covered by the KMNP include the KayanHilir, Pujungan, Bahau Hulu, Sungai Tubu, and Mentarang Hulu sub-districts. KayanMentarang National Park (TNKM) has an area of 1.271.696,56 hectares (based on the Decree of the Minister of Forestry Number: SK.4787/Menhut-VII/KUH/2014) (KSDAE, 2021).

Surveys to determine the condition of the biodiversity of KMNP are mainly carried out by competent parties in their fields, from within the country and abroad. In 2018, 3 different surveys were recorded in the KMNP area and its buffer zone (KSDAE, 2021).

The issue that currently concerns the management and related stakeholders is the threat to the langur monkeys population. In the 2000s, a population decline ranged from 50% to 80% (Atmoko et al., 2018). This decrease occurred due to the illegal hunting of bangat monkeys (*Presbytis hosei*) to take their geliga stones (*bezoar stones*). This geliga stone is found in the digestive tract of bangat, which is believed by the surrounding community to have properties to cure various diseases. However, there are no medical reviews to support this assumption, so the hunting of bangat that is carried out tends not to provide any benefit at all.

In dealing with the problem of threats to biodiversity as one aspect of achieving sustainable tourism, the National Park Office takes several steps to provide prevention. These

steps include cooperating with indigenous peoples to manage the area collaboratively and recruiting dozens of Community Forest Rangers Partners (MMP) and other Forest Security Forces scattered in each SPTN Region and KMNP Resort Area.

The collaborative form in question is manifested in the form of an organizational forum called the KMNP Policy Determination Council (DPK). The main tasks of the KMNP DPK are to manage Kayan Mentarang national park to achieve sustainable tourism by assisting the government in managing KMNP, determining management policies based on the aspirations of various parties within the government, and providing criticism and suggestions regarding the direction of development and development of KMNP, proposing a management body. KMNP to the Minister of Forestry in coordination with the Director-General of PHKA. The principle of collaborative management in KMNP is based on six aspects: community-based, sharing roles, sharing responsibilities, sharing benefits, and referring to the correct National Park Management Plan.

KMNP management activities to achieve sustainable tourism are carried out by the KMNP management body consisting of various parties, namely, local communities. BKSDA/PHK, and NGOs. Although the foundation for management activities has been built, it still requires a long journey and the community's active role in implementing it. There are also other obstacles such as political turmoil, legal certainty, readiness and support of the parties, and conflicts of interest. Iiyama and Susanti's (2004) research shows a good picture of Kayan Mentarang National Park's capacity. Today, Kayan Mentarang National Park has been praised for conserving endemic species and the community's high involvement in protecting the park by their local customary law (Pratama et al., 2017). Community involvement also protects the park from deforestation rampant in Kalimantan (Monthe et al., 2021). A study found that Kayan Mentarang is the only national park in Kalimantan (eight national parks on this island) that experienced positive forest cover change between 2012 to 2017, despite only 0.05% (Dwiyaheni et al., 2021). However, the government has considered a proposal to develop the Trans-Kalimantan Highway project intersecting with Kayan Mentarang National Parks and other protected areas. The highway could disturb the park's ecosystem, including the rare pygmy elephant habitat (Keong & Onuma, 2021). WWF is working to oppose such a project.

### **Sustainable tourism in Komodo Island National Park**

Komodo National Park is the oldest national park in Indonesia. This park was established on March 6, 1980, and has 173.300 Ha, including terrestrial and aquatic areas. Komodo National Park was established to preserve the life of the Komodo dragon (*Varanus komodoensis*) and its natural surroundings. Based on Komodo National Park data in 2018, there are around 2,872 Komodo dragons that live in the area (KNP, 2021).

Komodo National Park has won many international titles, including Man and Biosphere Reserve (1977), World Heritage Site (1991), and The New 7 Wonder of Nature (2011). The awarding of the title is expected to increase the branding position and help to increase tourist visits to Komodo National Park. Komodo National Park office is located on Jalan Kasimo, Labuan Bajo, West Manggarai Regency, Flores, East Nusa Tenggara Province. This National Park is managed directly by the Komodo National Park Office, the Implementing Unit of the Ministry of Environment and Forestry Republic of Indonesia. Komodo National Park has three major islands: Komodo Island, Rinca Island, and Padar Island. In addition to the three main islands, this national park also has many other small islands, namely Gili Motang Island and Nusa Kode Island.

Komodo National Park has people living in 3 villages namely, Pasir Panjang Village (Kampung Rinca and Kampung Kerora), Komodo Village (Kampung Komodo), and

Papagarang Village (Kampung Papagarang) (KNP, 2021). Communities living in the area have participated in preserving Komodo dragons since the time of their ancestors. The people in Kampung Komodo believe that their ancestors were born twins, one baby boy, and one female dragon when they were born into the world. They consider the Komodo dragons family and believe they are related by blood. Therefore, the people of Kampung Komodo never harm Komodo dragons and live with them every day.

Several studies have been conducted by Walpole and his colleagues in the early 2000s (Walpole, 2001; Walpole et al., 2001; Walpole & Goodwin, 2000, 2001). Subsequent research was conducted in 2004 by Hawkins and in 2018 by Lasso and Dales (Hawkins, 2004; Lasso & Dahles, 2018). The research conducted by Walpole is a comprehensive review of sustainable tourism, which explains that the economic benefits in national parks come from outside parties such as tourists and urban communities rather than villagers or residents. Local people earn income by selling goats as food for Komodo dragons because Komodo dragons will not come out if they are not given food. So that when there are fewer tourists, goat sales will also decrease. When the local community was given a questionnaire, the general and positive feedback they gave provided support for Komodo's conservative activities. In 2004, the Komodo dragon population experienced a significant decline to worry many due to predatory dogs and the growth of community settlements (Hawkins, 2004). People who do not benefit from the ecosystem in the conservative area of Komodo National Park use dynamite to catch fish which can damage coral reefs. Lasso and Dahle (2018) suggest that local governments pay more attention to this situation by encouraging fishers to change professions to become souvenir makers.

Today, a survey shows that tourist satisfaction is high (Kurniasari, 2019). However, another species poses a threat to the Komodos. Invasive toad *Duttaphrynus melanostictus* is potentially negatively impacting the population of Komodo. A recent survey by Kennedi et al. (2020) found that the toad does not exist yet on the islands but is available in a large number on nearby Sumbawa island. Even without this threat, Komodo dragons are now showing behavioral change, threatening their survival in the wild (Chakraborty, 2021). Tourism contributed to this behavioral change since tourists gave them too many cattle to eat, making the dragons less alert and too big to move (Rochmyaningsih, 2019). Meanwhile, outside the park, people hunting Timor deer (*Cervus timorensis*), the dragon's main prey, made the dragon smaller and invaded nearby villages to find food. Some are getting killed because of eating people's cattle. The authority proposed a complete shutdown in 2019 but was canceled by the tourism industry protest. When the COVID-19 came, the National Park was forced to complete shutdown in 2020.

However, the pandemic came with another threat. This threat comes from proposals for development projects such as Jurassic Park on the island of Komodo. This park is premium, and tourists have to pay to be able to interact with Komodo. This plan caused controversy in the community because it built a giant building on Rinca Island (Teguh et al., 2021). Over time, public opinion tends to reject the premium destination development plan (Hidayat et al., 2022). Indonesian netizens actively watch the development of this discourse. Asriyani and Verheijen (2020) criticize this plan for ignoring the historical fact that local people have lived together with Komodo dragons for decades. Finally, in August 2021, the UNESCO World Heritage Committee asked the Indonesian government to temporarily suspend the project because it was deemed to be against the principles of sustainable tourism by threatening habitat and risking local people's income (Choirisa et al., 2021).

On the water, Kuempel et al. (2021) evaluate the human impacts on 43 existing marine natural world heritage sites, including Komodo national park. They found that Komodo national park is the third site in cumulative human impact rating. The impacts primarily come





from climate change. While fishing, shipping, and invasive species, contribute little. However, fishing has an impact since the fishers still use toxic tubal materials, and the catch volume gets smaller each year due to the catching done before the fish lays eggs (Sudaryanto & Herdiansyah, 2018).

### ***Sustainable tourism in South Africa***

The growth and development of the global, national park movement have given Africa or South Africa, in particular, a solid impetus to pay more attention to management, funding, and implementation. The development is constantly being improved to preserve Africa's natural habitats by conserving native African flora and fauna. South Africa also focuses on domestic tourism, conducted in conjunction with social tourism programs such as Sho't Left and Via Mzansi (Ramukumba & Moeketsi, 2020). The implementation of National Parks management activities in South Africa by involving the whole role of the relevant parties is carried out by referring to the following legal concepts in Table 2.

Table 2. Regulations in Force in Conservation Areas in South Africa

<b>Years</b>	<b>About</b>
1996	The Constitution of the Republic of South Africa Act No. 108
1998	National Environmental Management Act No. 107
2003	The National Environmental Management: Protected Areas Act No.57
2004	the National Environmental Management: Protected Areas Act No.31

Source: Author, processed data

National parks in South Africa need to focus on new business models, commercialization, non-core activities, and retail activities such as shops, restaurants, and other goods and services in developing conservative areas to participate in developing tourism activities. In addition, this is also in line with the latest SANParks mission. The management needs to carry out their duties based on a solid and appropriate scientific basis to respond quickly to changes in the ever-changing system and adapt to it (Mabunda, 2003).

### ***Sustainable tourism in Kruger National Park***

Kruger National Park is one of the largest national parks in South Africa. It covers an area in the provinces of Limpopo and Mpumalanga in North-Eastern South Africa and extends 360 km (220 mi) from north to south and 65 km (40 mi) from east to west. The administrative headquarters are in Skukuza. Areas of the park were first protected by the government of the South African Republic in 1898, and it became South Africa's first national park in 1926. To the west and south of the Kruger National Park are the two South African provinces of Limpopo and Mpumalanga, respectively. To the north is Zimbabwe, and to the east is Mozambique. It is now part of the Great Limpopo Transfrontier Park. This peace park links Kruger National Park with the Gonarezhou National Park in Zimbabwe and the Limpopo National Park in Mozambique. The park is part of the Kruger to Canyons Biosphere, an area designated by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) as an International Man and Biosphere Reserve.

As the centerpiece of the national park system in South Africa and the world in general, Kruger National Park was established in 1926 and was further expanded by reference to colonial and apartheid laws. At that time, the colonial authorities used racial segregation in controlling land areas while regulating access for residents. Kruger National Park is often used as a reference for park management and has also been raised as a source of research on flora and fauna, ecosystems, biodiversity, and tourism.

A controversial issue among researchers is how to find the best way for national parks to manage various species in conservation areas, especially elephants, when the apartheid regime ended (Novellie, 2018). Other issues facing the Kruger national park were evaluated at a Park Conservation Services Management Committee meeting. The issue is related to foreign or invasive species and the discovery of three diseases that attack fauna species, namely bovine tuberculosis in lions (*Panthera leo*), anthrax, and rabies 2004 to 2007 (Timko & Innes, 2009). Furthermore, Kruger national park managers must pay special attention to monitoring activities related to isolation and fragmentation, illegal hunting, pressure and external attacks, water quality or water contamination, and diseases and pests. The problem of water quality is an essential finding for national park managers because the spatial configuration of the park cannot develop optimally for biodiversity conservation in the form of rivers. So far, the Kruger national park manager is known to be able to solve reorganization problems in a faster and less convertible time.

According to YoY incidents and hunting statistics, wildlife crimes have decreased significantly in Kruger National Park (KNP). Rhino hunting has decreased by 21.61%, and elephant poaching by 43.75% (SANParks, 2020). In the Parks Division, two rhinos were poached in Marakele National Park in January 2020. The existence of the rhinos has become a concern since the target is zero rhino poaching in the parks outside KNP.

The decline in poaching in KNP can be attributed to the implementation of an integrated anti-wildlife crime strategy involving all law enforcement agencies in South Africa and the Greater Limpopo Transboundary Conservation Area, significant arrests made at high levels of the chain hunting command, the Covid-19 outbreak restricting movement and strengthening security on the streets at the end of Q4, success with WASS "Meerkat," advanced surveillance technology deployed in Integrated Protection Zones (IPZ), as well as cooperation between SANParks Special Operations and Special Forces SANDF.

Despite this, some problems persist. Foreign biota, water quantity, and fire management have become the problem in Kruger. *Lantana camara* eradication in Kruger is still ineffective and results in negligible population decline (Dube et al., 2022; Shackleton et al., 2020). However, other alien species such as *Hylocereus undatus*, *Harrisia mortini*, *Eucalyptus spp.*, and *Acacia decurrens* successfully extirpated. The park management can act early by removing the alien species from tourist camps in prioritized order (Shackleton et al., 2020). The management of invasive species has been done since the 1950s (van Wilgen et al., 2020).

Water availability has become a political problem in South Africa. There is a competition for water between the irrigation interest of the local community and the tourism interest of what Peters and Woodhouse (2019) called "white constituencies of tourists and business owners." Even if local community interest is neglected, the park's water is still threatened by urban and industrial wastewater and coal mine water pollution (Houdet et al., 2020). A fatal case has been recorded when a high level of eutrophication water from industrial, mining, and residential waste polluted the Olifants river. The pollution kills a large population of fish, crocodiles, and water birds (Mirzabaev et al., 2019). Climate change also gave another challenge to water availability. The river flows in the park tend to change, and some sensitive species might cease to exist (Ramulifho et al., 2019).

In line with water scarcity, dry season fires have threatening the park. The probability of fire occurrence dramatically increases because of global warming, especially following years of above-average rainfall and grass biomass accumulation (Nieman, 2021). Some actions have been done, such as adaptive fire management (Rego et al., 2021). Still, research suggests that mega-fires clearer management goals need to be formulated (Cassidy et al., 2022).

### ***Sustainable tourism in Kgalagadi National Park***

Kgalagadi National Park is a large wildlife preserve and conservation area in southern Africa. It comprises two adjacent national parks: the Kalahari Gemsbok National Park in South Africa and the Gemsbok National Park in Botswana, with 38,000 square kilometers (15,000 sq mi) (SANParks, 2016). About three-quarters of the park lies in Botswana and one-quarter in South Africa. Kgalagadi means "place of thirst." Kgalagadi National Park has benefited from an increasingly international profile regarding the importance of ensuring a long-term conservation area of the wealth of natural resources, biodiversity, and ecosystems.

Based on the national environmental management of Protected Areas Law No. 57 of 2003 NEM: PAA, SANParks began to revise the management plan of Kgalagadi national park. The comprehensive process carried out includes, among others, adaptive management planning that refers to the desired development goals or targets, including achieving sustainable tourism, compiling a hierarchy of goals by reviewing the park zoning area, and determining the choice of higher and lower plans according to the necessary changes. Section 39(3) of NEM: PAA states that all parties involved, interested in, and affected by the existence of a conservative area have an equal opportunity to participate and provide comments on the planning changes. Article 41(2e) of NEM: PAA explains if the conservative area management plan includes at least the procedures for participation, including the participation of owners, local communities, or other interested parties.

Furthermore, the strategy for involvement and development of stakeholder roles is based on the SANParks guidelines for stakeholder engagement in Chapter 5 of the Environmental Management Law. Efforts to achieve sustainable tourism include creating channels and opportunities for disseminating and expanding information; promoting opportunities and forming understanding between various interested parties; providing opportunities for stakeholders and the public to provide inputs; and improving the decision-making process (SANParks, 2016). In addition, some values are applied: using a complex view of world systems and concepts while ensuring that nature functions and the long-term sustainability of ecosystems are well managed; promotions are carried out to ensure the resilience and integrity of the ecosystem with minimal interference; carry out the task of fully preserving biodiversity for future generations and understand that natural and social systems will continue to change and develop over time and overtime.

A study by Tichaawa and Lekgau (2020) concluded that Kgalagadi Transfrontier Parks is a low-impact protected area that restricts the scale of tourism and diversifies tourism activities to adjacent communities. However, for Kgalagadi, climate change has become one of the most significant threats (Saarinen et al., 2020). The park has become a refuge for people to avoid extreme temperatures in autumn and spring. The tourists' visits will decline as the temperature increases (Coldrey & Turpie, 2020). As for the local problem, the danger of trading game and poaching encouragement is considerable since several park CPA (Communal Property Association) projects have failed. The government has neglected Indigenous people who farm in the area for financial and technical support while unable to manage the farms. People then will engage in these crimes for livelihood survival (Senoamadi, 2019).

Table 3 shows each national park's characteristics selected to be used as a case study in this research.

Table 3. Distinguishing Characteristics of Six Case Study National Parks in Indonesia and South Africa

National Park	Location and Country	Geographical location	Year Established	Size	Regional Description	Main environmental management issues
Baluran National Park	Raya Banyuwangi Street, Situbondo Km. 35 Wonorejo, Banyuputih, East Java, Indonesia.	It is bordered by the Madura Strait, Bali Strait, Wonorejo village, Bajulmati river, Bajulmati village, Watukebo village,	1980	25.000 Ha	Specific dry forests consist of savanna vegetation types, mangrove forests,	Biodiversity loss (Javan banteng), invasive species (foreign trees, cows, and goats), long-tailed monkeys

		Kelokoran river, and Sumberwaru village.			monsoon forests, coastal forests, lower mountain forests, swamp forests, and forests that are always green throughout the year.	invasion buffer villages
Kayan Mentarang National Park	Government Center Street, TanjungBelimbing, Pujungan, Malinau Regency, North Kalimantan, 77562, Indonesia	In the northern part of East Kalimantan Province, precisely in the Malinau Regency, Nunukan Regency, and Bulungan Regency, directly adjacent to Sabah and Sarawak, Malaysia. Most of the area belongs to Malinau Regency, and some are included in Nunukan Regency.	1980	1.271.696 Ha	It has several forest types, such as mossy forests and lowland rainforest, with coverage from upstream to downstream.	Biodiversity loss (langur monkeys), the threat from the Trans-Kalimantan Highway project
Komodo National Park	Kasimo Street, Komodo National Park Hall, Labuan Bajo, West Manggarai Regency, Flores, East Nusa Tenggara Province 86754	In Labuan Bajo, West Manggarai Regency, Flores Island, East Nusa Tenggara Province	1980	173.300 Ha	Komodo Island, Rinca Island, and Padar Island. Also, other small islands, namely Gili Motang Island and Nusa Kode Island. <b>Thriving coral reefs.</b>	Invasive species (dogs, toads), fish sustainability (toxic materials, catching before laying eggs), behavioral change (less alert or invade nearby villages), "Jurassic Park" project, coral bleaching due to climate change
Kruger National Park	Eastern Mpumalanga and Limpopo provinces, South Africa	In the Transvaal Province, bordering Mozambique and the Sabi Sand Reserve	1898	1.948.500 Ha	South African Lowveld ecoregion	Foreign biota, water quantity, fire management, diseases (bovine tuberculosis, anthrax, and rabies)
Kgalagadi National Park	Kgalagadi District, Botswana, Northern Cape, South Africa	The park straddles the border between South Africa and Botswana and comprises two adjoining national parks, namely, Kalahari Gemsbok National Park in South Africa and Gemsbok National Park in Botswana	1931	3,800.000 Ha	Southern Kalahari coregion	Rising temperatures, game trading, poaching encouragement.

Source: Author, data processed

Environmental management issues in this study's national parks potentially severely affected sustainable tourism development. We have identified ten problems from the review, as depicted in Table 4.

Table 4. Environmental management issues affected sustainable tourism development in the national parks

Threats	Parks	Country
Biodiversity loss	Baluran, Kayan Mentarang, Komodo, Kruger	Indonesia and South Africa



Invasive species	Baluran, Komodo, Kruger	Indonesia and South Africa
Outward invasion	Baluran	Indonesia
Infrastructure development	Kayan Mentarang, Komodo	Indonesia
Behavioral change	Komodo	Indonesia
Climate change	Komodo, Kgalagadi	Indonesia and South Africa
Water scarcity	Kruger	South Africa
Forest fire	Kruger	South Africa
Illegal hunting (poaching)	Kayan Mentarang, Kgalagadi	Indonesia and South Africa
Faunal diseases	Kruger	South Africa

Source: Author, processed data

Almost all national parks, except Kgalagadi, reported biodiversity loss. Water issues are ever-present and unique to Kruger. The issue absent in Baluran, despite its ecosystem similar to Africa, is probably because of its tropical position. National parks in the border area, such as Kayan Mentarang and Kgalagadi, faced more obstacles from poaching. For Kayan Mentarang, the closed nature of the dense jungle ecosystem prevents officers from effectively monitoring the forest remotely, same as Kgalagadi, which, despite being arid, has been covered in some areas by dense bush. Threat from infrastructure development only exists in Indonesian parks in the form of road penetration in Kayan Mentarang and build environment in Komodo. Outward invasion only exists in Baluran, while behavioral change is only reported in Komodo. Old national parks such as Komodo and Kruger, and Baluran, designated in the same year as Komodo in 1980, faced invasive species problems. Climate change is threatening Komodo, Kruger, and Kgalagadi sustainability. Problems unique to Kruger are water scarcity, faunal diseases, and forest fire.

Environmental problems seem to affect the sustainability of tourism in these national parks. The impact reflected from the reviewed research and without proper measures could be driving down the tourist visits to the park, either in qualitative or quantitative terms. Of course, there will be some effects from the park's general management practices, such as marketing and tourist management. These at least put the parks' destiny to flat curve of lock into a stable equilibrium in TALC, rather than the declining curve of life-cycle type trajectory. However, this is not an ideal trajectory since sustainable tourism needs to change continuously as an adaptive system, fairly represented by ongoing change and mutation patterns.

National parks in Indonesia and South Africa have a clear legal basis that regulates boundaries and guidelines for managing, controlling, and conserving biodiversity, natural resources, wildlife, ecosystems, the environment, water resources, zoning systems, and various other details regulated in it. This legal basis is the basis for the national park management so as not to cross the line in carrying out its activities while considering the interests of many related parties and stakeholders. So we have the policy, but the implementation is far from perfect. In this way, we need a more focused framework that addresses the sustainability issues sequentially yet is still comprehensive.

## Conclusion

National parks in Indonesia and South Africa are faced with many unique and general problems. National parks in both countries faced biodiversity loss, invasive species, climate change, and illegal hunting. Baluran has a unique problem of outward invasion of long-tailed monkeys, while Komodo National Park is faced with a behavioral change of the prime megafauna, the Komodo dragon. Kruger National Park's water and fire problems are unique compared to other national parks reviewed.

A practical management framework and planning are needed to overcome obstacles and threats so that national park management can implement sustainable tourism practices. This practical management framework and planning needs to account for the community

around the national park, its biodiversity, and the resources needed by managers and the park's life itself, such as water and human resources. Savannah-based national parks need to focus more on water availability. In contrast, border-based national parks need to focus on biodiversity, which involves more conservation and security programs to address diseases and illegal hunting. Old national parks need to focus more on invasive issues, such as invasive species and human interactions.

Each obstacle faced by the respective national parks in Indonesia and South Africa needs to be identified regarding the suitability of the mechanisms carried out with the framework and management planning. Many models lack scalability and replicability, so they cannot be well articulated and often lead to unclear or incorrect implementations and interpretations. The point is that a suitable framework needs to be adapted to the conditions of each national park.

In addition, in supporting the realization of sustainable tourism, it is necessary to involve stakeholders such as the national government, provincial governments, and local governments, including residents and other stakeholders affected by the existence of the national park. The involvement in question is carried out in policymaking through joint decisions, promotion collaboration, and reducing efforts that were not accommodated previously. Management frameworks and plans must be flexible, adaptable, and accessible to the general public, including tourists. The framework developed also needs to refer to the points presented by UNESCO.

As for theoretical implications, we found that the physical nature of the national parks (ecosystem, position, and age) has implications for sustainable tourism management, which in turn affects the general sustainability issues faced by the national parks. These findings suggest that physical factors pushed the national parks into a lock-in stable equilibrium in Life Cycle Model since the factor is ever-present in the national parks. However, some mechanisms addressing the soft factors, such as human resources, community involvement, or tourist awareness, could suppress the contribution of physical factors to the sustainability of national park tourism. Our study observed ongoing change and mutation patterns since all national parks are working hard to formulate and implement new policies. Despite this, the awareness and readiness to tackle physical factors should always be in force for optimal park management. Consequently, this research contributes to the Life Cycle Model of national parks' sustainable tourism.

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