

Cumulative Impact Assessment Analysis on Tourism Activity Patterns in the Mandalika Area of Central Lombok

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Abstract

This study aims to evaluate tourist activity patterns and their cumulative impacts in the Mandalika Tourism Special Economic Zone (KEK Mandalika), focusing on three main attractions: the Mandalika International Circuit, Kuta Mandalika Beach, and Merese Hill. The rapid development of sport tourism and coastal tourism has increased tourist mobility between destinations, potentially generating cumulative environmental, social, and infrastructural impacts. This research employs a qualitative descriptive approach using the Cumulative Impact Assessment (CIA) framework. Data were collected through field observations, semi-structured interviews with local stakeholders, documentation, and secondary data from official tourism reports. The analysis identifies tourist movement patterns, impacted components, and the accumulation of impacts arising from interconnected activities across the three locations. A CIA interaction matrix was applied to classify impact intensity into low, moderate, and high levels. The results indicate that tourist movements are dominated by multiple and complex destination patterns, intensifying pressure within a single visit period. Environmental impacts show high cumulative pressure, particularly related to waste generation, vegetation disturbance, and noise, while infrastructure experiences significant pressure due to traffic volume and parking limitations. Socio-economic impacts are generally moderate, reflecting both economic benefits and social crowding. This study concludes that the CIA approach is effective for assessing interconnected tourism impacts and supports integrated and sustainable tourism management in Mandalika.

Keywords: Mandalika SEZ; Cumulative Impact Assessment; Tourist Movement Patterns; Sustainable Tourism

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Introduction

Tourism is a strategic sector in Indonesia's national development because of its contribution to economic growth, job creation, and improving community welfare.(Hamid et al., 2025)However, tourism development cannot be separated from the issue of environmental sustainability, considering that the environment has an important role in supporting all human activities.(Sudiani & Arthanaya, 2022) As the intensity of land use and natural resources increases, environmental sustainability has become a key issue in various global discussions. One sector closely linked to this issue is eco-tourism, which is highly dependent on the quality of ecosystems and environmental carrying capacity Chandrabuwono et al., 2025) . This development can impact the tourism sector by giving rise to social and environmental issues that require a new tourism model. To support sustainable tourism, a paradigm is emerging with the concept of environmentalism and a return to nature, which is included in alternative tourism.(Eli Santika & Setyono, 2025)

Tourism activities have the potential to provide economic benefits, for example through regional income and job creation.(Irawati & Prasetyo, 2025; Sujani et al., 2025)However, increasing the intensity of tourism activities also often causes disproportionate pressure on environmental resources and social structures if not managed in an integrated manner.(Maharani et al., 2025; Yanyan, 2025)Mass tourism literature also points to phenomena such as overtourism, a condition where the number of tourist visits exceeds the environmental and social capacity of the local community, resulting in negative impacts in various aspects including the quality of life of residents and pressure on natural resources.(Witara, 2024). In addition, research on the impact of tourism visits is not only direct but also accumulative in nature regarding changes in land use, pressure on infrastructure, and the socio-cultural dynamics of the community (Yusuf & Hadi, 2020).

The Mandalika area in Central Lombok Regency has developed into one of Indonesia's leading tourism destinations through the development of large-scale tourism infrastructure, including Special Economic Zones (KEK) and international event facilities such as the MotoGP circuit, in addition to the potential for marine tourism such as Kuta Beach which is one of the tourist attractions in this area known for its white sandy beaches, shallow waters, and coastal panoramas that attract domestic and international tourists. The Merese Hill area also has potential in the coastal hilly area located in the eastern part of Kuta Mandalika and is one of the leading natural tourist destinations in the Mandalika area.



Figure 1 Tourism Potential of Mandalika Special Economic Zone

This area is characterized by hilly topography with natural vegetation and open ocean views, which are a major tourist attraction, especially for landscape tourism and photography. Merese Hill also serves as a natural open space with high ecological and visual value within the Mandalika coastal system. This development makes Mandalika part of the government's efforts to strengthen the growth of the national tourism sector while increasing local economic opportunities through increasing tourist visits. Hosting tourism activities and major events in this area has complex social, economic, and environmental impacts on the surrounding community and coastal ecosystem. (Satiadji Ria Amirosa, 2024).

The Cumulative Impact Assessment (CIA) approach is crucial as a basis for sustainable tourism planning because it allows for a more comprehensive consideration of a destination's tourism carrying capacity. CIA focuses on analyzing the cumulative impacts arising from multiple, interacting activities within a region, rather than solely assessing the impact of a single activity or project in isolation. This approach allows for a more comprehensive understanding of how the combination of tourism activities, infrastructure development, and tourist movement can trigger increasing environmental and social pressures over time. (Hamman, 2025).

In the context of the Mandalika Special Economic Zone (KEK), the application of CIA is highly relevant because tourism activities at the Mandalika International Circuit, Kuta Mandalika Beach, and Merese Hill are interconnected within a single tourist movement system. Existing conditions indicate increased waste generation, pressure on coastal and hillside vegetation, traffic congestion, and limited supporting facilities, especially during peak seasons and large-scale events. Without a cumulative impact assessment, these pressures have the potential to be overlooked and can degrade the environmental quality and comfort of the tourist area. Therefore, the CIA approach is used in this study to identify and evaluate the combined impacts of tourist activities, while also providing the basis for developing a more integrated and sustainable Mandalika tourism management strategy.

Research methods

This study aims to evaluate tourist activity patterns and their cumulative impacts in the Mandalika Tourism Area, focusing on the Mandalika International Circuit, Kuta Mandalika Beach, and Merese Hill. A descriptive qualitative approach was used, using the Cumulative Impact Assessment (CIA) method, to analyze the interconnectedness and combined impacts of various tourism activities on the area's environment, society, and infrastructure.

Data collection was conducted through field observations, interviews, literature review, and documentation. Observations and interviews were used to identify the type and intensity of tourist activities and community perceptions of tourism impacts, while literature review and documentation served as supporting theoretical analysis and existing conditions of the area. This approach allows for a comprehensive assessment of tourism impacts within an integrated tourism area system.

The analysis stages in this study refer to a Cumulative Impact Assessment (CIA) framework simplified for group study purposes. The analysis begins with defining the study area boundaries, followed by identifying tourist activities and the impacted environmental, social, and infrastructure components. Next, an impact accumulation analysis is conducted to assess the interaction between locations and activities, and then evaluate the impact's significance level (low, medium, or high). The CIA analysis results are used as the basis for developing area management recommendations, such as activity zoning arrangements, visitor capacity restrictions, and sustainable tourism management strategies in the Mandalika area. A clearer explanation of the CIA analysis stages can be seen in Figure 1 below.



Figure 2 CIA Analysis Stages

Results and Discussion

Overview of the Research Area

Study Location

This research was conducted in Kuta Village, Pujut District, Central Lombok Regency, West Nusa Tenggara (NTB) Province, which is part of the Mandalika Special Economic Zone (KEK). The Mandalika SEZ was developed as a national strategic tourism area that integrates various tourism functions, ranging from sports tourism, coastal nature tourism, to panoramic tourism. The development of this area is characterized by increasing tourist visits and supporting tourism activities that have the potential to have cumulative impacts on the environment, society, and infrastructure.

The research focus is limited to three main destinations: the Mandalika International Circuit, Kuta Mandalika Beach, and Merese Hill. These three locations were chosen because they have distinct tourism activity characteristics yet are interconnected within a single tourist movement system. The Mandalika Circuit serves as a hub for sports tourism and large-scale events, Kuta Mandalika Beach



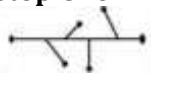

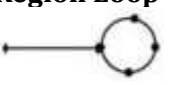
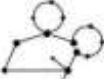
as a center for beach tourism and mass recreational activities, and Merese Hill as a panoramic destination serving as a tourist stopover.

Tourist Movement Patterns

The Mandalika Special Economic Zone (KEK) is a national strategic tourism area boasting a diverse range of coastal, hilly, and culturally diverse tourist destinations. These natural and cultural destinations form a spatially and functionally integrated tourism system, supporting sustainable tourism development in the southern region of Lombok Island.

Based on the results of field observations and the characteristics of tourist activities, the dominant tourist movement patterns that are relevant to this research are the Multiple Pattern and Complex Pattern, while the Single Pattern is relatively limited and not dominant in the context of the Mandalika area.

Table 1. Types of Movement Patterns

Movement Pattern	Pattern Types	Description
I. Single Pattern	Single Point 	There's no movement during the visit to a destination. Tourists visit one destination and return along the same route.
	Base Site 	Tourist movement patterns begin from their place of origin to their primary destination and then continue to secondary destinations. In this pattern, there can be more than one secondary destination.
	Stop Over 	The movement pattern of tourists focuses on the main destination, but on the way they visit several interesting secondary destinations that are visited by tourists.
II. Multiple Pattern	Chaining Loop 	Tourist movement patterns resemble a circle, with no repeating destination routes. Tourists travel by visiting several destinations according to their travel goals.
	Destination Region Loop 	Tourist movement begins with a route circling other destinations. After completing a circular tour (circular pattern), tourists return to their starting point via the shortest route between the main destination and the starting point. This pattern is a combination of single-point and chaining loops.
	Complex Neighborhood 	It is a combination of two or more of the tourist movement patterns mentioned previously.

Source:(Damayanti, 2024)

The dominant tourist movement patterns in the Mandalika area in this study show a combination of multiple and complex patterns. The multiple pattern is the most common pattern, where tourists have one primary destination (base site) and then continue to visit one or more secondary destinations before returning to their starting location. In the context of Mandalika, the Mandalika International Circuit serves as the primary destination, especially during international events. Next, tourists continue their journey to Kuta Beach Mandalika as a secondary destination for beach recreation and culinary activities, and to Merese Hill as a stopover destination to enjoy the natural panorama and sunset. This movement pattern increases the intensity of tourist mobility in a relatively short period of time, thus triggering accumulative pressure on the area's environment, society, and infrastructure.

Furthermore, a complex tourist movement pattern was also found, specifically the destination-region loop type. In this pattern, tourists visit several destinations within the same area sequentially without returning to the same starting point, forming a travel cycle within the Mandalika area. Tourist movement can start from Kuta Mandalika Beach, continue to Merese Hill, then head to the Mandalika Circuit, and end at another destination within the area. This pattern indicates that Mandalika functions as a unified integrated tourism system, where interactions between destinations occur intensively. This condition contributes to the emergence of accumulative impacts, such as increased vehicle volume, pressure on parking facilities and road access, increased cross-location waste generation, and pressure on environmental carrying capacity, which are the main focus of the Cumulative Impact Assessment (CIA) analysis in this study.

Tourist Characteristics

Number of Visits

The Mandalika Special Economic Zone (SEZ) is a national super-priority destination that has seen a significant increase in tourist visits in recent years. Data released by the Indonesia Tourism Development Corporation (ITDC) and official government media shows an upward trend, particularly during national holidays and international events. For more details, the number of visits to the Mandalika SEZ can be seen in the following table:

Table 2. Number of Tourist Visits 2022-2024

Tourist Destinations	Event Type	Year	Number of Tourists	Tourist Origin
Pertamina Mandalika International Circuit	MotoGP	2022	102,801 people	Local and International
		2023	102,929 people	Local and International
		2024	121,252 people	Local and International

	World Superbike (WSBK)	2021	25,000 people	Local and International
		2022	51,629 people	Local and International
		2023	59,251 people	Local and International
Kuta Mandalika Beach Merese Hill	-	2023	438,000 people	Local and International
Merese Hill	-	-	-	Local and International
Merese Hill	-	2023	6,200 people	Local and International

Source: Ministry of Tourism and Creative Economy and Previous Research

Origin of Tourists

Based on tourist origin, visits to the Mandalika Tourism Area are still dominated by domestic tourists. This dominance is influenced by several factors, including easy accessibility to Mandalika, intense national tourism promotion, and Mandalika's designation as a super-priority destination in Indonesia. These conditions make Mandalika a prime destination for domestic tourists, particularly during national holidays.

Table 3. Tourist Origin

Tourist Origin	Amount	Percentage
Domestic Tourists	39,628 people	±83%
Foreign Tourists	4,403 people	±17%
Total	47,786 people	100%

Source: ITDC (2024). Report on Tourist Visits to the Mandalika Area during the 2024 Eid Holiday Period. InJourney Tourism Development Corporation.

Meanwhile, according to data from the Ministry of Tourism and Creative Economy, the number of foreign tourist visits from abroad, who visited the Kuta village tourist destination with the highest number of visits, namely:

1. Malaysia with 234,466 visits
2. Australia with 159,308 visits
3. China with 114,260 visits
4. Singapore 106,963 visits
5. Timor Leste with 66,374 visits

Length of Stay

Based on 2025 data from the West Nusa Tenggara Statistics Agency (BPS), the average length of stay for tourists in star-rated hotels ranges from 1.8 to 2.0 days, while those staying in non-star-rated hotels average 1.5 to 1.7 days. This indicates that the Mandalika area is dominated by short-term tourist visits, primarily domestic tourists coming for short-term recreation or to attend specific activities and events.

Interview and Observation Results

Interview Results

Interviews with local residents, small business owners, and tourists in the Kuta Mandalika Village area indicate that tourism development in the Mandalika Special Economic Zone (KEK) has had a multifaceted impact. From a socio-economic perspective, most respondents stated that the increase in tourist visits, particularly during major events like MotoGP, has opened up new economic opportunities for local residents, such as increased income from trade, transportation services, and culinary businesses. Tourism activities centered around the Mandalika Circuit, Kuta Mandalika Beach, and Merese Hill also encourage the intensity of tourist movement within the area.

However, respondents also highlighted the increasingly significant negative impacts on the environment, particularly during peak visitor periods. Some residents expressed concerns about the increasing volume of waste, waterway pollution, and declining cleanliness around the beaches and hillside areas. Both domestic and international tourists generally acknowledged Mandalika's natural appeal, but also noted that environmental management, particularly waste management and sanitation facilities, remains suboptimal and needs improvement to ensure the area's sustainability.



Figure 3 Interviews with Residents and Visitors to the Mandalika Special Economic Zone

Source: 2025 Field Survey

Observation Results

Based on field observations conducted around Kuta Mandalika Beach and the tourist route leading to Merese Hill, several environmental issues relevant to the cumulative impact analysis were identified. Existing conditions indicate the accumulation of domestic and tourist waste in several locations, including open areas, roadsides, and drainage channels. The waste found was predominantly single-use plastics, beverage bottles, and leftover food packaging, indicating high levels of tourism activity without adequate waste management.

Furthermore, observations of waterways indicate sedimentation and pollution due to accumulations of organic and inorganic waste that obstruct water flow. This condition has the

potential to degrade the quality of the coastal environment and increase the risk of flooding, especially during the rainy season. In several locations around residential areas and tourist access, there is also a lack of trash receptacles and cleanliness monitoring, resulting in waste being disposed of indiscriminately.

Overall, these observations corroborate the interview findings that increased tourism activity in the Mandalika Special Economic Zone (SEZ), particularly in the three main research destinations, has created cumulative environmental pressures. This provides an important basis for implementing a Cumulative Impact Assessment (CIA) analysis to assess the impact interactions between locations and formulate more sustainable tourism management strategies.



Figure 4. Existing Conditions Around the Mandalika Special Economic Zone

Source: 2025 Field Survey

Identification of Research Location Boundaries

The Mandalika Special Economic Zone (KEK) is a national strategic tourism area developed as an integrated destination based on nature tourism, sports, and coastal recreation. In this study, the study area boundaries are focused specifically on three main tourist attractions: the Mandalika International Circuit, Kuta Mandalika Beach, and Merese Hill. These three locations are located within a single spatial unit in Kuta Village, Pujut District, Central Lombok Regency, and are directly related to tourist movement patterns and activities in the Mandalika area.

The selection of these three tourist attractions was based on the consideration that each represents a different function and character of tourism activities, yet they are functionally interconnected. The Mandalika International Circuit serves as a center for sports tourism activities and large-scale events, which triggers a surge in tourist visits at certain times. Kuta Mandalika Beach serves as a center for beach recreation, culinary, and accommodation activities, while Merese Hill serves as a natural and panoramic tourist destination frequently visited as a stopover. The interaction between these locations creates an intensive pattern of tourist movement within one area. For more details on the research locations, see Figure 1.



Figure 5 Research Boundary Map

Source: Research Processed 2025

From a Cumulative Impact Assessment (CIA) perspective, these three tourist attractions represent key hotspots for the accumulation of environmental, social, and infrastructure impacts. The concentration of tourists at the Mandalika Circuit during major events leads to increased traffic flow to Kuta Beach and Merese Hill, which in turn triggers cumulative pressures in the form of congestion, increased waste generation, pressure on parking facilities, and degradation of the coastal and hillside environment. Therefore, limiting the study area to these three locations is considered the most representative for identifying and analyzing the combined impacts of tourist activities within the integrated Mandalika tourism system.

Identification of Affected Components

Identification of impacted components was conducted to identify environmental, social, and infrastructure elements that could potentially experience cumulative impacts due to the intensity and patterns of tourist activity in the Mandalika Special Economic Zone (SEZ). In the context of this research, impacted components were analyzed in an integrated manner across three main objects: the Mandalika International Circuit, Kuta Mandalika Beach, and Merese Hill, which are interconnected by tourist activity within a single regional system.

Table 4. Identification of Affected Components

Component	Affected Aspects	Mandalika Circuit	Kuta Mandalika Beach	Merese Hill
Environment	Noise	Height during racing events	Low-medium	Low

	Waste generation	High during big events	Medium-high (daily tours)	Currently
	Land/vegetation conditions	Changes in built-up land	Pressure on coastal vegetation	Trekking route pressure
Social	Visual quality of the landscape	Affected by mass activity	Relatively well maintained	Potential to decline due to overcapacity
	Local economic activities	Significant improvement	Increasing MSMEs and tourism services	Improvement of informal services
	Visitor density	Height during the event	High on weekends/holidays	High in the afternoon
Infrastructure	Visitor comfort	Fluctuates during events	Downhill during peak hours	Decrease when overcapacity
	Access and traffic	High pressure during the event	Crowded during the holiday season	Busy at certain times
	Parking facilities	Often insufficient	Limited	Limited
	Sanitation facilities	High pressure	Medium-high pressure	Limited

Source: Research Processed 2025

Identification of Impact Accumulation Analysis (Cumulative Impact Assessment)

An impact accumulation analysis was conducted to identify and evaluate the combined impacts of various tourist activities and tourism support activities occurring simultaneously in the Mandalika Tourism Area, specifically at the Mandalika International Circuit, Kuta Mandalika Beach, and Merese Hill. This approach is important because each location does not stand alone but is interconnected through tourist movement patterns, particularly during peak visitor periods and large-scale events.

Accumulated impacts are analyzed by examining the interactions between tourism activities, such as sporting events, beach tourism, and hillside nature tourism, on environmental, social, and infrastructure components. Cumulative impacts arise when pressures from these various activities occur simultaneously, increasing the intensity of impacts that cannot be identified if only analyzed partially. An example is the surge in tourist numbers during an event at the Mandalika Circuit, which then spreads to Kuta Mandalika Beach and Merese Hill, creating double pressure on waste management, parking capacity, and environmental comfort.

Table 5 Identification of Cumulative Impact Assessment Analysis

Affected Components	Mandalika Circuit Tourism Activities	Kuta Mandalika Beach Tourism Activities	Merese Hill Tourism Activities	Accumulative Impact Level
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Environment	High noise during events, vehicle emissions	Tourist waste, pressure on coastal ecosystems	Erosion of trekking paths, vegetation disturbance	Tall
Socio-Economic	Increasing the income of MSMEs and the workforce	Local economic activity increases	Parking and local guide services are growing	Currently
Road Infrastructure	Traffic density during big events	Daily tourist vehicle surge	Irregular parking	Low-Medium
Parking Facilities	Parking limitations during international events	Informal parking on the roadside	Limited parking	Medium-High
Garbage and Cleanliness	Temporary trash during the event	High daily waste generation	Light trash from tourists	Medium-High
Visitor Comfort	Crowds during big events	Overcrowding during the holiday season	Density at sunset/sunrise time	Currently

Source: Research Processed 2025

- **Low Impact:** The impact is local, unsustainable, and easily controlled.
- **Moderate Impact:** The impact begins to affect the comfort and function of the area if it is not managed properly.

High Impact: Significant impacts, cumulative in nature, and have the potential to reduce environmental carrying capacity and the quality of tourist areas.

The analysis shows that environmental and infrastructure impacts have the highest cumulative impacts, primarily due to increased tourist movement between the Mandalika Circuit, Kuta Mandalika Beach, and Merese Hill within a relatively short visit period. This situation reinforces the urgency of implementing a CIA-based area management strategy.

Impact Level Evaluation

An impact evaluation was conducted to assess the cumulative impact of tourist activity at three key locations in the Mandalika area. This assessment used a classification of low, medium, and high based on activity intensity, visit frequency, and carrying capacity of each location. For more details, see Table 6 below:

Table 6. Impact Level Evaluation

Affected Components	Mandalika Circuit	Kuta Mandalika Beach	Merese Hill	Evaluation Description
Environment	Tall	Tall	Tall	Major event activities at the circuit, mass beach tourism, and panoramic visits to Merese Hill cause accumulation of rubbish, noise, land erosion, and pressure on natural vegetation.
Social – Economic	Currently	Currently	Low	Provides economic benefits for local communities, but in locations with high activity, it has the potential to cause density, spatial conflicts, and changes in community activity patterns.
Infrastructure	Tall	Currently	Currently	The surge in vehicles and the need for parking are high at the circuit, while Kuta Beach and Merese Hill experience limited basic facilities during the peak season.
Accumulation Between Locations	Tall	Tall	Tall	Multiple and complex travel patterns cause stress across locations within a single visit, magnifying the cumulative impact of the region.

Source: Research Processed 2025

The evaluation results show that the Mandalika Circuit and Kuta Mandalika Beach have a relatively higher cumulative impact than Merese Hill. This situation indicates the need for integrated area management to mitigate environmental, social, and infrastructure pressures resulting from the multi-faceted and complex tourist activity patterns.

Management Recommendations

Based on the results of the Accumulative Impact Evaluation, which showed variations in environmental, socio-economic, and infrastructure components at the Mandalika Circuit, Kuta Mandalika Beach, and Merese Hill, an integrated and sustainable area management strategy is required. These management recommendations are formulated based on the Cumulative Impact Assessment (CIA) principle, which emphasizes controlling combined impacts across locations and time.

The primary objective of these recommendations is to minimize cumulative negative impacts, maintain environmental carrying capacity, and maintain the economic benefits of tourism for local communities. The management recommendations are presented in the following table:

Table 7. Management Recommendations Based on Accumulative Impact Level

Location	Major Components Affected	Impact Level	Management Recommendations
Mandalika Circuit	Environment & Infrastructure	Tall	a. Visitor capacity management during large events - Centralized traffic and parking management & Event waste management system (temporary waste station)
	Social - Economic	Currently	b. Organized involvement of local MSMEs & Arrangement of trader zones so as not to disrupt circulation
Kuta Mandalika Beach	Environment	Tall	a. Determination of zoning for beach tourism activities & Addition of separate trash bin facilities - Educating tourists about beach cleanliness
	Infrastructure	Currently	b. Parking arrangements on the edge of the area & Improvement of public sanitation facilities
Merese Hill	Environment	Tall	a. Limitation of daily visitor quota & Arrangement of official trekking routes - Supervision and regulation of tourist waste
	Social - Economic	Low-Medium	b. Development of local guide services & conservation-based tourism education
Cross Mandalika Location	Accumulation Between Locations	Tall	c. Integration of area management (one management system) & Regulation of tourist visit patterns - Periodic cumulative impact monitoring system

Source: Research Processed 2025

Conclusion

This study aims to evaluate tourist activity and movement patterns in the Mandalika Special Economic Zone (KEK) using a Cumulative Impact Assessment (CIA) approach, specifically at three main destinations: the Mandalika International Circuit, Kuta Mandalika Beach, and Merese Hill. The analysis shows that tourist movement patterns are dominated by multiple and complex patterns,

leading to high visit intensity within a single time period and encouraging cumulative impacts across locations.

The cumulative impact evaluation indicates that environmental and infrastructure components experience moderate to high impacts, primarily due to waste generation, pressure on vegetation, noise, and limited supporting facilities during peak seasons and large-scale events. Meanwhile, socio-economic impacts tend to be moderate, with significant economic benefits for local communities, but with the potential for increased density and changes in spatial activity patterns.

Based on these findings, the CIA approach proved effective in identifying and evaluating the combined impacts of tourism activities and supporting projects in the Mandalika area. This study recommends implementing integrated area management through zoning regulations, activity restrictions in sensitive locations, and adaptive visitor management to support the future sustainability of Mandalika tourism. Further research is recommended to quantitatively assess environmental carrying capacity and expand the scope of analysis to include buffer destinations surrounding the core Mandalika area.

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References

- Chandrabuwono, AB, Sari, N., Waluyono, BD, Istihsan, MA, & Ramadhan, YR (2025). Community Environmental Communication in Tourism Destinations Community Environmental Communication in the Meratus Tahura Mandiangin Geopark Tourism Area. *JPPUMA Journal of Government and Social Politics, University of Medan Area*, 6(2), 106. <https://doi.org/10.31289/jppuma.v6i2.1617>
- Damayanti, M. Sari. (2024). TRAVEL PATTERNS IN KUTA MANDALIKA VILLAGE AS A SUSTAINABLE DESTINATION DEVELOPMENT. *Tourism, Hospitality And Culture Insights Journal*, 4(1), 40–56. <https://doi.org/10.36983/thcij.v4i1.564>
- Eli Santika, Y., & Setyono, P. (2025). ANALYSIS OF ENVIRONMENTAL CARRYING CAPACITY AND SUSTAINABILITY STATUS OF COKRO TULUNG SPRINGS TOURISM OBJECT, KLATEN REGENCY. 3(2), 26–52.
- Hamid, A., Satiadji, AR, & Zuraida, L. (2025). Sport tourism development strategy in the Mandalika Islands in realizing synergy with the local communities of Kuta, Mertak, and Sengkol villages,

- Pujut District, Central Lombok Regency. *Global Education Scientific Journal*, 6(3), 1459–1473. <https://doi.org/10.55681/jige.v6i3.4030>
- Hamman, E. (2025). Cumulative effects assessment under the World Heritage and Ramsar regimes. 2886–2900. <https://doi.org/10.1007/s00267-025-02236-9>
- Irawati, N., & Prasetyo, Hendi. (2025). Sustainable Tourism. *WIDINA MEDIA UTAMA*.
- Maharani, H., Faizah, H., & Fadhil, M. (2025). THE EFFECT OF CEKDAM FISHING TOURISM ON THE SOCIAL AND ECONOMIC RESULTS OF THE NAGARI JAHO COMMUNITY. In *Jurnal Keuangan dan Manajemen Terapan* (Vol. 6, Issue 2). <https://ejournals.com/ojs/index.php/jkmt>
- Satiadji Ria Amirosa, I. (2024). Arus Jurnal Sosial dan Humaniora (AJSH) Socio-Cultural Impact of Holding Mega Events on the Advancement of Sustainable Tourism in Tourist Villages in the Region. 4(3).
- Sudiani, LP, & Arthanaya, IW (2022). TOURISM DEVELOPMENT WITH AN ENVIRONMENTAL PRESERVATION CONCERN. *Journal of Legal Studies*, 18.
- Sujani, I, Mulyawan, U., & Tinggi Pariwisata Mataram, S. (2025). THE ROLE OF SOCIAL INSTITUTIONS IN IMPROVING LOCAL RESIDENTS' EMPLOYMENT OPPORTUNITIES IN THE TOURISM FIELD IN THE MANDALIKA SEZ. In *JRT Journal Of Responsible Tourism* (Vol. 5, Issue 1).
- Witara, IM (2024). *Journal of Tourism Studies*. 1(2).
- Yanyan, D. (2025). The impact of tourists on the marine environment : a review and managerial implications. *Regional Environmental Change*, 25(2), 1–12. <https://doi.org/10.1007/s10113-025-02385-x>
- Yusuf, I., & Hadi, TS (2020). LITERATURE STUDY: THE IMPACT OF TOURISM DEVELOPMENT. 25(2), 157–183.