GIS-based environmental assessment of selected prioritized tourist attractions on Lombok Island

H A R Suhono¹, R A Pratiwi¹ and A Kurniadhi¹
¹AECOM Indonesia, South Jakarta, Indonesia

hafsah.rahma@consultant.aecom.com

Abstract. As the national priority tourism destination, Lombok Island requires the implementation of strategic tourism development, bearing in mind that tourism is one of the economic development pillars of Indonesia's Vision 2045. The diversity of attractions on the island of Lombok, whether natural, man-made, or cultural, need to pay attention to environmental threats, including the potential of natural disasters in each attraction. One of the disasters that have occurred is the earthquake in 2018 which had impacts on the infrastructure and productive economy, including the tourism sector. Therefore, it is needed to map attractions that are suitable for the capabilities and characteristics of the environment. The primary objective of this research is to provide the environmental assessment of priority attractions that can be optimally developed, limitedly developed, or cannot be developed. In providing these recommendations, this study conducted 5 stages of analysis, those are tourist attractions validation, GIS-based suitability mapping, multi-criteria readiness scoring, and GIS-based environmental carrying capacity (ECC) and hazard assessment. Of the 32 selected attractions, there are 20 priority attractions, of which 5 of them are in ideal conditions. Those are Senggigi Beach, Narmada, Suranadi, Selong Belanak Beach, and Lembah Sembalun. This indicates that the 5 priority attractions have a suitable carrying capacity and low risk of natural hazards. The other attractions were also assessed based on the capability and the characteristic of the environment, so it can be a recommendation for the government in developing prioritized attractions for sustainable development and in the preparation of the spatial plan and tourism development documents.

1. Introduction
Tourism is one of the largest potential revenue contributors that help the economic growth of developing countries. The latest annual research of the WTTC (World Travel and Tourism Council) in conjunction with Oxford Economics shows that Travel & Tourism’s contribution to world GDP (Gross Domestic Product) outpaced the global economy for the sixth consecutive year in 2016, rising to a total of 10.2% of world GDP [1]. Also, the total contribution of Travel & Tourism to employment, including jobs indirectly supported by the industry, was 10.0% of total employment (12,241,500 jobs) [2]. Besides being a source of revenue and employment for the destination, it can also affect other sectors, both positively and negatively, depending on how the tourism development and tourists itself are being managed.

Based on ETE, natural resources are intensively used and consumed in the tourism business, and tourism has major impacts on the environment, ecosystems, economy, societies, and culture [3]. Because tourists have to visit the place of production to consume the output, tourism activity is inevitably...
associated with environmental impacts [4]. If visitor use exceeds the existing environmental capabilities and it is not controlled, it can put enormous pressure on an area and lead to impacts such as soil erosion, increased pollution, discharges into the sea, loss of natural habitat, increased pressure on endangered species, and heightened vulnerability to forest fires [5]. The direct environmental impacts that can be caused by tourism are water quality, air quality, noise pollution, solid waste and littering, habitat/ecosystem alteration and fragmentation, wildlife, aesthetic and cultural impacts, gateway communities outside national parks and other host communities, loss of biological diversity, depletion of the ozone layer, and climate change [6]. Therefore, tourism management planning is needed in managing tourism development in accordance with the carrying capacity and limits of acceptable changes.

Ecotourism and other sustainable tourism strategies have gone a long way towards minimizing this negative impact and ensuring that the economic benefits of tourism can contribute to environmental protection and the sustainable use of natural resources [7]. According to the Conceptual Definition established by the World Tourism Organization, sustainable tourism does not only optimize economic benefits, but must make optimal use of environmental resources that constitute a key element in tourism development and respect the socio-cultural authenticity of host communities [8]. The principle in the implementation of these strategies is very necessary to be implemented by the involvement of various stakeholders from various levels and regions.

In Indonesia, The Ministry of National Development Planning (BAPPENAS) has developed the Vision of Indonesia 2045 to make Indonesia one of the largest economies in the world in 2045 and improve the quality of life today in every aspect. Indonesia's Vision 2045 includes a structured strategy consisting of four main pillars, namely the development of human resources and the expansion of science and technology; economic development; equitable distribution of sustainable development; and national resilience and government management. Tourism is one of the pillars of economic development in which the implementation of the development strategy is divided into six phases. The first phase in implementing the strategy is the development of 10 priority tourist destinations, one of them being Lombok Island. 10 Priority Destinations were chosen as the initial drivers to mark Indonesia as the center of tourism for the whole country and not just because of Bali.

Lombok Island consists of 5 regencies/cities that are surrounded by small islands (Gili) and beaches. There is also a volcano, namely Mount Rinjani which is still active and is the second-tallest in Indonesia. It is not surprising that Lombok has a lot of tourism potential in both land and sea. Tourism products and its supporting products are usually developed in areas with scenic beauty, such as near the coastlines or elevated terrain such as hillside land [9]. On the other hand, due to its location and geographical condition, Lombok Island has coped with the challenges of natural disasters for hundreds of years—from earthquakes, volcanic eruptions, landslides, tsunami, and flooding. One of the most recent disasters that happened in Lombok Island was a series of earthquakes that struck in July 2018. Hundreds of aftershocks have continued to rock the island after the devastating events and have influenced several sectors, including ecology, economy, social, and politics [10]. With all the potentials and challenges and with the existence of environmentally-sensitive areas, planning and various considerations need to be undertaken [11]. Therefore, it is necessary to determine the priority of tourism attractions that can be developed, which doesn’t just optimize the economic benefits, but also protect the environment and social strength as other pillars of sustainable development.

GIS-based multi-criteria decision-making could be quite a capable approach to handle a variety of criteria affecting site attraction for ecotourism development [12]. The use of Geographic Information Systems (GIS) and multicriteria evaluation (MCE) approach provide a framework that allows various stakeholders to be involved in decision making [13]. In the context of developing tourism development sites, in addition to spatial information, planners and engineers may use perception, views, and preferences from various stakeholders in assisting the decision-making process [11]. Both methods are used to produce an assessment of tourist attractions that can be prioritized by the government.

A common analysis that can be done in determining the appropriate tourist attractions to be prioritized is land suitability analysis. The main goal of land suitability analysis is to identify areas
within a planning area that are best suited to land uses such as settlement, agriculture, national park, and other uses [14]. Furthermore, an understanding is needed regarding the level of readiness of each existing tourist attractions that consider various aspects of tourism as well as regulatory directions, especially with tourist attractions on the island of Lombok, which are spread across islands with different levels of access and amenities. There is also the Environmental Carrying Capacity (ECC), which is defined as the ability of a region's environment and resources to support the threshold of human activities for a specific period [15,16], and Natural Hazard Assessment as a preventive assessment to determine the level of vulnerability to disasters and to minimize the negative impact on tourist attractions.

Based on the things described, the objective of this study is to determine prioritized tourist attractions on Lombok Island based on land suitability, environmental carrying capacity, disaster factors, and the elements of tourism itself. This paper is expected to be able to provide recommendations to the government so that they can develop priority destinations, especially on Lombok Island sustainably and responsibly.

2. Research Method

![Figure 1. Research Framework.](image)

The stage begins with the selection of tourist attractions and ends with carrying capacity and hazard assessment. ECC and hazard assessment are placed at the last stage of analysis because stakeholders can control ECC and disaster mitigation compared to land suitability which is strictly regulated.

2.1. Tourist Attractions Validation

The first step of this research is to map the distribution of tourist attractions by type of tourist attractions through an open street map and reviewing reference documents, listed as follows:

- Rinjani Geopark by Indonesian National Commission for UNESCO, 2016
- RIPPARNAS (National Tourism Development Master Plan) 2020 – 2025 by the Indonesian Government
- RIRPPARDA (Regional Tourism Development Master Plan) 2013 – 2028 by the NTB Government
- RIRD (Master Plan & Detailed Plan) by NTB Tourism Agency, 2016

Next, the main process in the tourist attractions validation are discussions with each Regency/City Tourism Agencies to determine which tourist attractions can be considered in the analysis process based on their current activeness level.
2.2. Suitability Mapping Assessment

2.2.1. Data Analysis Method
Suitability mapping assessment is carried out based on applicable regulations which technically using GIS-based spatial analysis approaches from the sensitivity map results. GIS (Geographical Information System) is a useful tool for land-use suitability mapping and analysis for urban, agriculture, mining, and all land-use projects [17,18]. The GIS-based land-use suitability analysis has been applied in a wide variety of situations [19], including ecological approaches for defining land suitability/habitat for animal and plant species [20], geological favourability [21], the suitability of land for agricultural activities [22], landscape evaluation and planning [23], environmental impact assessment [24], selecting the best site for the public and private sector facilities [25], and regional planning [26]. The aspects of environmental sensitivity that are included are natural environment sensitivity, hydrology sensitivity, slope sensitivity, and indigenous people and cultural resource sensitivity. They are overlaid and classified into suitability categories.

2.2.2. Data Source
In producing the sensitivity map for each class, the data source used is secondary data with the following details.

| Class                      | Data Source                                                                 |
|----------------------------|-----------------------------------------------------------------------------|
| Natural Environment        | Forestry Area Map of NTB Province by Forestry Agency NTB (SK 598/Menhut-II/2009) |
|                            | Indicative Map of Forest Utilization by Ministry of Environmental and Forestry (SK 5984/Menhut-VI/BRPUK/2014) |
|                            | Nature Tourism Park Area by Ministry of Forestry (Rinjani-2014, Surnadi-2014, Gunung Tunakk-2014, and Tanjung Tampa-2014) |
|                            | Rinjani National Park Zonation by Rinjani National Park Agency (SK 243/KSDAE/SE/KSA.0/6/2017) |
|                            | Marine Conservation Zone by the Ministry of Marine and Fishery (57/KEMEN-KP/2014) |
| Hydrology                  | West Nusa Tenggara Regional Planning & Development Agency                   |
|                            | Topography Map (RBI) scale 1:25,000 by Geospatial Agency                    |
| Slope                      | DEMNAS by Geospatial Agency                                                 |
| Indigenous People          | National and Local Government of Indonesia (GOI)                           |
|                            | Aliansi Masyarakat Adat Nusantara                                           |

2.2.3. Criteria / Indicators
The standards used as a reference (regulation-based) in determining the sensitivity map are as follows.

| No | Class                        | Sensitivity                        | Regulation                                                                 |
|----|------------------------------|------------------------------------|-----------------------------------------------------------------------------|
| 1  | Natural/Marine Tourism Park  | Core Zone Sensitive for tourism activities | Minister of Environment and Forestry Decree No. 76 of 2015 on National Park Zone Criteria and |
| No | Class                       | Sensitivity                                             | Regulation                                                                 |
|----|-----------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------|
| 1  | Port Zone                   | Sensitive for tourism development                       | Management Blocks of Jungle Parks, Natural Parks, Forest Parks, and Natural Ecotourism Parks. |
|    | Protected Zone              | Sensitive for tourism activities                        | Government Regulation No. 36 of 2010 on Nature-based Tourism in Fauna Reserve, National Park, Forest Grand Park, and Nature Tourism Park |
|    | Rehabilitation Zone         | Sensitive for tourism activities                        | Law No. 31 of 2004 on Fishery Government                                    |
| 2  | National Park               | Sensitive for tourism activities                        | Regulation No. 60 of 2007 on Conservation of Fish Resources                |
|    | Core Zone                   | Sensitive for tourism activities                        |                                                                             |
|    | Utilization Zone            | Sensitive for tourism activities                        |                                                                             |
|    | Rehabilitation Zone         | Sensitive for tourism activities                        |                                                                             |
|    | Forest Zone                 | Sensitive for tourism development                       |                                                                             |
|    | Traditional Zone            | Sensitive for tourism development                       |                                                                             |
|    | Religion, Culture, History Zone | Sensitive for tourism development                                      |
|    | Specific Zone               | Sensitive for commercial development (strategic purpose only) |                                                                             |
| 3  | Forest Grand Park           | Sensitive for tourism development                       |                                                                             |
| 4  | Enclave                     | Sensitive for tourism development                       |                                                                             |
| 5  | Protected Forest            | Sensitive for commercial development (strategic purpose only) | Government Regulation No. 24 of 2010 on Forestry Area Utilization           |
| 6  | Limited Production Forest   | Sensitive for commercial development (strategic purpose only) |                                                                             |
| 7  | Permanent Production Forest  | Sensitive for commercial development (strategic purpose only) |                                                                             |
| 8  | Sea Turtle Migratory Corridor | Sensitive for tourism development                       | West Lombok Regent Decree No. 807/06/BLH/2016 about the establishment of communication forum on sea turtle conservation of West Lombok Regency |
| 9  | Mangrove Lembar             | Sensitive for tourism development                       | West Lombok Regent Decree No. 795/14/DLH/2017 about the establishment of mangrove conservationist forum of West Lombok Regency |
|    | Hydrology                   | Sensitive for commercial development (strategic purpose only) |                                                                             |

1. River setback for a river with no river embankment, watershed > 500 km², buffer 100 m  
   Sensitive for commercial development (strategic purpose only)  
   Government Regulation No. 38 of 2011
| No | Class | Sensitivity | Regulation |
|----|-------|-------------|------------|
| 2  | River setback for a river with no river embankment, watershed ≤ 500 km², buffer 50 m | Sensitive for commercial development (strategic purpose only) | Minister of Public Works Regulation No. 28 of 2015 |
| 3  | Lake setback, buffer 50 m | Sensitive for tourism development | |
| 4  | Springwater source setback, buffer 200 m | Sensitive for commercial development (strategic purpose only) | |
| 5  | Waterfall setback, buffer 200 m | Sensitive for commercial development (strategic purpose only) | There is no regulation related to the setback. The buffer zone of the waterfall is defined to be the same as the water spring. |
| 6  | Shoreline setback, buffer 100 m from the high watermark | Sensitive for tourism development | Presidential decree No. 51 of 2016 |

Slope:

| Slope | Sensitivity | Regulation |
|-------|-------------|------------|
| 1     | 0% - 5%     | Not sensitive for both tourism and commercial development. | Indonesia National Standard (SNI) No. 03-1733 of 2014 |
| 2     | 5%-15%      | Sensitive for commercial development (strategic purpose only) | |
| 3     | >15%        | Sensitive for tourism development | |

Indigenous People:

| No | Class | Sensitivity | Regulation |
|----|-------|-------------|------------|
| 1  | Customary Institutions registered by the GOI: List of Customary Institutions (Pranata Adat) by the NTB Province Culture and Tourism Agency (2014) | Medium | There is no specific restriction for tourism development in the villages whose customary institutions are recognised by the local community, however, the Law observed the purpose of the customary institution is to preserve community custom, tradition, and culture in the village. This should be a caution for tourism development. | Law No 6 of 2014 on Villages |
| 2  | Recognition of Indigenous Rights by AMAN | Medium | There is no specific restriction for tourism development in the villages whose indigenous community rights are recognised by AMAN, however, the Charter observes that indigenous members have the right to preserve ancestral land, promote traditional values and customs, customary law, and cultural identity and institution. | AMAN Charter (2017) - Indonesia Archipelago Indigenous Community |
| 3  | Indigenous People | Medium | ESMF identified Sasak as indigenous people with some cultural attractions found in | Indonesian Ministry of Public Works and Housing’s ESMF for Indonesia Tourism Development |
There is no specific restriction, however, several measures should be applied for tourism development that would affect indigenous people, including the preparation of a social assessment and indigenous people plan (IPP), using Free Prior Informed Consultation (FPIC) to obtain broad community support.

The suitability categories were further refined as follows:

**Table 3. Suitability Score Parameter.**

| Score Indicator | Score Parameter | Description | Score |
|-----------------|-----------------|-------------|-------|
| Suitability     | Allowed for commercial development and tourism activities | This area is defined as being not sensitive to commercial and tourism development - all tourism activities are allowed in this area. | 3 |
| Allow for limited infrastructure development, and/or tourist attraction | | This area is defined as sensitive for commercial development, where only activities of strategic development purposes are allowed in this area, including some tourism. | |
| Allow for limited tourism activities only | | This area is defined as sensitive for tourism development. In this area only, limited tourism activities are allowed, such as ‘natural’ tourism activities. | 2 |
| Not allowed for any type of tourism activities and/or any development | | This area is defined as sensitive for tourism activities and development. In this area, tourism activities and development are not allowed based on regulation. | 1 |
2.3. Readiness Assessment

2.3.1. Data Analysis Method

Determination of tourist attractions’ tourism readiness used the multi-criteria decision-making method through a scoring approach which was started by setting the assessment indicators. Multi-criteria analysis establishes preferences between options by reference to an explicit set of objectives that the decision-making body has identified, and for which it has established measurable criteria to assess the extent to which the objectives have been achieved [27]. The main indicators used for this assessment were gathered from the Ministry of Tourism (3A), and more supporting indicators were extracted from the main issues and strategy found on the document and survey study.

2.3.2. Indicators and Data Source

The following is a detailed parameter and data source for each indicator.

| Score Indicator | Score Parameter | Score | Data Source | Notes |
|-----------------|-----------------|-------|-------------|-------|
| Attraction       | Very Attractive | 3     | Observation and Online Survey (3857 respondents) | The scoring parameter is generated from the average calculation of the questions asked during the online survey, including the natural beauty condition, the quality of sea and beach water, the friendliness of the local community, the cultural attractions, and the experience gained. |
|                 | Attractive      | 2     | RIRD³ Documents |       |
|                 | Less Attractive | 1     | RIRD³ Documents |       |
| Accessibility    | ROW             | 3     | Site survey (observation) | Access conditions in the area are determined based on road dimensions and conditions obtained from field observations. |
| Quality          | 6-12m, 4lanes   | 2     | RIRD documents; Issues stated on RIPPARDA⁵ and RIPPARNAS⁶ |       |
|                 | <6m, <4lanes    | 1     | RIRD documents; Issues stated on RIPPARDA⁵ and RIPPARNAS⁶ |       |
|                 | Good Surface    | 3     | RIRD documents; Issues stated on RIPPARDA⁵ and RIPPARNAS⁶ |       |
|                 | Poor Surface on some segments/ spots | 2 | RIRD documents; Issues stated on RIPPARDA⁵ and RIPPARNAS⁶ |       |
|                 | Poor surface/ spots | 1 | RIRD documents; Issues stated on RIPPARDA⁵ and RIPPARNAS⁶ |       |
| Transport Node   | Within port and terminal service radius | 3 | GIS analysis from Regional Infrastructure Development | - |

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³ RIRD = Regional Infrastructure Development
⁴ RIPPARDA = Regional Program for the Development of Areas
⁵ RIPPARNAS = Regional Program for the Protection of Areas
⁶ GIS = Geographic Information System
| Score Indicator               | Score Parameter                  | Score | Data Source                               | Notes                                                                 |
|------------------------------|----------------------------------|-------|------------------------------------------|----------------------------------------------------------------------|
|                              | Within port or terminal service radius | 2     | Agency Infrastructure Data               |                                                                      |
|                              | Not in-service radius             | 1     |                                          |                                                                      |
| Amenities                    | Presence                          | 3     | Site survey (observation)                | Presence and quality of amenities in the tourism destinations assessed through field observation. |
|                              | >3                               | 2     | RIRD Documents; Issues stated on RIPPARD and RIPPARNAS |                                                                      |
|                              | 1 - 3                            | 1     |                                          |                                                                      |
|                              | None                             | 1     |                                          |                                                                      |
|                              | Quality                          | 3     | RIPPARNAS                                 |                                                                      |
|                              | Good Condition                   | 2     | RIPPARDANb NTB, RIPPARDA Kab/Kota         |                                                                      |
|                              | Adequate                         | 1     |                                          |                                                                      |
|                              | Poor Condition                   | 2     |                                          |                                                                      |
| Tourism Development Compatibility | KSPN³ and/or KPPN³              | 3     | RIPPARNAS                                 |                                                                      |
|                              | KSPD² and/or KPD² (SKW)¹         | 2     | RIPPARDA NTB, RIPPARDA Kab/Kota          |                                                                      |
|                              | None                             | 1     |                                          |                                                                      |
| Spatial Plan Compatibility (RTRW)² | Tourism and Natural Tourism Destinations | 3     | RIPPARNAS                                 |                                                                      |
|                              | Other Cultivation Area           | 2     | RIPPARDANb NTB, RIPPARDA Kab/Kota        |                                                                      |
|                              | Protected and Conservation Area  | 1     |                                          |                                                                      |
| Land Ownership Status        | Mostly: Cultivation Rights and/or Usage Rights and/or Management Rights | 3     | RIPPARNAS                                 |                                                                      |
|                              | Mostly: Rights and/or Unregistered | 2     | RIPPARDANb NTB, RIPPARDA Kab/Kota        |                                                                      |
|                              | Protected and Conservation Area  | 1     |                                          |                                                                      |
| Location                     | Very Strategic                   | 3     | Spatial Plan Document (2011-2031)        | Interview to Stakeholder*, Site Visit/Observation                     |
|                              | Less Strategic                   | 2     |                                          |                                                                      |
|                              | Not Strategic                    | 1     |                                          |                                                                      |
| Scale of Service Area        | Provincial Scale Service         | 3     | Spatial Plan Document (2011-2031)        | Interview to Stakeholder* and Site Visit/Observation                  |
|                              | Kabupaten (Regency) Scale Service| 2     |                                          |                                                                      |
|                              | Kecamatan (District) Scale Service| 1     |                                          |                                                                      |
| Detail Plan Availability     | Available                        | 3     | Interview to Stakeholder*                |                                                                      |
|                              | On Progress                      | 2     |                                          |                                                                      |
|                              | Not Available                    | 1     |                                          |                                                                      |

*Interviewees: Tourism Agency of each regency/city
2.4. Carrying Capacity and Hazard Assessment

Environmental carrying capacity (ECC) was analyzed by superimposing maps of air quality control services, biodiversity support services, climate control services, disaster mitigation services, waste & water treatment services, and water supply services to result in a composite map for the overall carrying capacity of Lombok Island. In addition, the overall natural hazard map is the result of the overlay of earthquakes, volcanic activities, landslides, tsunami, and flood hazard maps.

2.4.1. Data Source

In producing the ECC, the assessment was carried out from superimposing maps of air quality control services, biodiversity support services, climate control services, disaster mitigation services, waste and water treatment services, and water supply services obtained from secondary data by Local Environmental Agency, while for carrying out a natural hazard assessment, the secondary data sources used were as follows.

| No. | Natural Hazard Component | Data Source |
|-----|--------------------------|-------------|
| 1   | Earthquake               | Earthquake Disaster-Prone – National Geology Agency (2012)  
                                  United States Geological Survey – Earthquake Hazards Program (1963-2018) |
| 2   | Volcanic Eruption        | Center of Volcanology and Geological Hazard Mitigation |
| 3   | Tsunami                  | Tsunami Hazard Map by GIZ IS and DLR – 2012  
                                  Center of Volcanology and Geological Hazard Mitigation |
| 4   | Landslide                | NTB Landslide Vulnerability Map by Geology Agency |
| 5   | Floods                   | Multi-hazard Map by BAPEDALDA NTB  
                                  DEMNAS by Geospatial Agency – 2018 |

2.4.2. Categorization

Carrying capacity and hazard assessment are based on Lombok’s existing conditions and the direction of regulation. Both assessments are additional conditions for tourism development where each Tourist Attraction can adapt and mitigate all threats.

The categorization for carrying capacity and hazard assessment includes 5 categories:

A. Ideal: Tourist Attraction is a priority development and has a low risk of carrying capacity and medium vulnerability to natural hazards.

B. Conditional: Tourist Attraction is a priority development but has a high risk of carrying capacity and natural hazard risk.

C. Less Priority but Ideal: Less Priority Tourist Attraction that has a low risk of carrying capacity and natural hazard.
D. Less Applicable: Less Priority Tourist Attraction but has a high risk of carrying capacity and natural hazards.
E. Not Applicable: Tourist Attraction which is not suitable to be developed according to the suitability analysis.

3. Discussion

3.1. Tourist Attractions Validation Result

Based on the documents mentioned in methodology and the field surveys conducted, the existing tourist attractions in each regency/city are mapped, where the distribution of the existing tourist attractions will be presented and reviewed in the next process, namely tourist attractions validation. With this mapping, Lombok Island is dominated by natural and cultural tourism, with natural tourism having a greater number of tourist attractions and is scattered in every regency/city. For cultural heritage tourism, it is dominated in Mataram and Central Lombok.

![Existing Tourist Attractions](image)

**Figure 2.** Existing Tourist Attractions.

Based on discussion with each local stakeholder (at the regency/city level), there are 32 proposed tourist attractions which will then go through the tourist attractions assessment process for determining whether the Tourist Attractions selection will become Priority Tourist Attractions. The tourist attractions are as follows.
3.2. **Tourist Attraction Suitability Mapping Assessment Result**

*Figure 3. Tourist Attractions Validation Result.*

*Figure 4. Sensitivity Natural Environment Map.*

*Figure 5. Sensitivity Hidrology Map.*
From the results of the regulation-based suitability map of Lombok, the Lombok Island land area predominantly allows only for limited tourism activities (43.39%), and for limited strategic development purposes and tourism activities (41.13%). Only 4.91% of the land area is not allowed for any type of tourism activities and/or any type of development and is classified as a core zone for natural environmental sensitivity. Approximately 10.57% of Kabupaten in Lombok is allowed for commercial development and tourism activities.

**Table 6. Suitability Percentage Result.**

| Suitability                                         | Percentage (%) | Total Area (Ha) |
|----------------------------------------------------|----------------|-----------------|
| Kota Mataram                                       |                |                 |
| Allowed for limited tourism activities only        | 10.48%         | 635.69          |
| Allowed for limited strategic purposes development and tourism activities | 64.73%         | 3926.30         |
| Allowed for commercial development and tourism activities | 24.79%         | 1,503           |
| Kab. Lombok Barat                                  |                |                 |
| Not allowed for any type of tourism activities and/or any development | 2.72%          | 2,711           |
| Allowed for limited tourism activities only        | 62.43%         | 62,119          |
| Allowed for limited strategic purposes development and tourism activities | 29.96%         | 29,808          |
| Allowed for commercial development and tourism activities | 4.89%          | 4,868           |
| Kab. Lombok Tengah                                 |                |                 |
| Not allowed for any type of tourism activities and/or any development | 4.58%          | 5,500           |
| Allowed for limited tourism activities only        | 29.23%         | 35,141          |
| Allowed for limited strategic purposes development and tourism activities | 50.26%         | 60,421          |
| Allowed for commercial development and tourism activities | 15.93%         | 19,152          |
| Kab. Lombok Timur                                  |                |                 |
| Not allowed for any type of tourism activities and/or any development | 6.44%          | 10,492          |
| Allowed for limited tourism activities only        | 37.83%         | 61,619          |
| Allowed for limited strategic purposes development and tourism activities | 42.95%         | 69,945          |
| Allowed for commercial development and tourism activities | 12.78%         | 20,812          |
The results of the suitability mapping analysis, which is based on the sensitivity map, are then overlaid with the map of the tourist attraction locations that have been determined in the previous section. The results of the suitability scoring parameters for each tourist attraction are explained in the following table.

| Regency          | Tourist Attractions            | Suitability Scoring |
|------------------|--------------------------------|---------------------|
| Kab. Lombok Utara| Not allowed for any type of tourism activities and/or any development | 5.40% 4,392          |
|                  | Allowed for limited tourism activities only | 54.60% 44,435       |
|                  | Allowed for limited strategic purposes development and tourism activities | 35.88% 29,203       |
|                  | Allowed for commercial development and tourism activities | 4.12% 3,350          |

**Table 7. Suitability Scoring Result.**
### Regency Tourist Attractions Suitability Scoring

| Regency       | Tourist Attractions         | Suitability Scoring |
|---------------|-----------------------------|---------------------|
| Lembah Sembalun |                             | 2                   |
| Tete Batu & Otak Kokok |                             | 1 (restricted for tourism development) |
| Gili Sulat    |                             | 2                   |
| Gili Kondo    |                             | 2                   |

Based on the results of the analysis that has been done, 5 tourist attractions are restricted for tourism development, namely Pelawangan, Bangko-Bangko Beach, Areguling, Mount Rinjani, and Tete Batu and Otak Kokok. These areas are spatially located at either the core zone area, the protected zone, or the rehabilitation area of the Rinjani national park or natural/marine tourism park. Therefore, these areas are defined as sensitive for tourism activities and development area, where the tourism development are restricted based on regulations. Other tourist attractions are either allowed for limited tourism activities only or allowed for limited infrastructure development, and/or tourism attractions.

![Figure 8. Regulation Based Suitability Map Result.](image-url)
### 3.3. Tourism Readiness Assessment Result

The analysis continued with tourism readiness assessment, in which 5 of the tourist attractions would not be made a priority because it is sensitive for tourism activities and development. Meanwhile, 27 other tourist attractions were analyzed with multi-criteria-decision-making for each indicator and parameters that have been determined. The results of tourism readiness scoring for each tourist attractions are as follows.

**Table 8. Tourism Readiness Assessment Score.**

| Attraction                  | Condition | Regulation |
|-----------------------------|-----------|------------|
|                          | Accessibility | Amenities |                      |
| DTW                        | Accessibility | Amenities |                      |
| Heritages Trail Culinary    | Lack of signage | Adequate amenities (Urbanized Area) | KPPN Mataram Kota dsk (RIPPARNAS 2010-2025) |
| Islamic Center Religous     | Good road infrastructure | Adequate amenities (Urbanized Area) | KSPD Mataram Metro dsk (RIPPARDA NTB) |
| Tamam Mayura Religous, Heritage | Lack of signage | Adequate amenities | KSPD Mataram Metro dsk (RIPPARDA NTB) |
| Attraction       | Condition | Regulation |
|------------------|-----------|------------|
| **DT W**         |           |            |
| Type of Attraction | Accessibility | Amenities |
|                  | Road Quality Score |质量| Quality Score | Quality Score |
|                  | Transport Node |运输节点| | |
|                  | Accessibility |可访问性| | |
|                  | RO W | RO W| | |
| **Tiga Gili**    | Marine Tourism | | | |
| Marine Tourism   | Unorganized boat inadequate Port | | | |
|                  | Lack of water supply | | | |
|                  | 1 1 2 | 1 3 | KSPN Senggigi - Tiga Gili KSPD I | 3 Conservation Forest | 1 Mostly ownership rights and building rights |
| **Senaru**       | Waterfall, Hiking Traditional village | | | |
| Waterfall, Hiking Traditional village | Damaged road | | | |
|                  | Lack of water supply | | | |
|                  | 1 2 1 | 1 2 | KSPN Senggigi - Tiga Gili KSPD IV | 3 Permanent Production Forest | 2 Mostly ownership rights and unregistered |
| **Pelanwang Senaru** | Camping Hiking | | | |
| Camping Hiking   | Inadequate infrastructure inadequate road quality | | | |
|                  | No amenities | | | |
|                  | 1 1 1 | 1 1 | KSPN Senggigi - Tiga Gili KSPD IV | 3 Conservation Forest | 1 Mostly unregistered |
| **Tanjung Medana** | Regatta, Fisherman village | | | |
| Regatta, Fisherman village | Inadequate amenities | | | |
|                  | 3 2 3 | 3 3 | KSPN Senggigi - Tiga Gili | 3 Tourism Area | 3 Mostly ownership rights and unregistered |
| Condition | Regulation |
|-----------|------------|
| Attraction | Accessibility | Amenity | Location | Scale of Service | Detailed Plan |
| **DTW** | **Type of Attraction** | **Accessibility** | **Road Quality Score** | **Amenities** | **Regulation** | **Score** | **RTRW (Land Use)** | **Score** | **Land Status** | **Score** | **Scale of Service** | **Score** |
| Pantai Senggigi | Beach and culinary | Adequate road | 3 | 3 | Low quality of amenities | 1 | KSPN Senggigi - Tiga Gili | 3 | Tourism Area | 3 | Mostly ownership rights and unregistered | 2 | 3 | 3 | 1 |
| Narmada | Heritage, Culinary | Adequate road | 3 | 3 | Low quality of amenities | 2 | KSPD Lingsar, Narmada and its surroundings | 3 | Natural Tourism Destination | 2 | Mostly ownership rights | 2 | 3 | 3 | 1 |
| Tamansari | Agrotourism and religion | Inadequate road | 1 | 2 | Inadequate amenities | 2 | KSPD Lingsar, Narmada and its surroundings | 2 | Tourism Area | 2 | Mostly ownership rights | 2 | 3 | 3 | 1 |
| Suranadi | Heritage and religion | Adequate road | 2 | 3 | Inadequate amenities | 2 | KSPD Lingsar, Narmada and its surroundings | 3 | Tourism Area | 3 | Mostly ownership rights | 2 | 3 | 3 | 1 |
| Gili Nanggu | Marine Tourism | Inadequate port | 1 | 3 | Inadequate amenities | 1 | KSPD Sekotong and its surroundings | 2 | Tourism Area | 3 | Mostly unregistered | 2 | 3 | 3 | 2 |
| Attraction         | Accessibility | Amenities       | Regulation                          |
|--------------------|---------------|-----------------|-------------------------------------|
| DT W               |               |                 |                                     |
| Gili Gede          | Marine Tourism| Inadequate port| KSPD Sekotong and its surroundings  |
|                    |               | Adequate road surface; Poor road infrastructure | 2 | 3 | 2 | 1 | 1 | 2 | 3 | 2 | 1 |
| Mekaki Beach       | Beach         | No amenities    | KSPD Sekotong and its surroundings  |
|                    |               |                 | 3 | 2 | 2 | 1 | 1 | 2 | 3 | 2 | 1 |
| Pantai Nambugu     | Beach         | No road access (off road) | KSPD Sekotong and its surroundings  |
|                    |               |                 | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 2 | 1 |
| Bangko Surfing     |               | Poor road surface | KSPD Sekotong and its surroundings  |
|                    |               |                 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 2 | 1 |
| Condition       | Regulation          |
|-----------------|---------------------|
| **Attraction**  |                     |
| **Accessibility** |                    |
| DTW             |                     |
| Type of Attraction |             |
| Attraction      | Amenity            |
| Accessibility  | RTRW (Land Use)    |
| Road Quality Score | Land Status       |
| Location       | Scale of Service   |
| Score          | Detailed Plan      |
| Score          |                     |
| Score          |                     |
| Bangko*        | cc; damaged road; Poor infrastructure |
| Pantai Selatan | Marine Tourism Horse Riding |
| Belanak        | Poor access         |
| Pantai         | No Amenities       |
| Marine Tourism | Poor access         |
| Loteng (C.3)   | Plantation Area    |
| Mostly ownership and building rights |
| KSPN Pantai Selatan Lombok |
| KSPD Zona Selatan RIPPARDA LOTENG |
| Nature Park    | Mostly ownership rights |
| Attraction | Accessibility | Amenities | Regulation |
|------------|---------------|-----------|------------|
| Mawi* Surfing | Poor road surface | (Restrooms, healthcare) | RIPPARDA LOTENG (C.3) |
| Pantai Mawun Marine Tourism Beach | Poor road infrastructure | Inadequate amenities | KSPN Pantai Selatan Lombok |
| Jogohills No attraction | Poor road infrastructure | N/A | KSPD Zona Tengah Lombok (B.2) |
| Tubajai Waterdam | Poor road infrastructure Narrow road | Inadequate amenities | KSPD Zona Tengah Lombok (B.2) |
| Pantai Lancang Marine tourism Beach | Poor road infrastructure | Inadequate amenities | KSPN Pantai Selatan Lombok, KSPD Zona Selatan Lombok Tengah (C.3) |
| Attraction | Accessibility | Amenities | Regulation |
|------------|---------------|-----------|------------|
| DTW        | Road Quality Score | Team Quality Score | RTRW (Land Use) |
| Type of Attraction | Access | Amenities | Scale of Service |
| Guling Beach Paragliding | Poor access 2 | No Amenities (Restorem, healthcare) 1 | KSPD Sekotong and its surroundings 2 |
| Tanjung Aan Marine Tourism | Poor road surface 2 | No Amenities (Restorem, healthcare) 1 | KSPN Pantai Selatan Lombok 3 |
| Bukit Merae Hills Island Hopping | Poor road infrastructure Dama ged road 2 | Inadequate amenities (restrroom) 1 | KSPD Zona Selatan Lombok Tengah C.3 3 |
|          | Block ed access 2 |                     | Plantation Area 2 |
|                | Condition | Regulation |
|----------------|------------|------------|
|                | Attraction | Accessibility | Amenities | Regulation |
| DTW            | Type of Attraction | Accessibility | Amenities | Score | RTRW (Land Use) | Score | Land Status | Score | Scale of Service | Detailed Plan |
| Desa Ende      | Traditional village | Good access | Sufficient amenities | KPPN Praya Sade (RIPPARNAS 2010 - 2025) | 3 | Food Crop Agricultural Area | 2 | Mostly ownership rights | 2 | 3 | 3 | 3 |
| Desa Sade      | Traditional village | Good access | Sufficient amenities (tourist information, convenience store) | KPPN Praya Sade (RIPPARNAS 2010 - 2025) | 3 | Food Crop Agricultural Area | 2 | Mostly ownership rights and unregistered | 2 | 3 | 3 | 3 |
| Gerupuk / Batu Payung | Unique natural feature | Poor road access | No amenities | KSPN Pantai Selatan Lombok | 3 | Food Crop Agricultural Area | 2 | Mostly management rights | 3 | 1 | 2 | 1 |
| Attraction                     | Condition | Regulation |
|-------------------------------|-----------|------------|
| DT W                          |           |            |
| Type of Attraction            |           |            |
| Attractiveness                |           |            |
| Accessibility                 |           |            |
| Accessibility Score           |           |            |
| Road Quality Score            |           |            |
| Transport Node                |           |            |
| Amenities                     |           |            |
| Quantity Score                |           |            |
| Quality Score                 |           |            |
| Regulation Score              |           |            |
| Scorc                          | RTRW (Land Use) | Scorc |
| Land Status                   |            |            |
| Scale of Service              |            |            |
| Detailed Plan                 |            |            |
| Sentra Perikanan Awan G      | 1         | 2 2 1      |
| Traditional Market Culinary   | 1         | 1 1        |
| Narrow Road                   | 2         | 1 1        |
| Inadequate Roads              | 2         | 1 1        |
| No Tourism Facilities         | 1         | 1 1        |
| Poor Road Access              | 1         | 1 1        |
| KPPN Praya Sade (RIPPARNAS 2010 - 2025) | 3         | Plantation Area |
| KSPD Zona Selatan Lombok Tengah | 3         | Plantation Area |
| Bena Kembang & Bena Stokel   | 2         | 2 1 1      |
| Waterfall Hiking              | 1         | 1 1        |
| Poor Road Access              | 2         | 1 1        |
| Inadequate Amenities          | 2         | 1 1        |
| KPD RIPPARDA Lombok Tengah (Zona Utara) | 2         | Plantation Area |
| KPD RIPPARDA Lombok Tengah (Zona Utara) | 2         | Plantation Area |
| Poor Road Access              | 2         | 2 1 1      |
| Inadequate Amenities          | 2         | 2 3        |
| KPD RIPPARDA Lombok Tengah (Zona Utara) | 2         | Protected Forest Area |
| Mostly ownership rights and unregistered | 2 3 2 1     |            |
| Attraction                          | Type of Attractiveness | Accessibility | Amenities          | Regulation          | Score | RTRW (Land Use) | Score | Land Status | Score | Scale of Service | Scale of Service | Detailed Plan |
|------------------------------------|------------------------|---------------|--------------------|---------------------|-------|----------------|-------|--------------|-------|-----------------|-----------------|----------------|
| Pink Beach (Tan gsi)               | Island hopping         | Poor road access | No Amenities (Restroom, healthcare) | KSPN Pantai Selatan Lombok Prioritas 1 SKW 4 RIPPARDA LOTIM | 3     | Protected Area 1 | Mostly ownership rights | 2   | 2   | 2   | 2               |                 |                |
| Island hopping                     | Marine Tourism         | Poor road access | No Amenities (Restroom, healthcare) | KSPN Pantai Selatan Lombok Prioritas 1 SKW 4 RIPPARDA LOTIM | 3     | Protected Area 1 | Mostly ownership rights | 2   | 2   | 2   | 2               |                 |                |
| Island hopping                     | Marine Tourism         | Unpaved road   | Inadequate amenities (old building) | KSPN Pantai Selatan Lombok Prioritas 1 SKW 4 RIPPARDA LOTIM | 3     | Coastline Area 2 | Mostly unregistered   | 2   | 3   | 3   | 2               |                 |                |
| Attraction                          | Condition | Regulation                     |
|-----------------------------------|-----------|-------------------------------|
| **Type of Attraction**            |           |                               |
| Gunung Rinjani                    |           |                               |
| Hiking Campiing                   |           |                               |
| Lembeh Sembulan                   |           |                               |
| Hotspiring Agrotourism            |           |                               |
| Tete Batu & Otak Kokok            |           |                               |
| Spring water                      |           |                               |
| Gili Sulat                        |           |                               |
| Island hopping Campiing           |           |                               |
| **Attraction**                    |           |                               |
| **Accessibility**                 |           |                               |
| **Road Quality Score**            |           |                               |
| **Transport Node**                |           |                               |
| **Amenities**                     |           |                               |
| No amenities                      |           |                               |
| Inadequate amenities              |           |                               |
| **Quantity Score**                |           |                               |
| **Regulation**                    |           |                               |
| Conservation Forest Areas         | 2         | Mostly unregistered 2 3 2 1   |
| Protected Forest Area             | 2         | Mostly unregistered 2 3 2 1   |
| Conservation Forest Areas         | 2         | Mostly ownership rights 2 1 2 1|
| Protected Forest Area             | 2         | Mostly unregistered 2 1 1 1   |

KSPD Rasimas Sembalun Dsk (RIPPARDA NTB) Prioritas 1 SKW 1 RIPPARDA LOTIM
KSPD Rasimas Sembalun Dsk (RIPPARDA NTB) Prioritas 1 SKW 2 RIPPARDA LOTIM
KSPD Rasimas Sembalun Dsk (RIPPARDA NTB) Prioritas 1 SKW 2 RIPPARDA LOTIM
KSPD Rasimas Sembalun Dsk (RIPPARDA NTB) Prioritas 1 SKW 2 RIPPARDA LOTIM
KSPD Rasimas Sembalun Dsk (RIPPARDA NTB) Prioritas 1 SKW 2 RIPPARDA LOTIM
| Condition | Regulation |
|-----------|------------|
| Attractions | Location |
| Accessibility | | |
| Amenities | Sc | RTRW (Land Use) | Sc | Land Status | Sc | Detailed Plan |
| | | | | | | |
| Gili Konndo | Island hopping | 3 | Infor mal boat | 1 | 1 | No amenities | 1 | Prioritas 1 SKW 4 RIPPARDA LOTIM | 2 | Protected Forest Area | 1 | Mostly unregistered | 2 | 1 | 1 | 1 |
After the scoring assessment, the classification for each tourist attraction was divided. If the tourist attraction has a score of more than or equal to 1.91 (65% of the maximum score), then the tourist attractions are categorized in priority classification, and if below, is categorized into the less priority category or not allowed, according to the results of the suitability mapping that has been done.

**Table 9. Tourism Readiness Assessment Result.**

| Regency / City     | DTW    | Result | Classification     |
|--------------------|--------|--------|--------------------|
| Mataram            | Kota Tua Ampenan | 2.39 | PRIORITY |
|                    | Islamic Center | 2.33 | PRIORITY |
|                    | Taman Mayura | 2.14 | PRIORITY |
| Lombok Utara       | Tiga Gili | 2.09 | PRIORITY |
|                    | Senaru | 2.08 | PRIORITY |
|                    | Pelawangan Senaru | 1.77 | NOT ALLOWED |
|                    | Tanjung - Medana | 2.42 | PRIORITY |
| Lombok Barat       | Pantai Senggigi | 2.61 | PRIORITY |
|                    | Narmada | 2.29 | PRIORITY |
|                    | Taman Lingsar | 1.72 | LESS PRIORITY |
|                    | Suranadi | 2.13 | PRIORITY |
|                    | Gili Nanggu | 2.19 | PRIORITY |
|                    | Gili Gede | 2.25 | PRIORITY |
|                    | Mekaki Bay | 2.22 | PRIORITY |
|                    | Pantai Nambung | 1.82 | LESS PRIORITY |
|                    | Bangko Bangko | 1.61 | NOT ALLOWED |
| Lombok Tengah      | Pantai Selong Belanak | 2.23 | PRIORITY |
|                    | Pantai Mawi | 2.03 | PRIORITY |
|                    | Pantai Mawun | 2.16 | PRIORITY |
|                    | Jogo Hills | 1.3 | NOT ALLOWED |
|                    | Batujai | 1.65 | LESS PRIORITY |
|                    | Pantai Lancing | 1.78 | LESS PRIORITY |
|                    | Are Guling | 1.69 | NOT ALLOWED |
|                    | Tanjung Aan | 2.27 | PRIORITY |
|                    | Bukit Merese | 2.27 | PRIORITY |
|                    | Desa Ende | 2.74 | PRIORITY |
|                    | Desa Sade | 2.74 | PRIORITY |
|                    | Gerupuk / Batu Payung | 1.62 | LESS PRIORITY |
|                    | Sentra Perikanan Awang | 1.69 | LESS PRIORITY |
|                    | Aik Berik | 1.42 | LESS PRIORITY |
|                    | Benang Kelambu & Benang Stokel | 1.88 | LESS PRIORITY |
| Lombok Timur       | Pink Beach (Tangsi) | 1.83 | LESS PRIORITY |
|                    | Pink Beach (Telone) | 1.89 | LESS PRIORITY |
|                    | Pantai Surga | 1.63 | LESS PRIORITY |
|                    | Gunung Rinjani | 1.81 | NOT ALLOWED |
| Regency / City          | DTW | Result | Classification    |
|------------------------|-----|--------|-------------------|
| Lembah Sembalun        | 2.03| PRIORITY |
| Tete Batu & Otak Kokok | 2.01| NOT ALLOWED |
| Gili Sulat             | 1.62| LESS PRIORITY |
| Gili Kondo             | 1.62| LESS PRIORITY |

From the total tourist attractions assessed, 20 tourist attractions are in a condition that can be prioritized, or in other words, already have tourism readiness. Furthermore, 13 tourist attractions are in the less priority classification, where tourism aspects are needed to be prepared according to the specified indicators.

**Figure 9. Readiness Assessment Result Map.**

### 3.4. Carrying Capacity and Hazard Assessment Result

#### 3.4.1. Environmental Carrying Capacity (ECC)

Based on the mapping of superimposing results of air quality control, services, biodiversity support services, climate control services, disaster mitigation services, waste and water treatment services, and water supply services, most areas of Lombok show low to moderate carrying capacity, except areas surrounding Gunung Rinjani Geopark and a small area in the southeast (Sekotong) and southwest (Jerowaru). This result contrasts with the suitability map, where most areas that are not suitable are natural conservation areas, which have high carrying capacity and good environmental quality. Kota Mataram has a low carrying capacity for all activities, which means that increased pressure in resource use will be felt relatively quickly compared to other areas of higher carrying capacity.
3.4.2. Natural Hazards

The overall natural hazards map is the result of the overlay of earthquakes, volcanic activities, landslides, tsunami, and flood hazard maps. This superimposed map of natural hazards can be used to understand which areas of Lombok Island are most vulnerable to several natural hazards.

Figure 10. Environmental Carrying Capacity.

Figure 11. Earthquake Prone Hazard Map.

Figure 12. Volcanic Hazard Map.
The vulnerability of Lombok to natural hazards is distributed in all parts of the island. All areas of Kota Mataram are recognized as high natural hazard vulnerability areas due to the high vulnerability of flood and earthquake hazards. The southern area of Lombok Island is also identified as a high natural hazard vulnerability area, as this area is highly prone to earthquakes. Mount Rinjani National Park area is also considered as a high vulnerability area to natural hazards, specifically the areas surrounding the peak of Mount Rinjani, as this area has a very high potential for lava flows and toxic gases from a volcanic eruption.
3.4.3. Results

Based on the Tourist Attraction Readiness Assessment, 33 Tourist Attractions are appropriate with suitability standards, 20 Tourist Attractions are Priority Tourist Attractions, and 13 other Tourist Attractions are less priority. The next step is to determine from the entire Tourist Attractions which ones are suitable, support carrying capacity, and has a small disaster risk.

Table 10. Carrying Capacity and Hazard Assessment Result.

| Regency        | Tourism Attraction | Carrying Capacity and Hazard Assessment |
|----------------|--------------------|----------------------------------------|
| Kota Mataram   | Ampenan Old Town   | Conditional                             |
|                | Islamic Center     | Conditional                             |
|                | Taman Mayura       | Conditional                             |
|                | Tiga Gili          | Conditional                             |
|                | Senaru             | Conditional                             |
| Lombok Utara   | Pelawangan         | Not Applicable                          |
|                | Tanjung-Medana     | Conditional                             |
| Lombok Barat   | Pantai Senggigi    | Ideal                                  |
|                | Narmada            | Ideal                                  |

Figure 16. Natural Hazard Assessment Result.
There are 5 groups of tourist attractions that can be developed according to their classification.

- **Ideal**
  Tourist attractions that are in ideal conditions are Senggigi Beach, Narmada, Suranadi, Selong Belanak Beach, and Lembah Sembalun. These areas also have a medium vulnerability to natural hazards. Tourist Attractions included in this category are natural attractions and the category shows that the tourist attractions can be developed optimally because they already have tourism readiness and have adequate environmental support. Even though it has readiness in tourism and has low-medium risk environmental vulnerabilities, the government must still pay attention so that its development does not exceed the carrying capacity. Many resource-based cities have developed rapidly by virtue of abundant natural resources, but they also face problems of over-exploitation and resource exhaustion[28].

- **Conditional**
  Tourist attractions that are in a conditional condition are Ampenan Old Town, Islamic Center, Mayura Park, Tiga Gili, Senaru, Tanjung-Medana, Gili Nanggu, Gili Gede, Mekaki Bay, and others.

| Regency       | Tourism Attraction          | Carrying Capacity and Hazard Assessment |
|---------------|-----------------------------|----------------------------------------|
| Taman Lingsar | Less Applicable             |                                        |
| Suranadi      | Ideal                       |                                        |
| Gili Nanggu   | Conditional                 |                                        |
| Gili Gede     | Conditional                 |                                        |
| Mekaki Bay    | Conditional                 |                                        |
| Pantai Nambung| Less Applicable             |                                        |
| Pantai Bangko-Bangko | Not Applicable     |                                        |
| Pantai Selong Belanak | Ideal                 |                                        |
| Pantai Mawun  | Conditional                 |                                        |
| Batujai       | Less Applicable             |                                        |
| Areguling     | Not Applicable              |                                        |

| Lombok Tengah | Tanjung Aan          | Conditional                   |
|---------------|----------------------|------------------------------|
| Bukit Merese  | Conditional          |                              |
| Desa Sade and Ende | Conditional        |                              |
| Sentra Perikanan Awang | Less Applicable |                              |
| Benang Kelambu & Benang Stokel | Less Priority but Ideal |                              |
| Pink Beach/Pantai Tangsi | Less Priority but Ideal |                              |
| Pantai Surga  | Less Priority but Ideal |                              |
| Gunung Rinjani| Not Applicable       |                              |

| Lombok Timur | Lembah Sembalun        | Ideal                        |
|--------------|------------------------|------------------------------|
| Tete Batu & Otak Kokok | Not Applicable |                              |
| Gili Sulat   | Less Priority but Ideal |                              |
| Gili Kondo   | Less Applicable        |                              |
Mawun Beach, Tanjung Aan, Bukit Merese, and Sade and Desa Ende. These tourist attractions have excellent tourism readiness but have a high risk of environmental vulnerabilities. Therefore, limited development and tourism management are needed, especially in managing environmental conditions. Most of the tourist attractions are in this category, thus showing that the government's focus on developing tourism in Lombok should be on its environmental vulnerabilities.

- **Less Priority but Ideal**
  Tourist Attractions included in this category are Benang Kelambu & Benang Stokel, Pink Beach / Tangsi Beach, Surga Beach, and Gili Sulat. These Tourist Attractions have the environmental carrying capacity that supports tourism development optimally, but when analysed based on the readiness of tourism, these tourist attractions must still be developed in accordance with their respective weaknesses, such as in terms of availability and quality of attractions, amenities, accessibility, and land. These conditions allow tourist attractions to become the priority for the next stage of tourism development, provided that the government makes improvements in its tourism aspects, such as elements of attractions, accessibility, and amenities.

- **Less Applicable**
  Tourist attractions included in this category are Lingsar Park, Nambung Beach, Batujai, Awang Fishery Centres, and Gili Kondo. These tourist attractions do not yet have sufficient tourism readiness and are also in an environment that does not support the development of massive tourism. With these considerations and limitations, these tourist attractions can be considered as supporting tourist attractions.

- **Not Applicable**
  Tourist attractions that do not support tourism activities are Pelawangan, Bangko-Bangko Beach, Areguling, Mount Rinjani, and Tete Batu and Otak Kokok. This category is determined because the tourist attractions are in areas that are sensitive for tourism based on regulations. This category is dominated in the North Lombok Regency, which is the location of the active Mount Merapi. The priority of tourism development is strongly discouraged at this tourist attraction because it can interfere with environmental sustainability and can have a significant impact in the event of a natural disaster.
Planning for tourism development on Lombok Island as one of the national priority destinations needs to be done strategically by determining tourist attractions that can be prioritized, not only in the aspect of tourism but also has environmental conditions that should be ready to accommodate tourism development. This paper assesses tourist attractions spread across the island of Lombok as a recommendation for the government regarding which tourist attractions should be prioritized by considering comprehensive aspects and a systematic process. This paper offers an analysis starting from the suitability map analysis, tourism readiness assessment, and finally environmental carrying capacity and natural hazard assessment.

Based on the analysis that has been carried out, the distribution of tourist attractions on the island of Lombok is in the southern region of the island. Tourist attractions that can be prioritized in the early stages of tourism development on Lombok Island are tourist attractions that are in ideal conditions, namely Senggigi Beach, Narmada, Suranadi, Selong Belanak Beach, and Lembah Sembalun. Tourist attractions in this category are natural attractions. This shows that the government can direct the development of Lombok Island in the early stages to become a natural tourism destination. Even though these tourist attractions are in an ideal condition, which means they have tourism readiness and have a medium risk of environmental vulnerability, the government still must implement a tourism development scenario to avoid over-exploitation and resource exhaustion. One scenario that can be applied is the preparation of phase two prioritized tourist attractions which are included in the ‘Less Priority but Ideal’ category, namely Benang Kelambu & Benang Stokel, Pink Beach/Tangsi Beach, Surga Beach, and Gili Sulat. Those tourist attractions that can be developed in the second stage are also natural tourism, which indicates that the main anchor of tourism activities on the island of Lombok is

4. Conclusion

Figure 17. Tourist Attractions Classification Result.
natural tourism, especially beach-based tourism. While the government focuses on the development of tourist attractions that are prioritized in stage 1, the government can prepare the development of tourism elements (attractions, accessibility, and amenities) in tourist attractions that will be developed in the second stage. In addition, another part of the scenario that can be applied is the preparation of supporting tourist attractions, namely tourist attractions that are in the ‘conditional’ and ‘less applicable’ categories, but activity restrictions and management must be applied. For tourist attractions that are in the ‘not applicable’ category, namely Pelawangan, Bangko-Bangko Beach, Areguling, Mount Rinjani, and Tete Batu & Otak Kokok, it is not recommended to be a development priority because they can have a negative impact on the environment and tourism activities themselves. It should be noted that all areas in the City of Mataram are highly susceptible to natural disasters and thus require mitigation plans. The government is expected to consider the analysis and scenario recommendations given in developing priority tourist attractions on the island of Lombok, in order to create sustainable and responsible tourism.

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