



Theme: Multiple Spatial Criteria to determine Unique Marine Tourism Rank

INTRODUCTION

Background of Indonesia Tourism

Tourism is a fast growing industry, and one of the main incomes of several countries. As political condition conducive along last 10 years, Indonesia tourism industry has the same trend, growth rapidly. Hotel and Restaurant contribute 3% of Gross Domestic Product; with a significant growth of 13% per year (Statistic Indonesia, 2012).

Marine tourism is part of nature based tourism. It is not specific to the landscape, but also opportunities for learning and discovery social and environment ethic.

There is limitation for marine tourism definition. Some of definitions are:

“Marine tourism is economic process to develop unique marine ecosystem as market to selected consumer who interested in ecotourism and aware of conservation (Wheat (1994) & Steele (1993).”

Other definition by Tourism Board British Columbia: “Marine tourism is activities that are conducted primary in a marine setting and involve marine resources or terrestrial resources that occur at that marine/terrestrial interface.”

Indonesia Marine tourism had long neglected, so far government focuses on conservative land base tourism. Marine tourism began had attention since Indonesia develop Department of Marine Exploration (1999), which now change to Ministry of Marine Affairs and Fisheries Republic of Indonesia. The challenges are Indonesia

government to collect the asset, a potential location of marine tourist destination, and identify a unique marine landscape with its ecosystem into national databases.

Indonesia is archipelagic country, with 5 Major Island and totals 17,504 islands throughout west to east. Its nature geography is a potential site for marine tourism. The coastline is 95,181 km, put Indonesia at second rank in a list of countries by length of coastline (www.wikipedia.org). Under the sea resources are complete from offshore biodiversity to deep water abundant sea lives.

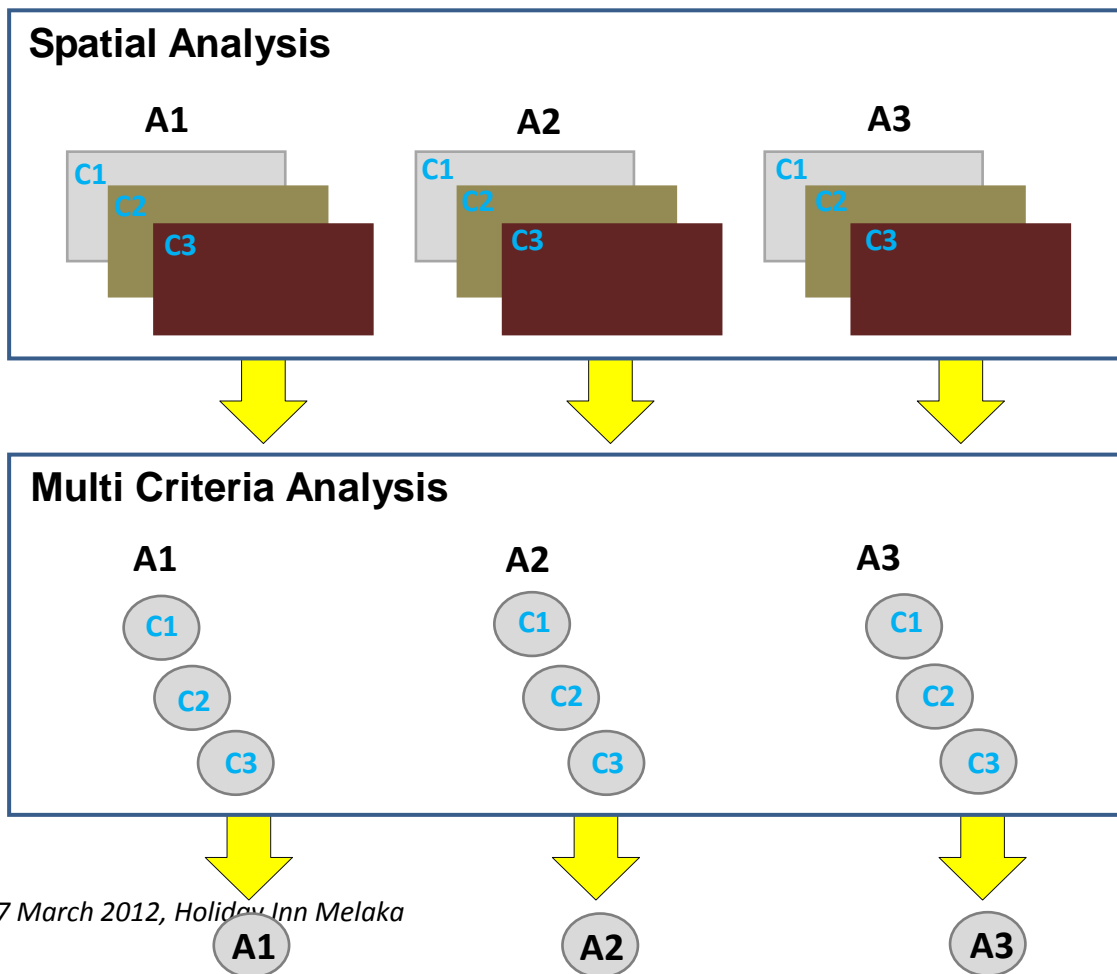
Spatial Multi Criteria Analysis (SMCA) Definition

SMCA involve a set of geographically-defined alternatives (events) from which a choice of one or more alternatives is made with respect to a given set of evaluation criteria (Jankowski, 1995; Malczewski, 1996).

SMCA refers to the application of multi criteria analysis in spatial context where alternatives, criteria and other elements of the decision problem have explicit spatial dimensions. Since the late 1980s, multi criteria analysis has been coupled with Geographical Information Systems (GIS) to enhance spatial multi criteria decision making (Chakhar; Mousseau, 2007).

SMCA different from conventional MCDM techniques due to inclusion of an explicit geographic component. In contrast to conventional MCDM analysis, SMCA requires information on criterion values and the geographical locations of alternatives in addition to the decision makers' preferences with respect to a set of evaluation criteria. This means analysis results depend not only on the geographical distribution of attributes, but also on the value judgments involved in the decision making process. In a simple word SMCA provide linkage between criteria analysis and spatial analysis.

Figure 1. Spatial Multi Criteria Analysis, adapted from van Herwijnen, 1999



ANALYSIS

Purpose of the Paper

This paper is intended to assist government to identify potential location of marine tourism and estimating the economic impacts for local community. The result as databases mapping should be applied on the regional planning on province and regency level. The databases, emphasis a unification of need from local community meets the appropriate decision maker to ensure quality of marine tourism.

Marine Tourism Nusa Tenggara Barat

Nusa¹ Tenggara Barat (NTB), one of 33 Indonesia's Province, comprises hundreds of islands spread over 2 big islands: **Lombok** and **Sumbawa**. NTB has two major popular marine tourism destinations: Moyo Island at north Sumbawa and 3 Gili² (Meno; Trawangan; Air) at west Lombok.

Although NTB has gold mine resources, operated by one of the largest gold producer - Newmont Mining Corporation, the annual economics statistic show public income and the average of personal revenue is under National Index. Natural resources do not support much: dry climate, poor land fertility, terrain geomorphology, distinctive deep ground and limited groundwater. This condition enforces local community to spawned marine tourism that has been unexploited as human capital to enforce economic growth.

As tourism market place, NTB has an advantage: it lies between Bali; the world popular tourism destination, and Komodo; a New World 7 Wonders. Considering the location between two world potential tourism destinations, the local government therefore creates campaign "Lombok is Bali Sister Island". There is tendency that tourist has desire to get similar landscape as 'past' Bali which more natural and solitude. Most of Lombok tourist is Bali's tourist impromptu and Komodo transit tourist.

Other promote factor are the presence of low budget airlines, such as Air Asia with route Jakarta Bali and Merpati Airlines which service Bali – Lombok and Lombok - Sumbawa, directly affects to increase NTB tourism. Many of pleasure boat operators with various budgets, from low cost to high class package, offering a cruise from Bali to Lombok and Sumbawa. Other popular route is LOB (Live on Board) from Bali-Komodo via north coast of NTB.

¹ Nusa mean island (Sanskrit language)

² Gili mean small island (Sasak language)

Criteria

This study uses multiple spatial criteria to define rank of the potential location.

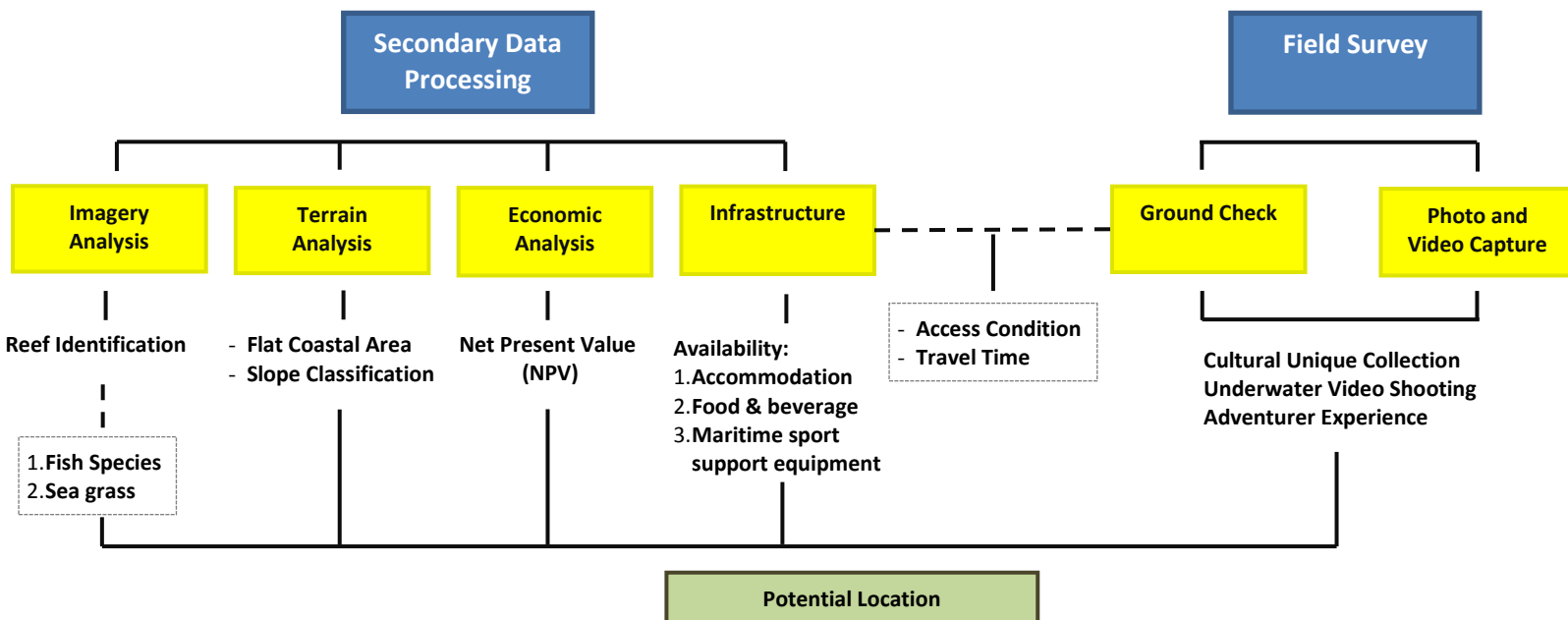
1. Physical criteria: wave level, sea water temperature, coral - animal - vegetation diversity, hazardous level.
2. Infrastructure: road access, lodging - food - drink services facility, availability of public restroom, the electric power service, quality of drinking water and communication service provider.
3. Cultural distribution pattern: differences between western part with influence of Hindu - Bali culture; middle part from Islam - Sasak and eastern part with Bajo – a tribal nomad.

SAMC for Marine Tourism in NTB

This paper is limited only on popular marine activity as potential tourist attraction, at each location. The activities are classified to:

1. Sea based activities: swimming, sea fishing.
2. Sport marine: surfing, diving, snorkeling, volley ball beach.
3. Unique experience: cultural observation, adventure sport.

Figure 2. Research Methodology



Spatial Analysis and Physical Characteristic

The result of spatial analysis from slope and satellite imagery:

Lombok has different morphology at northern part and southern part. At north, the morphology is dominated by highland and mount – Rinjani³, and at south its flat plateau. Opposite of that, coastal plain at north is narrow, while south is divided into: west, which is wide and flat coastal, east is cliff and steep slope.

Sumbawa relatively flat and hilly in the middle, except at north east peninsula, there is Tambora⁴ volcano. Coastal area dominated by flat plain sandy beach. At north east of island there is volcanic island – Satonda.

Coral reef identification from satellite imagery analysis show deployment around Gilis. Only small scale of reef identify offshore coastal area. Ground check survey verify the reef condition at most of Gili is good, unfortunately they are poor reef on offshore. Some of them damage by excessive harvest and many of them were destroy from explosive fishing method.

There are 3 major ethnic on NTB: Sasak, Bali and Bajo. Sasak is Lombok's native ethnic, they culture is similar with Balinese. Social geography pattern of NTB determine from tribal distribution which influence a tradition; cultural and religion. It trace Sasak domination in Lombok, Balinese live mostly in Sumbawa inland, and Bajo distributed along north coastal and eastern part of Sumbawa.

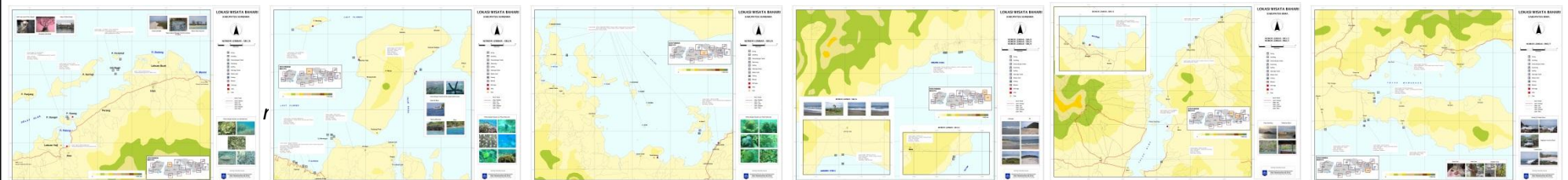
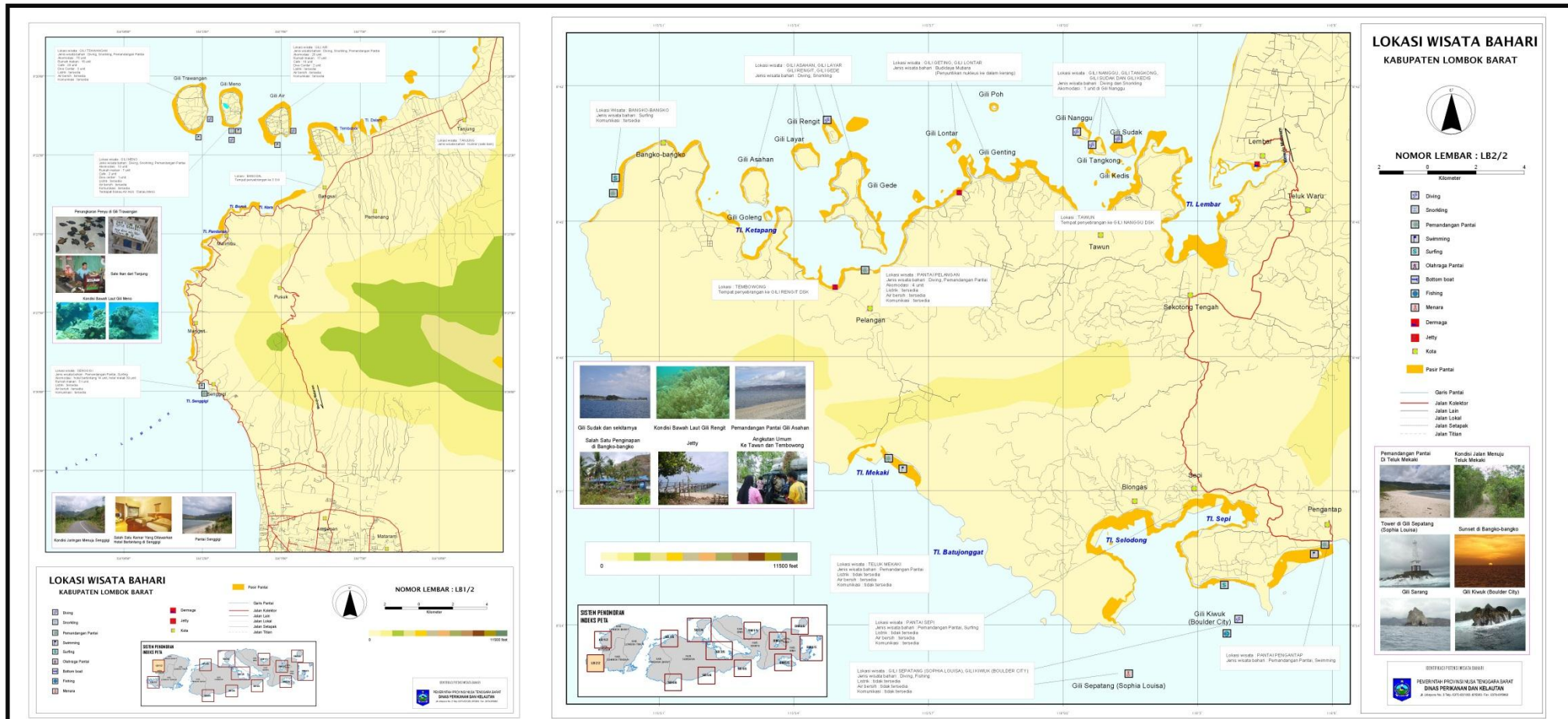
Historical data of earthquake and geological analysis result, location hazardous are on south part of Lombok and East part of Sumbawa. The weather constraint in high speed wind, high waves and dry are obstacle combination for marine tourism.

Lombok as central government has better infrastructure and facility than Sumbawa. Even so, an access to tourism destination at south Lombok was not in good condition. Public transportation was minimal in Sumbawa, as are tourism support facilities. A highway across north of Sumbawa coating with asphalt, and south path way was gravel road network.

³ Rinjani is an active volcano, 3726 meters asl, the second highest volcano in Indonesia.

⁴ Tambora is an active stratovolcano, explosive on 7 eruption indexes on 1815.

The study area is divided into 2 (two) regional area: Lombok Island and Sumbawa Island. Below is atlas map of potential marine tourism for Lombok and Sumbawa.



Marine Site Destination Rank

Mapping distribution of marine tourism destination location in atlas format is basic material to make tourism rank. Survey location was held to identify unique culture on each location and ground check of nature characteristic. Potential locations are categorized by rank: Weak; Medium and Strong.

Below is description of marine tourism potential location based on its rank.

STRONG

(1) Gili Meno – North West of Lombok:

Gili Meno is located in the middle of the famous 3Gili-Lombok, potential as Diving area. The coral reef is on good condition, the facility is complete. The main factor that makes Gili Meno is better place than the other two islands is this location is not as crowded as Gili Trawangan, and the reef is better than Gili Air. While other island has water supply from the mainland, Gili Meno has independent water source from lake on western part of the island.

(2) Bangko-Bangko Beach – South West of Lombok

Bangko-bangko beach is potential site for surfing even though the waves do not quite spectacular. Bangko beach is private area with continuous middle wave, becomes favorite among amateur surfer or beginner stage surfer.

(3) Sophia Louisa (Gili Sepatang) – South of Lombok,

Sophia Louisa is one and only the most outer island on NTB. It is small rock outer island of Indonesia border territory with Australia. Sophia Louisa is surrounding by boulder city. This area is restricted to advance diver. Combination of strong undercurrent, high wave and scattered large rock island are the deadly factor for non professional diver. This site is top location for adventurer professional diver.

(4) Moyo Island – North Sumbawa

Moyo is famous internationally as a private vacation island for high class society. Princess Diana had visited this island on 90's to avoid media.

(5) Sili Beach – South Sumbawa

If you like driving adventure, Sili is an appropriate site. To reach this location whether horse or walk is the choice. Transportation is on bad condition, which causes Sili is not recommended site for tourism on output analysis. Ground check

surveys discover unique side of this location. Desolate village of Sili lies on narrow valley surrounded by steep hills and dense vegetation. The people are living in traditional culture without electricity, and no transportation available. Although its population living along coastal line; they are farmer, no one live as fisherman.

(6) Banta island – East Sumbawa

Subsurface condition is the main attraction of Banta. Reef, shark, wheel and coral fish species with clear visualization and soft white sand are the best combination as diving – snorkeling – swimming favorite site.

MEDIUM

1) Gili Sula - North East Lombok

This site is suitable as environmental tourist destination. Mangrove grows along coastal area in very good condition. Replanting from local community revive mangrove ecosystem, like crab, shrimp and lizard. Since this area divine as protected area, government build wood bridge as an access to mangrove area as research location or tourism destination.

2) Gili Rengit – South West Lombok

SMCA analysis shows Gili Rengit as potential site for diving and fishing. Contrary with ground check survey, the people around area still living under poor hygienist awareness. The beach unfortunately has not maintain well, very dirty and minim facilities.

3) Mekaki Bay and Sepi Bay – South Lombok

These two sites have wide flat beach landscape with white sand, suitable for family recreational and water sport like volley, swimming, and sunbath relaxing. Despite of high rank potential as tourism site, these two beautiful beaches down grade to medium rank because of poor infrastructure and lack of public facilities.

4) Satonda island - North West Sumbawa

It is volcanic island with sea water crater on top of it. The salty lake is form of tsunami from Tambora high explosive on 1815. Unique geomorphology from mountain to beach into deepwater diving is put this site into medium potential location for marine tourism.

5) Snake island – South East Sumbawa

Various sea snake species live in this rock small island. This site becomes medium location for animal eco-tourism.

WEAK

1) Umbi⁵ Island – South East Sumbawa

Beside endemic vegetation, there is no unique factor of this site.

2) Gili Bungin

This island population 3,000 and total area 8.5 ha, its density is 28 person per meter square. Gili Bungin is the most density island in the world. Originally Gili Bungin was separated from Sumbawa as main island, but now there are headland reclamation connected Gili Bungin and Sumbawa. Now day slum tourism is popular in the world. This Gili is suitable for slum site tourist destination.

3) Tanjung⁶ Ringit – South Lombok

This location formation is steep cliff with cave on the shoreline at the bottom of the cliff. The cave had been use on Japan colonialism as hiding place and command centre headquarter in Lombok. Unfortunately this location is hidden because lack signage and information thus becomes unpopular site.

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⁵ Umbi is eatable vegetation root or tuber.

⁶ Tanjung mean cape.

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