

Original Paper

MAPPING OF ECOSYSTEM MANAGEMENT PROBLEMS IN GILI MENO, GILI AIR AND GILI TRAWANGAN (GILI MATRA) THROUGH PARTICIPATIVE APPROACH

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ABSTRACT

Coral reefs, mangroves and birds are becoming the major attraction of tourism in three islands - Gili Meno, Gili Air and Gili Trawangan (Gili Matra) - Lombok, Indonesia. Since the launching as a conservation area in 1993, tourism in Gili Matra has grown rapidly. On the other hand, the ecosystem continues to be degraded. Sooner or later, the ecosystem degradation will affect tourism and economic sustainability of the community in Gili Matra. The purposes of this study were to identify the stakeholders, and to map the ecosystem management problems in Gili Matra, to provide the basis for policy making in the future. The research method was depth interviews and focus group discussion (FGD). Identification of stakeholders was conducted using stakeholder analysis, while mapping of ecosystem management problems was carried out by participatory mapping. The stakeholders, who manage the ecosystem as tourism assets in Gili Matra, are: government, community and businessmen. The fishermen, tourists and businessmen are the primary stakeholders, meaning they have a high interest and the greatest influence on ecosystem management. Destructive behavior of stakeholders, especially the main stakeholders has led to the degradation of the ecosystem in Gili Matra, so it is important to nurture these stakeholders, to sustain tourism and economic viability of the community in Gili Matra.

Keywords: economic; ecosystem; Gili Matra; sustainability; tourism.

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INTRODUCTION

The tourism sector has been the main livelihood of the people in Gili Matra. The Regent of Lombok Utara stated that 70% of Lombok Utara's revenue (PAD) comes from tourism sector, especially from the Gili Matra. In 2011, a total of 886,880 foreign and local tourists visited Nusa Tenggara Barat (NTB), and 50% of them visited Gili Matra (Primadona Lombok, 2012). With the opening of the Lombok International Airport in 2011 and the launching of Visit Lombok-Sumbawa 2012, NTB government hopes the number of tourist visiting NTB will increase.

Coral reefs are a major attraction for marine tourism activities, such as snorkeling, bottom

glass boat, and diving in Gili Matra. Interest in diving over the years has developed rapidly since its introduction in 1995. On the other hand, the natural condition of coral reefs in Gili Matra has deteriorated, especially in locations that are used as a dive. Bakhtiar et al. (2000) claimed that 55.39% of coral reefs were in bad condition. In 2008, the damage had reached 75%, partly due to the use of coral as building materials, fishing activities, El-Nino and destructive behavior of tourists (Ahyadi and Jupri, 2008). This adverse situation has reduced the interest of tourists for diving (Ahyadi, 2010).

Besides coral reefs, there are mangrove forests around Lake Meno that also have a potential to be developed for birdwatching ecotourism (Suana et al., 2008; Benazir, 2012). About 30 species of birds have been found in the mangrove forest (Virgota and Tresnani, 2006; Setiawan, 2008; Benazir, 2012). The high dependence of local communities on mangrove forests, mainly for firewood, causes damage to the mangrove forests. Construction of hotels and restaurants as a supporting tourism also contributed to this situation. This happens due to the lack of clarity regarding the planning for the conservation and utilization of the area (Suana et al., 2011; Benazir, 2012).

Mangrove forests and coral reefs have been continuously degraded. This condition can threaten the sustainability of Gili Matra as a

tourism area. It could also threaten the economics of the communities that depend on the tourism sector (Dixon et al., 1993; Milazzo et al., 2002). As such there is urgency for the efforts of sustainable management. This study was carried out to identify the stakeholders, and mapping of ecosystem management problems in Gili Matra, to provide the basis for policy making.

MATERIALS AND METHODS

Study Site

The study was conducted over four months (June to September 2012) in Gili Meno, Gili Air and Gili Trawangan, Pemenang District, Lombok Utara, Indonesia. (Fig.1).

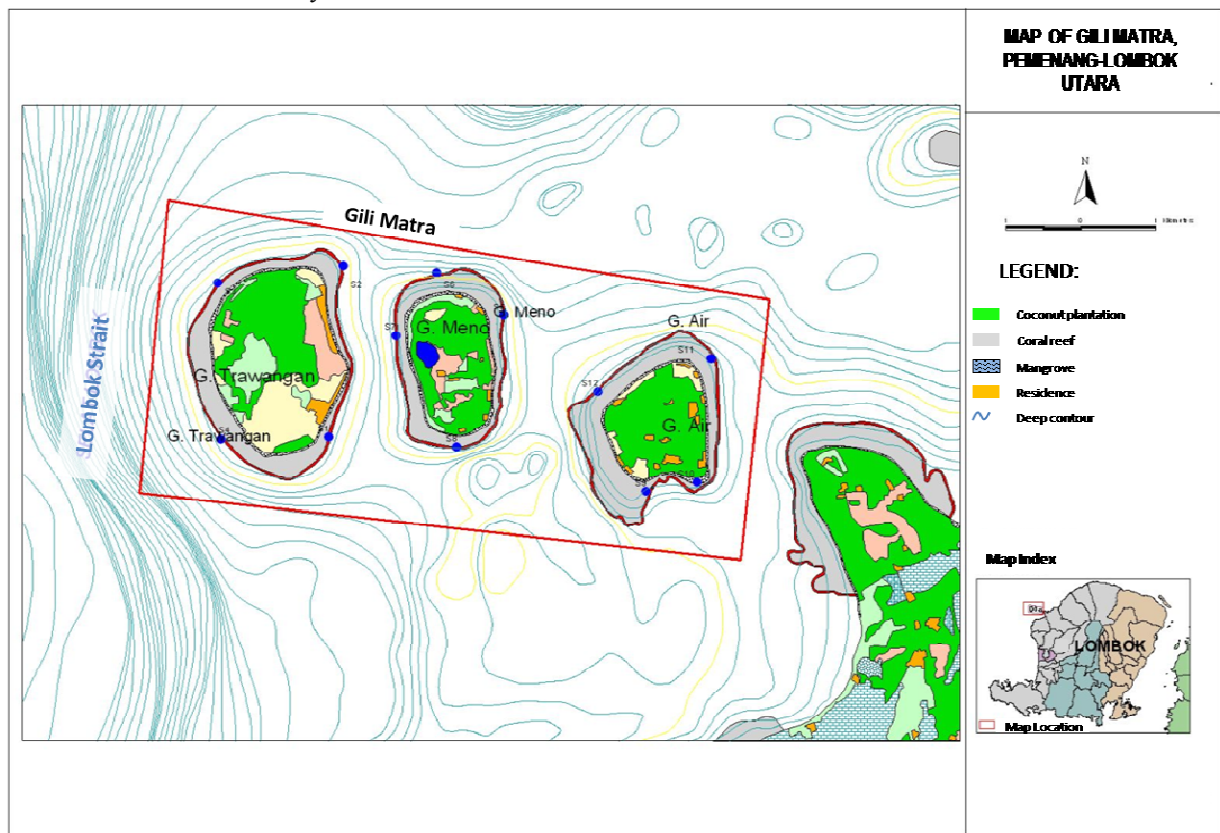


Figure 1. Study site at Gili Meno, Gili Air and Gili Trawangan (Gili Matra). Map source: BAPPEDA NTB (2010).

Data Collection and Analysis

Depth interviews and focus group discussion (FGD) are two methods used to collect the data.

The data collection was conducted in two phases. The first phase consisted of identifying and mapping of stakeholders who managed the

ecosystem as a tourism asset, while the second phase dealt with identifying and mapping of management problems.

Identifying and mapping of stakeholders was conducted through depth interviews and analyzed using stakeholder analysis (Brown et al., 2001). In this method, the stakeholders were grouped based on the level of interest and influence on the management of ecosystem as a tourism asset in Gili Matra.

Identifying and mapping management problems was conducted through FGD using participatory mapping (International Fund for Agricultural Development, 2009). Participants in the FGD, consisting of representatives of stakeholder, were: Department of National Water Conservation Area (BKKPN); Department of Environmental and Natural Resources (KLH); Department of Tourism, Department of Land (BPN); Village Government; Youth Community; Fishermen Community; NGOs; Dive Center; Boatman; Rental of Cart and Bicycle; Operators of Hotels and Restaurants; and Travel Agents.

RESULTS AND DISCUSSION

The magnitude of the potential ecosystem in Gili Matra is a great attraction for people to use it in different ways. One of the most important ecosystem utilization in Gili Matra is as a marine tourism object. From year to year the tourism activities in Gili Matra grow rapidly.

Management of tourism in Gili Matra involves multi sectors and institutions. Based on the interviews and FGD, the stakeholders involved and played a role in the management of ecosystem and tourism in Gili Matra, are: government, communities and businessmen.

Government agencies involved are: Department of Tourism, BKKPN, KLH, BPN, Village Government and Higher Education. The communities are: Youth Community, Fishermen Community, Tourists, and NGOs. Dive Center, Boatman, Rental of Cart and Bicycle, Operators of Hotels and Restaurants, and Travel Agents are the businessmen that are involved and played a role on the management of ecosystem and tourism in Gili Matra. The roles of stakeholders are presented in Table1.

Table 1. The role of stakeholders in the management of the ecosystem in Gili Matra

Group	Stakeholder	Role
A	Government	
	Department of Tourism	Policy making, facilitating and monitoring of the tourism management
	BKKPN	Policy making, facilitating and monitoring of coastal and marine management
	KLH	Policy making, facilitating and monitoring of environmental management
	BPN	Policy makers and land use permits
	Village Government	Encourage and facilitate community in environmental management
	Higher Education	Research and community services in ecosystem management
B	Communities	
	Youth Community	Organizing and increasing the role of youth in ecosystem management
	Fishermen Community	Organizing and increasing the role of fishermen in the preservation of coral reef as a habitat for fish and underwater tourism object
	NGOs	Encourage, mediate and advocate environmental management
	Tourist	Tourist's behavior is very influential on the natural condition of the ecosystem
C	Businessmen	

Dive Center	Providing underwater tourist activities
Boatman	Providing sea transportation
Rental of Cart and Bicycle	Providing cart or bike for sightseeing
Operators of Hotels and Restaurants	Providing accommodation to tourists
Travel Agents	Providing information and travel guides to tourists

Many stakeholders with different roles in ecosystem and tourism management in Gili Matra indicated dynamics and high complexity on ecosystem management in the region. The stakeholder's roles affect the level of importance and influence on an object or program. The stakeholder analysis indicated that the stakeholders could be grouped into four categories: primary, secondary, tertiary and external stakeholders (Brown et al., 2001). The primary stakeholders are: fishermen community, tourists, and businessmen (except travel agents, rental of cart and bicycle). Secondary stakeholders are the travel agents. Tertiary stakeholders are the government and NGOs. External stakeholders are the youth community and rental of cart and bicycle.

The primary stakeholders are the most important stakeholder involved in the management of ecosystems for sustainable tourism development in Gili Matra. Their level of interest and impact on the sustainability of ecosystems is the greatest. For the fishermen, coral reefs and mangroves are where they look for fish and other animals. The utilization of these ecosystems as places to catch fish and other animals affects the natural condition of coral reefs and mangrove forest (Kunzmann, 2001). Therefore, this study prioritizes the participation of these groups. For tourists, the natural condition of the ecosystem is a source of aesthetic services. Tourist's behavior would be very influential on the natural condition of the ecosystem (Anthony and Inglis, 2004; Hawkins, 2005).

The number of stakeholders and the importance of their role are often not in accordance with reality. Based on the interviews of 50 people consisting of various institutions, communities, and tourists, this study revealed that 32% of them did not know the status of the

management of Gili Matra, and 45% did not know the importance of ecosystem in Gili Matra for sustainability of tourism. Most respondents (74%) stated that the government was solely responsible for repairing, maintaining and facilitating the management of ecosystems. While 86% of respondents said their economics depended directly or indirectly on tourism.

Lack of awareness and concern of stakeholders in the preservation of ecosystems in Gili Matra are caused by several factors, including: lack of knowledge of the importance of ecosystems for sustainable tourism; misconceptions about conservation of ecosystems as an effort that will reduce their income; most of the stakeholders are migrants or non-indigenous, so undesirable happenings do not have too big impact for them.

Complexity of the ecosystems utilization in Gili Matra has led to the complexity of the problems posed. The differences of utilization of the ecosystem will give different pressures on the ecosystems in Gili Matra. Based on the participatory mapping, tourism management problems in Gili Matra result in the decline in the quality of the ecosystem as a tourism asset. Ecosystems in Gili Matra not only are an asset to tourism, but also as a source of fish as well as mitigation.

The degradation of ecosystems is caused by various factors, especially human activities such as: fishermen, businessmen and tourists. The factors include: anchovy fishing nets; mourami nets; catching the reefs fish with potassium or cyanide; boat anchors; destructive behavior of tourists; land use changes, especially mangrove forest; and waste disposal of tourism businesses (hotels and restaurants). The problems, causes and effects are presented schematically in Fig. 2.

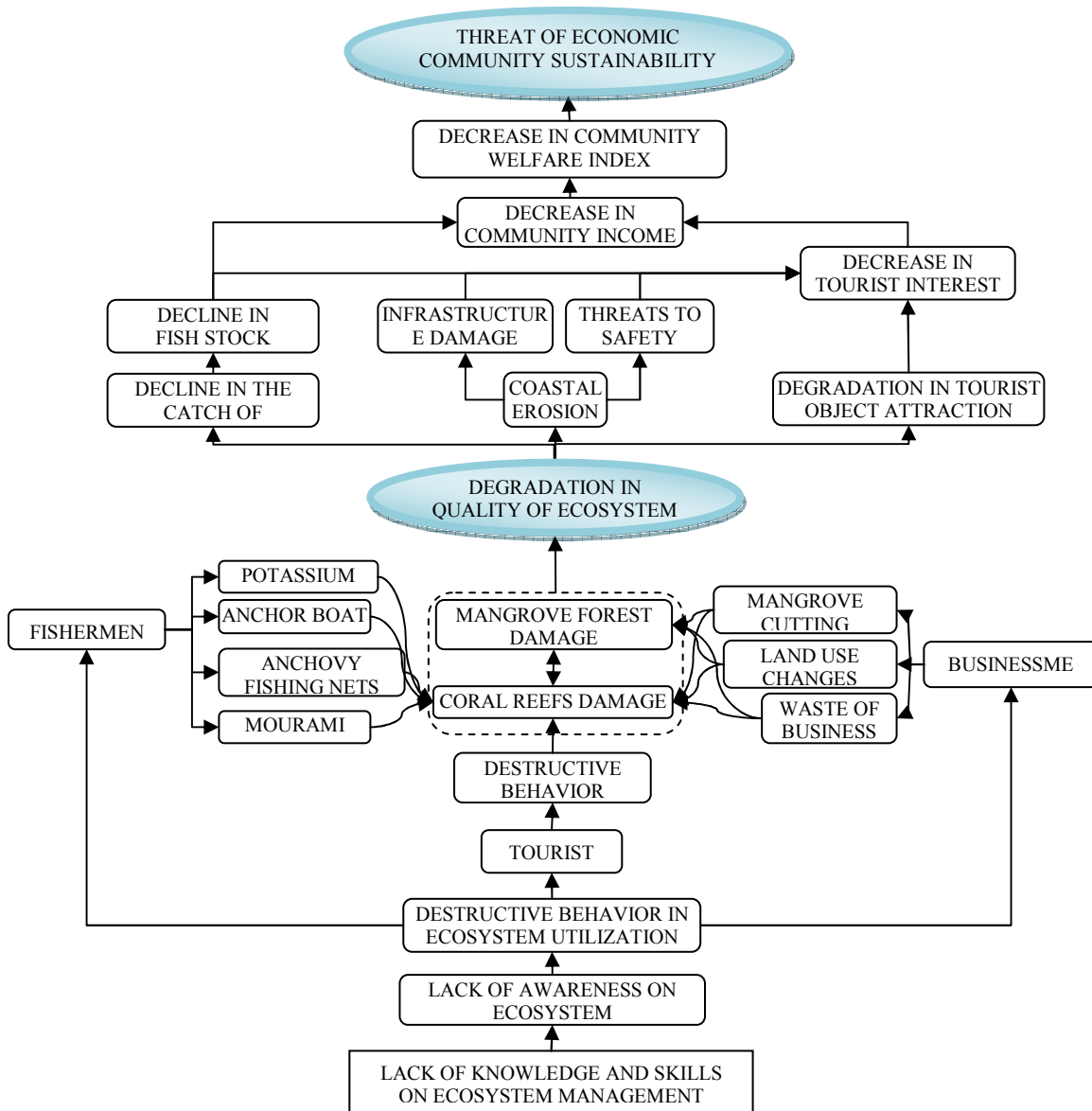


Figure 2. Schematic chart of ecosystem management problems and their impact on the sustainability of the economic community in Gili Matra

These factors cause damage to the ecosystems in Gili Matra. The current Gili Matra's condition is very different from that several decades ago, both in terms land cover, diversity of flora and fauna, and ecosystems (mangroves and coral reefs). Based on participatory mapping

(Fig.3) and a comparison of some studies (Table 2), it can be concluded that the level of damage to the ecosystem in Gili Matra has been very drastic, up to 90%, and 75% of the damage caused by human activities.

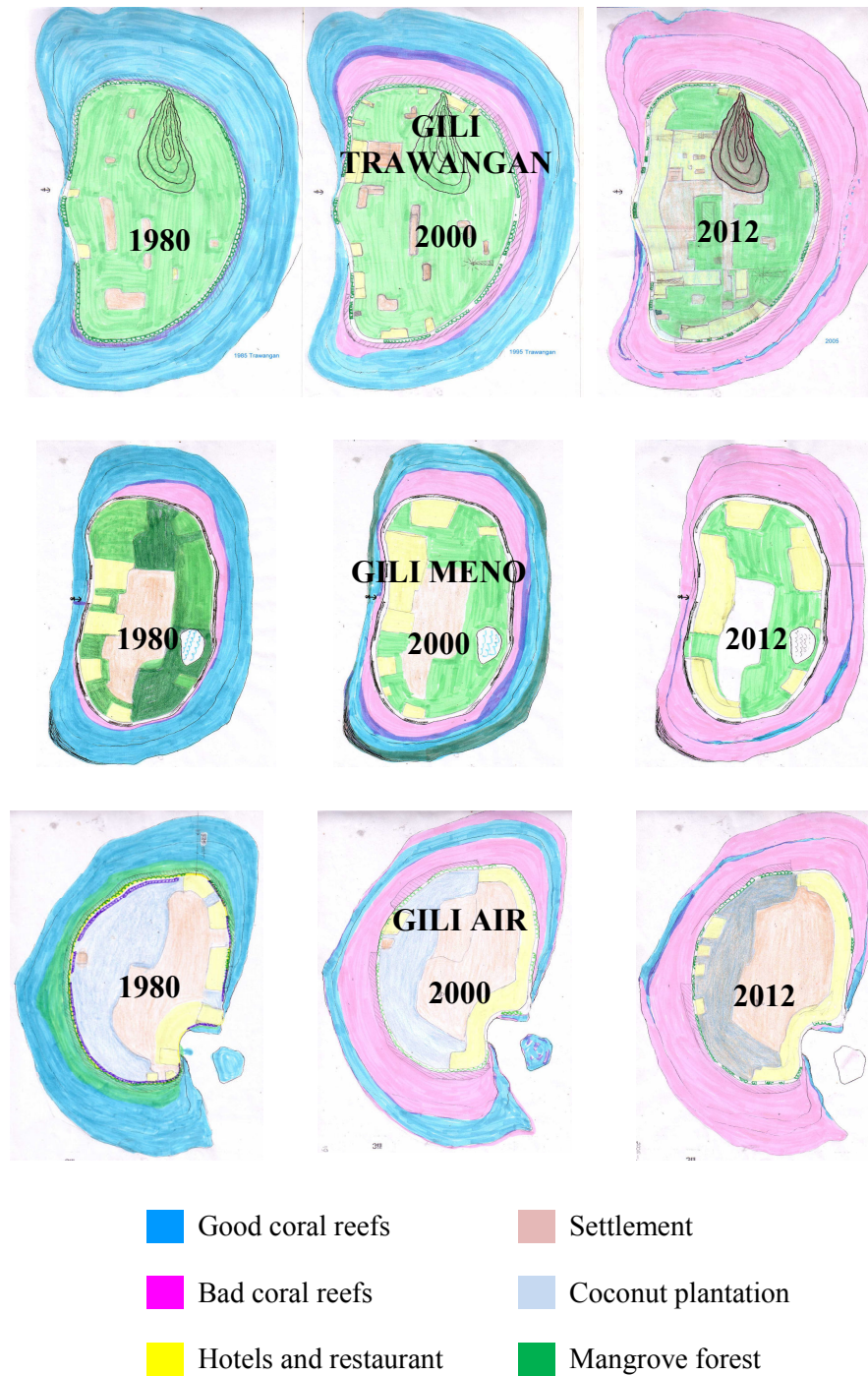


Figure 3. Ecosystems and land cover changes in the Gili Matra

Table 2. Comparison of the condition of coral reefs cover and number of fish in Gili Matra since 1998 to 2010 in the same locations

Source	Year	Status	Coral Reefs Cover (%)	Number of Fish
Dahuri et al.	1998	Good to Very Good	50 to 100	123 species of 33 families
Department of Conservation and Natural Resources (BKSDA)	2000	Bad to Good	10.20 to 55.39	73 species of 22 families
Ahyadi	2010	Bad to Fair	12.74 to 36.10	54 species of 11 families

Damage or loss of quality of ecosystems in Gili Matra could not be controlled by granting a conservation area which is used for tourism. On the contrary, since the granting of the status as a conservation area, the level of damage is increasing; as tourism development in Gili Matra tends to be oriented to the increasing number of tourists without seeing the economic value. The consequences of this orientation are: increased living space, improved infrastructure facilities, and increased volumes of waste. These consequences led to increased pressure on ecosystems, which is a tourist attraction (Wilkinson, 1993; Huttche et al., 2002; Milazzo, et al., 2002). This means that the damage to the ecosystem would discourage tourists to visit Gili Matra, and sooner or later it will threaten the community's economy.

CONCLUSION

Fishermen community, tourists and businessmen are the main stakeholder in the management of the ecosystem as a tourism asset in Gili Matra, which is based on the level of importance and impact on the ecosystem. Destructive behavior of stakeholders, especially the main stakeholders, has led to the degradation of ecosystems in Gili Matra. It is of paramount importance to nurture these stakeholders, to sustain tourism in Gili Matra.

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REFERENCES

- Ahyadi, H. dan A. Jufri. 2008. Analisis Perubahan Ekosistem Terumbu Karang untuk Menunjang Pengelolaan Kawasan TWAL Gili Indah yang Berkelanjutan. Laporan Kegiatan Riset dan Pengembangan Daerah. Badan Perencanaan Pembangunan Daerah, Nusa Tenggara Barat, Mataram. (in Indonesian)
- Ahyadi, H. 2010. Evaluasi Sumberdaya Terumbu Karang untuk Wisata di Gili Trawangan Propinsi Nusa Tenggara Barat. Tesis Magister. Sekolah Pascasarjana Institut Pertanian Bogor, Bogor. (in Indonesian)
- Anthony, B. and J. Inglis. 2004. Increased spatial and temporal variability in coral damage caused by recreational scuba diving. *Ecol. Appl.* 12 (2):427-440.
- Bachtiar, I., Karnan, T. Hidayat. A. Arianto, Bursan, E. dan Susiono. 2000. Inventarisasi Kerusakan Terumbu Karang pada Kawasan Konservasi Gili Indah Kabupaten Lombok Barat. Laporan Kegiatan Pembinaan dan Peningkatan Usaha Konservasi di Dalam dan Luar Kawasan Konservasi. Unit Konservasi

- Sumberdaya Daya Alam, Nusa Tenggara Barat, Mataram. (in Indonesian)
- Benazir. 2012. Keanekaragaman Burung di Kawasan Mangrove untuk Menunjang Pengembangan Ekowisata Birdwatching di Gili Meno Lombok Utara. Skripsi Sarjana. Program Studi Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Mataram, Mataram. (in Indonesian)
- BKSDA. 2000. Laporan Pendataan Kondisi Terumbu Karang di Taman Wisata Alam Laut Gili Indah Propinsi Nusa Tenggara Barat, Mataram. (in Indonesian)
- Brown, K., E. Tompkin and N.N. Adger. 2001. Trade-off Analysis for Participatory Coastal Zone Decision Making. Publication Office, Overseas Development Group, University of East Anglia. Norwich.
- Dahuri, R., V. Nikijulw, A. Suparman, F. Yulianda, I. Setyobudi dan R.A. Kinseng. 1998. Buku 1: Rencana Pengelolaan Taman Wisata Alam Laut Gili Indah Propinsi Nusa Tenggara Barat. Proyek Penyusunan Neraca Sumberdaya Kelautan dan Pesisir Daerah. Kerjasama Dirjen Pembangunan Daerah dengan Dirjen Perlindungan Hutan dan Pelestarian Alam. (in Indonesian)
- Dixon, J.A., L.F. Scura, and T. van Hof. 1993. Meeting ecological and economic goal; Marine Park in Carabina. *Ambio*. 22: 117-125.
- Hawkins, J.P., C.M. Roberts, D. Kooistra, K. Buchan, and Susan. 2005. White sustainability of scuba diving tourism on coral reefs of Saba. *Coast. Manag.* 33 (4): 373 – 387.
- Huttche, C.M., A.T. White, and M.M. Flores. 2002. Sustainable Coastal Tourism Handbook for the Philippines. Cebu. Philippine.
- International Fund for Agricultural Development. 2009. Good Practice in Participatory Mapping. A review prepared for the International Fund for Agricultural Development.
- Kunzmann, A. 2001. Coral, fishermen, and tourists. *Jurnal. Pesisir. Lautan*. 4(1): 17-22.
- Milazzo, M., R. Chemello, F. Badalamenti, R. Camarda, and S. Riggio. 2002. The impact of human recreational activities in marine protected areas: what lessons should be learnt in the Mediterranean Sea? *Mar. Ecol.* 23 (1): 280–290.
- Primadona Lombok. 14 Januari 2012. Pemkab Lombok Utara Optimalkan Potensi Wisata Tiga Gili.
- Setiawan, A. 2008. Karakteristik Habitat Burung di Gili Meno Desa Gili Indah Kecamatan Pemenang Lombok Barat. Skripsi Sarjana. Program Studi Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Mataram, Mataram. (in Indonesian)
- Suana, I.W., A. Virgota, I. Hadi dan G. Tresnani. 2008. Pengembangan Ekowisata Pengamatan Burung (Birdwatching) di Desa Gili Indah, Lombok Barat. Laporan Program Penerapan Ipteks DP2M Dikti. Program Studi Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Mataram, Mataram. (in Indonesian)
- Suana, I.W., A. Muspiah, K. Sukenti, B.F. Suryadi dan N.I. Julisaniah. 2011. Rehabilitasi Hutan Mangrove di Danau Air Asin Gili Meno dalam Rangka Pengembangan Ekowisata Pengamatan Burung (Birdwatching). Laporan Pengabdian Kepada Masyarakat DIPA PNBP Unram. Program Studi Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Mataram, Mataram. (in Indonesian)
- Virgota, A. dan G. Tresnani. 2006. Bioekologi Burung di Desa Gili Indah Kecamatan Pemenang Kabupaten Lombok Barat serta Prospeknya sebagai Ekoturisme. Laporan Penelitian Dosen Muda DP2M Dikti. Program Studi Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Mataram, Mataram. (in Indonesian)
- Wilkinson, C.R. 1993. Status of coral reefs in Southeast Asia: threats and responses. In: Global Aspects of Coral Reefs: Health, Hazards, and History (R.N. Ginsburg, ed.). University of Miami. Florida. p.311-31.