Resilience Thinking Approach to Protect Marine Biodiversity in Small Islands: A Case of Gili Trawangan, Indonesia

LAA Bakti, Marjono, G Ciptadi, and F Putra

Brawijaya University Graduate Program, Jl. MT. Haryono No.169, Ketawanggede, Kec. Lowokwaru, Kota Malang, Jawa Timur 65145, Indonesia
Faculty of Agriculture, University of Mataram, Jl. Majapahit No.62 Mataram, West Nusa Tenggara 83114, Indonesia
arifin2020@student.ub.ac.id

Abstract. This paper examines the resilience thinking approach to protect marine biodiversity in small islands with the case of Gili Trawangan, Indonesia, which is part of a marine protected area. The rapid development of the world's tourism industry, the monetary crisis in 1997, national reforms in 1998, global warming, and the irresponsibility of local governments to enforce formal rules on marine resources, have had a tremendous impact on marine biodiversity on small islands like Gili Trawangan. This study uses a qualitative method, including stakeholder interviews, participant observation, stakeholder mapping, and local document collection. The collaborative effort that was built by local residents with foreign businesspersons, academics, non-governmental organizations, and the village government of Gili Indah, started in 2001 was intended to protect the marine ecosystem on Gili Trawangan from destructive fishing practices, to prevent the further degradation of marine biodiversity on the islands. Results of this study found several collaborative work initiatives in Gili Trawangan to meet the challenges, e.g., the institutionalization of customary law called “Awig-Awig” to regulate coral reef activities, enforcement of regulations on marine biodiversity such as coral reefs, strengthening institutional capacity, and restoring the degraded coral reefs ecosystem.

1. Introduction
Indonesia has 17,502 islands and 85,700km² of coral reefs, which represents 14% of the world’s coral reefs. More than 3,500 marine species live in Indonesian seas, especially in coral reefs. Coral around Gili Trawangan, which is currently among the most popular scuba diving destinations in Indonesia, has suffered substantial damages. Gili Trawangan requires unpolluted marine habitats for fisheries, tourism, and marine biodiversity. Unfortunately, global warming, pollution, sea level rise, destructive fishing, irresponsible harvesting of coral reefs, and reckless tourism activities, which can threaten local food needs and tourism revenues [38], have mostly damaged these habitats.

Unhealthy habitats need to be restored on a large scale so that they can support fishing and tourism activities, which in turn can increase the income of business owners in the islands. Therefore, efforts to restore degraded coral reefs and coastal habitats should be the main strategy for local businesses. Collaboration theory has been applied to community-based tourism development in Gili Trawangan, Indonesia [1], where it was found effective in facilitating multi stakeholder partnership involving turbulent planning domains. This paper explores how a small island community responds to socio-ecological disturbance to protect their marine biodiversity by applying resilience thinking approach.
2. Literature Review

2.1. Collaboration

In their comprehensive theory of collaboration, Wood & Gray define collaboration as a process of self-governance, meaning that collaboration happens when a group of autonomous stakeholders who care about a common issue, come together in an interactive process, using shared rules, norms and structures, to decide how to manage their problem domain [2]. The problem domain refers to situations in which the complexity of issues is beyond the capability of any single individual or group and requires an inter- or multi-organizational response [3]. Collaboration, therefore, becomes a strategy to manage interdependence and leverage the combined “collective power” of stakeholders to raise the level of political dynamics to achieve a common goal. Others have echoed the core ideas in the comprehensive theory of collaboration [4; 5].

In this context, collaboration is defined as the process by which multi stakeholders work together to learn, innovate and adapt in response to changing social, ecological, economic and geopolitical conditions in small islands.

Two of the resilience building benefits of collaboration include: (1) it can provide new solutions through processes that leverage the different skills and perspectives of participating stakeholders; and (2) it has the potential to break new ground with innovative solutions to problems based on the creativity generated by groups working together [6]. Collaboration has the ability to change those involved by exposing them to a greater variety of people and sectors and thereby changing the way they solve problems [2]. In this way, collaboration is an emergent process rather than a prescribed state of organization [7] and has benefits such as reduced transactional costs [2], greater social–ecological resilience [8], enhanced and improved governance [9].

Complexities and uncertainties inherent to ecosystem of small island tourism imply the need for flexibility within the planning process. In Gili Trawangan, the involvement of local community and private sector in partnership program for protection of the island biodiversity has been implemented since early 2000 [1]. This small island’s collaborative approach brings local people, business, community leaders, researchers, and other stakeholders together and encourages long-term collaboration through the development and strengthening of institutional ties.

2.2. Tourism Area Life Cycle (TALC) Characteristics of Gili Trawangan

Gili Trawangan is the largest in land area (340 ha) of three small coral islands that are part of the much larger island of Lombok, situated off its west coast and facing the island of Bali (Figure 1). Gili Trawangan experienced many of the characteristics of the Tourism Area Life Cycle (TALC) [10], starting with the TALC stages of exploration (discovery by tourists) and involvement (initial local participation and local organization) from the mid-1970s through the mid-1980s (Figure 2). During this time, the island was governed by traditional rules (adat), which were formulated and agreed upon by the local population, who worked as farmers and fishermen. These locals were the first to respond to the arrival of foreign visitors and were the forerunners of small-scale tourism on Gili Trawangan [11]. Their understanding of the local coral reef ecosystem was very simple, and generally keeps the truthfulness of their social-cultural life in their daily practices.
The TALC stage of development (equivalent to the adaptive cycle growth phase) began in the early 1990s, at which time the economic potential of Gili Trawangan as a diving and beach destination became recognized by outside investors, including businesspersons and national and local politicians. In 1992, Indonesia’s central government sent military forces to evict the residents of Gili Trawangan at the behest of tourism developers [12]. The violent act was not successful, and residents eventually rebuilt their businesses, while others rented their lands to tourism investors. In the late 1990s and early 2000s Gili Trawangan was entering the consolidation phase of the TALC and adaptive cycle models as Indonesia started a shift into one of the world’s largest democracies. Migration to Gili Trawangan increased the island’s population from about 400 in 1996 [11] to 1,089 in 2003 [13]. During those periods, many new accommodations, restaurants, and tourism facilities were quickly built without any planning or regulatory frameworks. This approach was worsened by national policies that stimulated foreign investor interests over the authority of local communities to managing their development [14]. The first fast boat ferries from Bali started arriving in Gili Indah at this time, along with investments in large, upscale resorts and a rapid increase in the number of tourists and outside investors (both Indonesian and foreign). This resulted in a dramatic change in the island’s demographics and economy [15]. Traditional agriculture largely disappeared in the early 2000s, as land was more valuable for tourism and speculation. Due to the small size of the island and its growing tourism orientation, the community came to a general agreement, which later become an awig-awig regulation, to limit

**Figure 1.** Map of Gili Trawangan, Indonesia
transportation to horse drawn carts and bicycles, and banning motor vehicles to both ensure safety and reduce air pollution.

By the mid-2010s, most of Gili Trawangan’s land base is used for tourism (80%), while tourist numbers have grown from 54,957 tourists in 2009 to 503,341 in 2014 [16]. Access to Gili Trawangan from Lombok takes 25 to 30 minutes by regular boat and 10 to 15 minutes by fast boat. Many tourists come for snorkeling and scuba diving, resulting in 27 certified dive shop operations on Gili Trawangan alone [17].

Gili Trawangan community has become increasingly aware of the environmental damage that have accompanied increasing numbers of tourists and levels of tourism development (Bakti et al., 2008). Collaboration across many different scales and involving different stakeholders has been integral to the island’s efforts to conserve and restore its marine resources. This collaboration has also demonstrated the resilience of the community of Gili Indah overall, but especially Gili Trawangan. To understand this collaboration work requires an understanding of resilience theory, with particular attention to the panarchy model of the tourism-dependent small island system.

2.3. Resilience Thinking and Panarchy
Holling and Gunderson define ecosystem resilience as “... the magnitude of disturbance that can be absorbed before the system changes its structure by changing the variables and processes that control behavior” [18]. The resilience conceptual model comprises numerous distinct scales with cross-scale connections that form a multilevel and hierarchical social-ecological system (SES) structure [19]. A SES, therefore, exists across multiple levels and time frames [20] and is able to absorb a spectrum of shocks and disturbances, as it maintains its capacity for renewal, re-organization, and development ([8]; [21]. Other characteristics of the resilient system include having the potential for multiple metastable regimes, rather than a single equilibrium [18].

The essence of resilience theory embraces the following components and assumptions about a SES [20]: (1) External change drivers are disturbances that are exogenous to the SES, such as climate conditions, non-local governance systems, and external economic factors. (2) Fast moving internal variables are those that change quickly when stressed, such as air pollution, water supply, and gasoline prices, and are often referred to as “disasters” or “crises” when they occur. (3) Slow moving internal variables, also known as controlling variables, are those that remain more stable under pressure, such as soil fertility conditions (for agriculture), religious and cultural traditions, and monetary systems, and are usually referred to as an “annoyance” because their shifts occur over a long period of time. (4) Both fast and slow variable changes can occur in non-linear patterns, making them difficult to predict [8].

Constructed on these fundamental building blocks and assumptions, Walker and Salt developed a framework to provide a way of thinking in which a system can sustain itself by (a) retaining control over its core essential functions and structures; (b) being capable of self-organization under changing conditions; and (c) building and enhancing its future capacity for learning and adaptation [20]. The aim of resilience thinking is to understand how environment and humans operate together in complex adaptive systems to achieve these goals [8; [21]; [22]; [23]. Another key consideration in resilience theory is that changes in a SES reflect movement through the “adaptive cycle”. Different systems move through this cycle at different scales of space and time. Most, although not all, systems follow a four-phase cycle: (1) a rapid growth or exploitation phase [r] wherein new resources and opportunities are discovered and exploited; (2) a consolidation and conservation phase [K] in which the system matures, consolidates, and become rigid against change; (3) an energy release or collapse phase [Ω] where the stress of conservation against increasing levels of change leads to a collapse of the system’s structures; and (4) a re-organization and renewal phase [α] during which a less structured system context allows innovations, adaptations, and eventually new opportunities for exploitation and development to emerge [18; 20].

The growth [r] and consolidation [K] phases emerge from standard ecological theory, in which an ecosystem’s growth [r] stage is controlled by colonizing species tolerant of environmental variation.
which then transitions to the consolidation [K] stage, which is dominated by species adapted to a narrower range of variation [18]. The other phases consist of the collapse stage [Ω] and the renewal stage [α] and are typically briefer events. For example, in the context of the forest, a collapse [Ω] could be a wildfire or insect outbreak that releases biomass's nutrients, while the reorganization [α] phase could include an adjustment to a loss or change in soil nutrients. The phase that leads into a new adaptive cycle, begins with completion of the reorganization [α] and the start of the exploitation [r] state. Not all systems move through all stages of the adaptive cycle, with the collapse phase often being avoided though planned renewal [20]. On the other hand, some systems may be “trapped” in a collapsed cycle, never being able to escape degraded or impoverished conditions [24]. Through this adaptive cycle, three main variables are rise and fall in influence, which are referred as resilience (characterized by a high capacity for innovation and adaptation), potential (having a high capacity for change due to accumulated resources, such as biomass or human social capital), and connectedness (providing a high capacity for control and management to guide future directions) [19].

A tourism panarchy model [25] is outlined following Gunderson and Holling’s hierarchical nesting of one system level within another [18]. In a tourism panarchy model, the core of a local tourism system is shown as being part of the larger regional tourism system that contains other parallel local tourism systems. The regional tourism system is similarly embedded in hierarchy of a larger tourism systems leading to our global tourism system. It is also important to recognize that a tourism system, no matter the hierarchical level, is deeply embedded in a social-ecological system that consists of many non-tourism components, along with many other parallel systems. This model creates a comprehensive and complex tourism system [26], covering social, economic, geopolitical, and ecological components, along with the processes and functions that complement the totality and are essential for sustainability [27]. These systems and processes are related to one another, although some linkages are much stronger than others. Discussions over how to define the tourism system [28], and even whether such a system exists [29], reveals the challenges and flexibility of a systems approach to social science research.

As noted above, the level of resilience in a system changes over time through the adaptive cycle, this is an integral part of the panarchy model [18; 20]. As others have pointed out [25; 30], the four-phase adaptive cycle, equates to different stages in the Butler’s Tourism Area Life-Cycle (TALC) model (Figure 2) [10]. A young, newly emerging, tourism system [α] enters a phase of growth [r] (equated to the exploration, discovery, and early development stages in TALC), as it responds to the potential for new kinds of relationships at higher function. As tourism investments increase, the system grows, more energy is created, and relationships becomes more permanent [K] (equated to the advanced development and consolidation phases in TALC). The rigidity of the consolidation stage causes a drop in the resilience of the system as a level of complacency set in based on assumptions of past momentum. The system’s capacity to respond to change and absorb shocks, therefore, may not keep pace with changes in the tourism market or possibly in its tourism product. This can lead to a phase that includes the release of suppressed and pent-up energies (possible social instabilities) and a collapse in tourist arrivals [Ω] (referred to as stagnation or decline in TALC). This collapse is a ‘destabilizing event’ and the dissipated energy is then recycled back to into a reorganization phase (post- stagnation in TALC), which is hopefully followed by a new phase of change (exploration, discovery in TALC) and growth (development in TALC).
Figure 2 The Tourism Area Life Cycle (TALC) model showing comparable stages in the Adaptive Cycle Model Based on [10] and [19].

McKercher’s reflection on the TALC recognized that destinations behave like living ecosystems rather than discrete products [31]. Tourism destinations are not discrete entities but multi-agent, multilevel, multi-dimensional social-ecological systems that are in constant states of evolution [32]). From this perspective, the resilience of a tourism system would be its capacity to effectively evolve to maintain its core functions and a desired level, while also recognizing its relationships in a panarchy of parallel and hierarchical subsystems. Panarchy complexity also displays how various subsystems may be in different adaptive cycle phases at the same time and could consequently influence each other in unpredictable and non-linear ways.

3. Materials and Methods

We employed a qualitative method, which includes stakeholder interviews, participant observations, stakeholder mapping, social network analysis, and collection of local documents and other information sources. I did participant observations starting on January until August 2021 and conducted twenty in-depth interviews from the community tourism system in Gili Trawangan, which includes a tourism services subsystem, a tourist attraction subsystem, a tourism marketing subsystem, a tourism governance subsystem, a business service subsystem, and collaborative leaders. The objective of this semi-structured interview was to discover stakeholder’s perspectives on a particular situation, idea, or program, rather than making generalization about their behavior.

We used the guideline designed based on resilience indicators and collaboration, which focus on the collaborative role of small island communities in response to marine biodiversity threats in the island. We asked how the interviewees’ communities responded to changes in their social-ecological system, and what roles collaboration played in building resilience on the islands. We also collected and analyzed local documents related to development and community collaboration programs on the islands to better understand their collaboration experiences. Through these qualitative approaches, we were able to gain insight into the experiences of the community facing the various socio-ecological pressures that have befallen them in the past, and a better understanding of what factors influence the community response. For example, how people deal and adapt to their coral reef degradation, or how they understand the causes of coral bleaching and how they tried to restore it.
4. Results and Discussion

4.1. Multi Stakeholder Partnership to Protect Marine Biodiversity

Gili Trawangan system has attempted to self-organize itself to address the Gili’s marine biodiversity threats. Because of the relatively weak local government, the island’s response has mostly been through collaborative efforts organized by local leaders and involving multiple stakeholders, including owners of dive shops, hotels, restaurants, as well as the Kadus (sub village head), the Kades (village head), and local fishermen. Such collaboration is a direct reflection of the self-organizing characteristic of a well-integrated system. On Gili Trawangan, this is possible because (1) there is a broad awareness of the huge impacts that tourism growth has brought to the island, (2) the island is small enough that people know each other and communicate regularly, and (3) there is a mix of Indonesian and immigrant populations from around the world who bring different knowledge and skills to address the challenges they face.

The following strategies have been employed to meet the challenges that Gili Trawangan has faced since the island entered the early consolidation phase of development in the early 2000s. They have been largely self-organized initiatives that have included significant community participation, including both indigenous and foreign residents, business people, universities, and local NGO’s ([33; 34; 35; 36; 37].

4.2. Institutionalization of customary law called “Awig-Awig” to regulate coral reef activities

The escalation of local institution of community based fisheries management in Gili islands constituted the local fishers response to challenges they faced such as the monetary crisis in 1997, the global warming, the 1998 national reform, and the unaccountability of the government to impose official procedures in marine resources. These challenges have made local community to initiate the revitalization of the local institution called awig-awig [13], which is part of the Lombok cultural system. The customary law “Awig-Awig” (proven by Village Decree No. 12/Pem.1.1/06/2001) was introduced with concern to the damage of coral reef following the increasing local use of destructive fishing practices, especially bombing blast as well as to protect traditional fisheries and keep traditional culture related to fisheries. Although local fishermen in the past used to fish with dangerous explosives, this bad fishing practice should not be carried out. Therefore, local community in Gili islands as their self-governance made “Awig-Awig” over the marine biodiversity resources, in response to the political instability during the Reform era.

4.3. Enforcement of coral reef regulation

The SATGAS or Yayasan Front Pemuda Satgas Gili was established in 2000 to ensure the enactment of “Awig-Awig”, e.g. protecting marine biodiversity. Lack of resource support has hindered the effectiveness of the SATGAS’s monitoring task to enforce the “Awig-Awig” implementation. This challenge has motivated SATGAS to build collaborative approach with the local businesses (such as dive operator, hotel, and restaurant) in the island. The tourism entrepreneurs, then, established Gili Eco-Trust (GET) in 2001, which aim to protect the coral reefs around the island and the restoring damaged reefs using Biorock® technology. e.g. providing facilities and operational cost to support the monitoring of SATGAS activities. Because of the GET’s support, overall “Awig-Awig”, particularly on prohibition of destructive fishing, has effectively enforceable. GET is now working in collaboration with the National Aquatic Center for Marine Conservation (Balai Konservasi Kelautan Perairan Nasional - BKKPN) to enforce the coral reef regulation, thus protecting the marine biodiversity of the marine protected area of the islands.

4.4. Strengthening the institutional capacity

Some institutional policy initiatives on fishery and tourism management have been introduced in Gili islands. The National government has revised and approved the Law on the management of coastal areas and small islands (UU No. 1 / 2014). The Minister of Maritime Affairs and Fisheries has issued regulations on the management plan and zoning in Tourism Park Aquatic Gili Islands (KEPMEN No.
At the regional level, NTB province has approved the regional regulation on the management of coastal and marine areas in small islands (PERDA No. 2 / 2008). Whereas, at the district level, North Lombok has enacted local regulation on spatial plans in 2011 (PERDA No. 9 / 2011). At the village level, the community in the islands has reviewed the awig-awig regarding coastal zoning and replaced it with the village regulation on management of coastal and marine zones (PERDES Gili Indah No: 03 / 2014).

4.5. Restoration of degraded coral reef ecosystem using Biorock® technology

Besides facilitating the enforcement of the awig-awig for coral reefs management, since 2006 GET in collaboration with the Global Coral alliance, University of Mataram, the Biorock® Thailand, the Marine Foundation, and local NGOs, has used the Biorock® technology to set up a program of rehabilitation and protection of coral reef ecosystem as a mean of saving the island’s biodiversity. Biorock® was found effective for the coral restoration because it can accelerate coral growth as much as 2-6 times faster than the natural growth [17; 38]. The collaborative approach of restoring the Gili island’s coral reefs has attracted more and more participants from various countries to attend the Biorock® workshop that organize by GET every two years. This offers a stable environment for corals and fishes, and promotes the concept of sustainable ecotourism in the marine protected area of small islands.

5. Conclusion

One response to the socio-ecological crisis facing by the small island is the collaborative and resilience thinking approach, which offers a conceptual framework for understanding the change and interaction of multiple-scale socio-ecological systems in the management of sustainable tourism system. The collaborative work has demonstrated that multi stakeholder partnership is a panacea in a complex, tourism-dependent small island system when dealing with socio-ecological changes. In such a context, system collapse is a constant threat, which from a resilience perspective may be a good thing because it fosters self-organizing collaboration and innovation, which can then lead to new opportunities for community development and growth. The historical interactions among the multi stakeholder involved on Gili Trawangan makes it a good example of how a panarchy of systems forms and functions in responses to biodiversity threats caused by the tourism industry and global warming. The diverse interest groups involved in this process operate at different scales and move through their own adaptive cycles as they collaborated and managed coral reef management system for the island. Understanding the chronological evolution of the goals and functions of community collaborations on Gili Trawangan from a resilience systems perspective provides valuable insights into the dynamics of biodiversity protection in marine protected areas of small island context, as well as lessons for other areas facing similar challenges.

Acknowledgment

The authors would like to thank Gili Eco Trust for supporting this research.

References

[1] Graci S 2013 Collaboration and partnership development for sustainable tourism Tourism Geographies 15(1) 25-42
[2] Wood D J & Gray B 1991 Toward a comprehensive theory of collaboration Journal of Applied Behavioral Science 27 139-162
[3] Trist E L 1983 Referent organization and the development of interorganizational domains Human Relation 36(3) 247-268
[4] Thomson A M and Perry J L 2006 Collaboration processes: inside the black box Special issue Public Administration Review 66 20–32
[5] Gray B 1989 Collaborating: Finding common ground for multiparty problems (San Fransisco: Jossey-Bass)
[6] Lasker R, Weiss E & Miller R 2001 Partnership synergy: practical framework for studying and strengthening the collaborative advantage Milbank Quarterly 79 (2) 179-205

[7] Bedwell W, Wildman J, Diazgranados D, Salazar M, Kramer W & Salas E 2012 Collaboration at work: an integrative multilevel conceptualization Human Resource Management Review 22(2) 128-145

[8] Walker B, Carpenter S, Andereis J, Abel N, Cumming G, Janssen M and Pritchard R 2002 Resilience Management in Social–Ecological Systems: a working hypothesis for a participatory approach Conservation Ecology 6 (1) 14

[9] Imperial M T 2005 Using collaboration as a governance strategy: lessons from six watershed management programs Administration and Society 37(3) 281-320

[10] Butler R 1980 The Concept of a tourist area cycle of evolution: implications for management of resources Canadian Geography 24(1) 5-12

[11] Hampton M P 1998 Backpacker tourism and economic development Annals of tourism research 25(3) 639-660

[12] Kamsma T, and Bras K 2000 Gili Trawangan – from desert island to “marginal paradise” ed Hall D R and Richards G Tourism and sustainable community development (London: Routledge) pp 170–184

[13] Satria A, Matsuda Y & Sano M 2006 Questioning community based coral reef management systems: a case study of awig-awig in Gili Indah, Indonesia. Environment, development and sustainability 8(1) 99-118

[14] Silver C 2005 Do the donors have it right? Decentralization and changing local governance in Indonesia ed Richardson H and Bae C H Globalization and urban development. Advances in Spatial Science Series (Heidelberg: Springer Berlin) pp 95-108

[15] Vaisutis J, Bedford N, Elliot M, Ray N, Stewart I, Ver Berkmoes R, William C, Witton P & Yanagihara W 2007 Indonesia 8th Edition (Melbourne: Lonely Planet)

[16] Badan Pusat Statistik Kabupaten Lombok Utara 2015 Lombok Utara In Figure 2015

[17] Bakti L A A, Radiman T U, Retnowulan A, Hernawati, Sabil A and Robbe D 2012 Biorock reef restoration in Gili Trawangan, North Lombok, Indonesia ed Goreau T J and Trench R K Innovative Methods of Marine Ecosystem Restoration (London: Taylor and Francis) pp 59-79

[18] Holling C & Gunderson L 2002 Resilience and adaptive cycles In Holling L G Panarchy: Understanding Transformations in Human and Natural Systems (Washington DC: Island Press) pp 25-62

[19] Holling C S 2001 Understand the in complexity of economic, ecological, and social systems Ecosystem 4 390-405

[20] Walker B & Salt D 2006 Resilience thinking: sustaining ecosystems and people in a changing world (Washington : Island Press)

[21] Folkle C, Carpenter S, Elmqvist L, Gunderson L, Holling C S & Walker B 2002 Resilience and sustainable development: building adaptive capacity in a world of transformations Ambio 31(5) 437-440.

[22] Allen C R, Cumming G S, Garmestani A S, Taylor P D & Walker B 2011 Managing for resilience Wildlife Biology pp 337-349

[23] Folkle C 2016 Resilience In Oxford Research Encyclopedia of Environmental Science (Oxford University Press USA) pp 1-68

[24] Allison H E and Hobbs R J 2004 Resilience, adaptive capacity, and the “lock-in trap” of the Western Australian agricultural region Ecology and Society 9(1) 3

[25] Farrell B H & Twining-Ward L 2004 Reconceptualizing tourism Annals of Tourism Research 31(2) 274-295

[26] Baggio R 2008 Symptoms of complexity in a tourism system Tourism Analysis 13(1) 1-20

[27] Lew A A and Hall C M 1998 The Geography of sustainable tourism: lessons and prospects ed Hall CM and Lew A A Sustainable Tourism: A Geographical Perspective (London: Addison Wesley Longman) pp 199-203
[28] Leiper N 1990 Tourist attraction systems *Annals of tourism research* **17**(3) 367-384
[29] Leiper N 1982 Why ‘the tourism industry’ is misleading as a generic expression: the case for the plural variation, ‘tourism industries’ *Tourism management* **29**(2) 237-251
[30] Hamzah A and Hampton M P 2012 Resilience and non-linear change in island tourism *Tourism Geographies* **15** 43-67
[31] McKercher B 2005 Destinations as products? a reflection on Butler's life cycle *Tourism Recreation Research* **20**(3) 97-102
[32] Davoudi S 2012 Resilience: a bridging concept of a dead end? *Planning Theory and Practice* **13**(2): 299–333
[33] Bakti L A A 2003 Introduction of action learning for sustainable waste management in Gili Trawangan *Working Group III Report*
[34] Bakti L A A, Goreau T J, Robbe D, Virgota A 2010 Using community action planning (CAP) tools for sustainable ecotourism development in Gili Trawangan, Lombok. The Int. Seminar on Harmonization of Tourism Development (Udayana University, Bali)
[35] Gili Eco Trust 2010 *Seventh Indonesian reef restoration training / workshop* (Gili Trawangan, Indonesia)
[36] Gili Eco Trust 2012 *Eighth Indonesian reef restoration training / workshop* (Gili Trawangan, Indonesia)
[37] Robbe D, Purnawadi, Ali U, and Bakti L A A 2011 Gili Matra, marine protected area: ecotourism and community management *Proc. 2nd Coral Reef Management Symposium on Coral Triangle Areas* (Kendari, Indonesia)
[38] Bakti L A A, Robb D, Virgota A and Goreau TJ 2008 Biorock reef restoration for sustainable ecotourism in Gili Trawangan (Global Coral Reef Alliance)