Stakeholders' perceptions of the impacts of marine protected areas tourism on the social and ecological system resilience in Bali, Indonesia

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Abstract

This thesis focuses on stakeholders' perceptions with respect to the impact of marine protected area (MPA) tourism on social ecological system resilience in Bali, Indonesia. It utilises a multi case studies approach and adapts the Resilience Assessment Framework (RAF) to examine three MPAs that have different types of governance systems. The research employed mixed methods to carry out the assessment, combining structured interviews, semi–structured in-depth interviews, and focus group discussions. The research participants consisted primarily of fishers, but also included other important stakeholders such as government officials, non-governmental organisation (NGO) support workers, and tourism and/or dive operators who had been operating on sites within the MPAs for more than 10 years. Research participants provided their perceptions of marine ecosystem health, MPAs, MPA tourism, and their expectations for the future in the context of livelihood for themselves and their families. The use of mixed methods allowed the researcher to compare participants' responses to the structured interviews with data obtained through semi–structured in-depth interviews and focus group discussions. Key findings suggest that the majority of the participants perceived that there was declining health of their local marine ecosystem, at least from a fishery productivity perspective. Findings also suggest that the presence of MPAs and tourism in the MPAs have created both opportunities and conflicts for the fisheries sector. Present generation fishers perceived there are limited or few opportunities for them to transition from fishing and switch to tourism as their main livelihood. However, fishers had low expectations regarding their children's ability to support themselves through fishing and had low confidence in the ability of marine resources to provide a decent livelihood in the future. This research is the first to focus specifically on the perceptions of stakeholders on the

effectiveness of MPAs, marine ecosystem health and marine tourism in the Indonesian context. The outcome of this research proposes an enhanced framework of resilience assessment for MPA tourism which emphasises a transdisciplinary integration of conservation and sustainable use approaches.

Key words

Fishers, social – ecological system, marine protected areas, marine tourism, Bali, resilience.

Attestation of Authorship

I hereby declare that this submission is of my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any degree or diploma of a university or other institution of higher learning.

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Fahri Mirza Kurniawan Pedju

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Acronyms

CTI	Coral Triangle Initiatives
MMAF	Ministry of Marine Affairs and Fishery (Indonesia)
MPA	Marine Protected Area
MSY	Maximum Sustainable Yield
NGO	Non-Governmental Organisation
PADI	Professional Association of Dive Instructors
SES	Social – Ecological System

Glossary

Adat	Customary or traditional ways to conduct socially related affairs
Banjar	A unit comprising a group of families or households in Balinese villages that collaborate and regulate the conduct of social and, to some degree, spiritual affairs.
Destructive fishing practices	Fishing practices that employ gears such as cyanide and dynamite that negatively impact coral reefs habitat.
Overfishing	An occurrence when fishing effort has surpassed the capacity of the targeted species to recover to healthy population levels.
Marine Protected Area	A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
Marine Protected Areas Network	A group of MPAs that are scientifically designed, which, due to their biophysical and geographical attributes, were supposed to support each other through replenishment of larvae and/or recruits of species and thereby enhancing the social – marine ecological system resilience.
Marine Reserves	One of the strictest forms of MPA of which no extractive activities (e.g. fishing) are allowed. Within an established multipurpose MPA that is managed through zoning system, a no-take-zone is equivalent to marine reserve.
Maximum Sustainable Yield	Assumption that there is a maximum of catch that can be caught without causing population collapse.
Paper parks	The condition where a conservation area is considered as not functional or effectively managed, and thus only exists on maps.
Kabupaten	A municipality or a regency (and often also referred to as district), which is a third layer of government administration system after the central and provincial government. Typically, an Indonesian province comprises several *kabupatens* and/or cities.
Pecalang laut	Traditional marine ranger (Balinese).

Chapter 1: Introduction

1.1. Introduction

The depletion of tropical marine resources due to overfishing and destructive fishing practices has created social and ecological problems in many developing countries where the coastal communities are highly dependent on these resources for food (Burke, Sellig, & Spalding, 2002). One of the most widely advocated approaches for addressing these problems is through the establishment of a marine protected area (MPA) (Roberts & Hawkins, 2000; Salm, Clark, & Siirila, 2000). An MPA is defined by the International Union for Conservation of Nature (IUCN) as "A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (IUCN, 2012, p.12). Besides fisheries, other economic activities also occur within marine ecosystems. Marine tourism is one of these activities. Orams defines marine tourism as "recreational activities that involve travel away from one's place of residence and which have as their host or focus the marine environment (where marine environment is defined as those waters which are saline and tide-affected)" (1999, p.9). Marine tourism is particularly popular in tropical marine ecosystems, especially in destinations that have rich coral reef biodiversity. Since the early 1990s, the marine tourism industry has grown considerably in these areas with the advance of scuba diving and related recreational activities. The introduction of both MPAs and tourism to many coastal fishing communities in developing countries has proved to be contentious as their introduction has created both positive and negative outcomes for the social - ecological system.

This thesis contributes towards the development of transdisciplinary knowledge in MPA tourism. The research focuses on stakeholders' perceptions (particularly fishers' perceptions) of the impacts that fisheries activities, MPAs, and tourism activities have on the resilience of the social-ecological system. The research also focused on understanding stakeholders' perspectives on the roles of MPAs and tourism in enhancing social-ecological system resilience. In this thesis, resilience is defined as the ability of a social-ecological system, which includes all of the natural and social components or actors of the system, to absorb disturbance and maintain its basic functions (Walker, Holling, Carpenter, & Kinzig, 2004; Walker & Salt, 2006).

Understanding the perceptions of stakeholders, primarily fishers who are considered key marine protected area (MPA) stakeholders, is essential because stakeholders have a significant influence on the social-ecological system; they affect the outcomes of MPA governance and the successful management of social-ecological system.

The research explores these issues using a multi-case study approach and examines three MPAs in Bali, an island in Indonesia that is an established tourism destination in Southeast Asia. Bali is also located within the Coral Triangle, an area known for its high tropical marine biodiversity.

This chapter will briefly introduce the significance of the area (i.e., the significance of the Coral Triangle region and of Bali), the social-ecological challenges of the area, the ambitions and failures of MPAs in addressing these social-ecological challenges, the presence of tourism in MPAs, the various key stakeholders in MPAs, and the relevance of MPA tourism as a social-ecological system. The chapter concludes by outlining the primary research question and specific research objectives that provided the direction for this thesis.

1.2. Coral Triangle: The global centre of tropical marine biodiversity and Indonesia's commitment to protect it

The Coral Triangle (

Figure 1) is acknowledged as the marine region with the world's highest levels of tropical marine biodiversity (Allen, 2008; GOI, 2009a, 2009b). While its total marine surface area covers a mere 1.6% of the planet's oceanic area, it is host to 76% of the world's known coral species (600 coral species) and 37% of the world's reef fish species (2,500 reef fish species) (CTI, 2016). The Coral Triangle region includes six countries: Indonesia, the Philippines, Malaysia, East Timor, Papua New Guinea, and the Solomon Islands. The governments of these countries have recognised the importance of safeguarding marine resources for food security, coastal protection, and livelihood for more than 363 million people who live in this region. In 2009, these six Coral Triangle countries declared their commitment to protect and ensure the sustainability of this important region through an agreement known as the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI).

Figure 1. Coral Triangle: The global centre of tropical marine biodiversity

The non-binding CTI produces a regional plan of action that CTI members follow under their national plan of action. The CTI plan of action calls for the establishment of more

MPAs and networks of MPAs (which will be explained in subsequent sections) to reverse the trend of degradation of the region's marine resources and ecosystems.

Indonesia has already developed its CTI national plan of action as well various legal instruments to promote the protection of its marine resources; this includes the establishment of MPAs and a network of MPAs across the country. These MPAs are intended to benefit biodiversity protection, fisheries, and tourism as well as encourage the participation of various sectors, including local governments, the private sector, and NGOs, in order to collaboratively manage the MPAs (GOI, 2009c; 2004; 2007). The Indonesian government has set a national target to have an MPA surface area coverage of 20 million hectares by the year 2020 (GOI, 2004).

1.3. Bali and its socio-ecological relevance as marine tourism destination

Being located in the heart of Coral Triangle puts Bali in a special position for both Indonesia and the Coral Triangle region. As a globally established tourist destination, the island of Bali attracts about four million foreign tourists (i.e., non-Indonesians) and seven million domestic tourists annually (Bali statistics, 2015). Some researchers have even considered this island to be "the world's best tourism laboratory" (Cole, 2012, p. 4). In less than a decade, the island has experienced rapid development associated with increases in tourism demand from the growing middle-class population of several large Asian countries such as China, India, as well as Indonesia.

The Indonesian government has established an international tourism target of 20 million international tourists by 2019, a significant increase from the target of nine million tourists in 2014 (Permana, 2015) Additionally, the country has also produced an ambitious development strategy known as the Master Plan for the Acceleration and Expansion of

Indonesia's Economic Development, which includes the designation of Bali as a tourism hub or gateway for the Bali-Nusa Tenggara Timur islands corridor, an archipelago in the south-eastern part of Indonesia (GOI, 2011b).

Despite the pressures and rapid growth of tourism in Bali (McTaggart, 1980; Rodenburg, 1980), it has been argued that Balinese society possesses characteristics that enable it to cope with and adapt to changes while maintaining its cultural identity (Howe, 2005; Lietaer & De Meulenaere, 2003). This social and cultural resilience has been demonstrated in Bali's responses to the two terrorist attacks it experienced in 2002 and 2005, which negatively impacted tourism revenue over the short-term; however, in subsequent years Bali managed to regain the confidence of its tourists and investors in tourism (Hitchcock & Putra, 2007; Smyth, Nielsen, & Mishra, 2009).

As Bali possesses characteristics of a resilient society, high marine biodiversity, and an increasing number of tourists visiting the island, it should be a success story with regard to MPAs and tourism. In contrast, the ecological performance of Bali's MPAs is poor, as it is elsewhere in Indonesia (Alder et al., 2010; Burke, Sellig, & Spalding, 2011; T. McClanahan, M. J. Marnane, J. E. Cinner, & W. E. Kiene, 2006; Mustika, Ratha, & Purwanto, 2013).

1.4. Over-exploitation and destruction of tropical marine resources

It is now widely accepted that the health and viability of many marine ecosystems have declined globally due to unsustainable exploitation (Burke et al., 2002, 2011; FAO, 2010), and this situation is predicted to worsen with the growing threat of climate change (McClanahan, Maina, & Pet-Soede, 2002). In addition to climate change related

challenges, the major threats to marine resources in the Coral Triangle region stem primarily from overfishing and destructive fishing (Burke et al., 2011).

1.5. MPAs: Roles and challenges, and their symbiosis with tourism

1.5.1. Roles of Marine Protected Areas

The increasing pressures upon marine resources throughout the world warrants global conservation measures to halt or reverse marine ecosystem degradation. MPAs are considered one of the most important solutions to address the challenges of overexploitation, and in many countries, it is promoted as an effective management tool to ensure both biodiversity protection and sustainable fisheries (Mous et al., 2005; Roberts, Bohnsack, Gell, Hawkins, & Goodridge, 2001; Roberts & Hawkins, 2000). Hence, MPAs are viewed as both a natural conservation and a social management tool to enhance the resilience of coastal and marine areas (Ballantine, 2014; Costello, 2014; Hughes, Bellwood, Folke, Steneck, & Wilson, 2005).

In countries where there is high dependence on food from the sea, primarily as source of protein, the roles and benefits of MPAs are crucial to safeguarding food security as well as sustaining communities' livelihoods and providing coastal protection (Gjertsen, 2005; Roberts et al., 2001; Roberts & Hawkins, 2000).

1.5.2. Types of Marine Protected Areas

The IUCN recommended guidelines (see Appendix 1.) for classifying protected areas, including MPAs, into different categories according to their functions and management objectives (IUCN, 1994; Salm et al., 2000). These guidelines for MPA categories have been adopted and/or adapted by many countries throughout the world. The various categories of MPAs that exist today provide a spectrum of protection, from full protection

(i.e., no human entry) to sustainable use of the resources. Somewhere in between, it seeks to allow for the conservation of natural resources for cultural purposes, tourism, and for the sustenance of local livelihoods, or a combination of functions. Most MPAs are sanctioned by national or local governments with legal mandates, however, many are now also being established by private entities (e.g. tourism resorts and pearl farms), local communities, and non-governmental organisations (Bottema & Bush, 2012; Svensson, Rodwell, & Attrill, 2008).

1.5.3. 'Paper parks': Challenges of Marine Protected Areas

Many MPAs throughout the world, especially those in developing nations such as Indonesia and nations within the Coral Triangle region, are either poorly designed or poorly managed, and many can be described as 'paper parks', that is, parks that have been formally designated but have no practical impact on marine conservation (Alder et al., 2010; Alder, Sloan, & Uktolseya, 1994; Burke et al., 2011; Roberts et al., 2001; Roberts & Hawkins, 2000). Many of these problems are caused by a lack of funding (Gravestock, Roberts, & Bailey, 2008), cultural issues, political will (Sale, P.F., 2008), or a combination of these factors (Ballantine, 2014). Often, the problems occur when there is too much pressure on the resources (e.g. from fishing) and insufficient resources or infrastructure to safeguard marine ecosystems. Failures of administering management actions to achieve the conservation and sustainable objectives of these MPAs have created a lot more scepticism amongst the scientific community and the general public, and especially among direct users such as fishers. To make matters worse, many MPAs have been created in isolation from stakeholders' involvement through a 'top-down' approach, where the participation local fishing communities is often excluded. For many years, these types of MPAs in developing countries such as Indonesia have become non-functional and have existed only

on maps with little to no change to the reality of how marine resources are used or managed.

1.5.4. Network of marine protected areas

The results of overfishing and, particularly in developing countries, destructive fishing, has resulted in the call for more MPAs to be created in the form of a network so that they could replenish themselves (e.g. through the transfer of coral and fish larvae) if one or a few of the MPAs within the network were under disturbance during a particular period (e.g. during a coral bleaching event). Conservation experts (Costello, 2014; Costello & Ballantine, 2015; Mous et al., 2005; Roberts et al., 2001; Roberts & Hawkins, 2000; Sale, P.F., et al., 2005) have even gone as far as calling for additional, larger marine reserves (i.e., stricter forms of MPAs, or exclusive no-take MPAs, where extractive activities are prohibited) that are connected to benefit fisheries and biodiversity protection. The establishment of such MPA networks, especially including significant 'no-take' marine reserves, are hoped to address anthropogenic and natural pressures and increase ecological resilience.

As part of their commitment to protecting marine resources within the Coral Triangle region, each government agreed to increase the number of MPAs and MPA surface area coverage as well as to build networks of MPAs (GOI, 2009a).

1.5.5. Tourism in marine protected areas

Coastal and marine ecosystem offers a variety of opportunities for tourism and recreational activities. In fact, the bio-physical features of coastal and marine environment led to the development of numerous recreational activities that take advantage of the underwater life, wave actions, the wind, as well as the beach and coastal landscape (Miller, M.L., 1993; Miller, M.L., & Auyong, 1991; Orams, 1999). This attraction and development of coastal

and marine tourism offer both opportunities and challenges for the environment and social component of the tourism system (Miller, M.L., 1993; Miller, M.L., & Auyong, 1991).

Furthermore, the global growth of coastal and marine recreational activities has led to the growing number of tourists to visit tropical destinations around the world, where the warmer climate permit most of the popular activities such as surfing (Buckley, 2002; Dolnicar & Fluker, 2003), sailing, snorkelling and scuba diving, and wild life watching are accessible almost year-round.

As tourism stakeholders, especially those from economically advanced countries, have become more aware about safe guarding the environment and social issues in coastal marine tourism destinations, the challenge to maintain the sustainability of these destinations has become more important, if not contentious (Bottema & Bush, 2012; Svensson, Rodwell, & Attrill, 2008). For example, as scuba diving has become more popular the demand to travel to warmer water locations that feature coral reefs and their associated colourful marine species for diving has risen sharply. Since the 1960s over 24 million divers have been certified by a single dive certification body alone, while the average number of SCUBA certifications annually is close to 900,000 divers (PADI, 2016). This growing number of recreational divers has given rise to a higher awareness of and appreciation for healthy marine ecosystems. As a consequence, divers, dive operators, and resort owners have become advocates for the conservation of healthy coral reef ecosystems and for better stewardship and protection for high quality dive destinations.

In several dive destinations around the world, this positive correlation between dive tourism and marine ecosystem protection incentivises many dive operators and resort owners to protect their ‘house’ reefs and eventually establish MPAs. Indeed, the presence of nature-

based tourism in MPAs is expected to generate revenue to help cover management costs. In addition, there are expectations that the development of tourism will provide economic benefits for local communities. This is the type of symbiotic relationship that has long been promoted as a potential partnership between tourism and nature conservation (Agardy, 1993; Bookbinder, Dinerstein, Rijal, Cauley, & Rajouria, 1998; Budowski, 1976; Leslie, 1986; Scherl & Edwards, 2007).

In Indonesia, the idea of a symbiotic relationship between MPAs and tourism is not new. For example, Salm (1985) proposed the integration of tourism and conservation objectives for Seribu Islands National Park, one of the oldest MPAs in the country. Additionally, many MPAs in Indonesia (e.g., Bottema & Bush, 2012) and other developing countries (e.g., Svensson et al., 2008) were initiated by dive operators and tourism entrepreneurs.

1.6. Stakeholders in marine protected area tourism

Understanding key stakeholders' perceptions is important in social-ecological system resilience assessment. Key stakeholders, especially fishers, have a close association with their marine resources, which allows them to accumulate spatial and temporal knowledge with respect to the status of the marine resources (i.e., of the ecological system) and how these marine resources interlink with the communities, socio-economic and cultural factors (i.e., the social or anthropogenic systems). It is important to understand key stakeholders' perceptions regarding their knowledge and expectations of the social-ecological system, and this research examined the social- and ecological-related issues and problems that stakeholders think are important, and it explored how stakeholders would improve or increase socio-ecological system resilience.

This is particularly important for Indonesia because the nation underwent major decentralisation and legal reform processes in 1999 and 2004, which promoted greater local participation in decision-making for social, economic, and political matters (Schmit, 2008). Thus, local stakeholder perceptions have become a vital aspect in shaping policies and regulations pertaining to marine conservation and tourism development, including in Bali.

Some of the key stakeholders in MPA tourism are fishers, tourism operators, related government institutions, community leaders (including traditional leaders and religious leaders), and non-governmental organisations (NGOs). The following sections offer brief descriptions of these stakeholders and their relevance to this research.

1.6.1. Fishers

Fishers are the direct users of marine resources through extractive means (i.e., through capture fishery). While for most remote coastal communities fishing activities have been artisanal or subsistence in nature, fishing is becoming commercialised in many fishing communities with easy access to markets to sell their catch (McClanahan, T., et al., 2006). This encourages overfishing behaviour across many fishing grounds. The presence of MPAs that limit fishing activities and regulate access to fishing grounds will not be supported by fishers wholeheartedly, and similarly, any competition for space with dive operators and/or dive tourists has often created discontent that has led to protracted conflicts between these two stakeholders. Hence, it is crucial to get fishers' buy-in to support MPA management objectives; by understanding fishers' perceptions, MPA managers can devise the right strategies to address grievances, misinformation, and/or other needs these fishers may have.

1.6.2. Tourism operators

The increasing presence of tourism in popular destinations such as Bali is a growing challenge, and an opportunity. This is especially the case in marine tourism where the popularity of surfing and recreational scuba diving, for example, have put a lot of demand on tour operators to find new sites or suitable locations. This has stimulated many tour operators (e.g., dive operators, resort owners and budget accommodation venues) to invest in developing opportunities in remote locations far from urban centres (Towner, 2016). The arrival of marine tourism, which is often associated with surfing, scuba diving and snorkelling as its main attraction, has been both a blessing and a curse in some of these remote areas. The tourism businesses have provided new livelihood opportunities for local communities, but at the same time, they have influenced the price of coastal property, put pressure on the villagers to sell off their land, and increased water consumption and waste water discharge (Cole, S., 2012). As dive sites sometimes overlap with fishing grounds, this has created conflicts between dive operators and local fishers. Conversely, the introduction of scuba diving has created higher conservation awareness and pride among the local communities, but with the increasing number of tourists visiting remote villages, there has been genuine concern about losing cultural identity and about other negative influences on social structures in local communities.

1.6.3. Government institutions

In Indonesia, there are various government agencies that have some jurisdiction or influence on the governance of marine resources. These include national agencies such as the Ministry of Forestry and Environment, which has responsibilities for national parks (e.g., West Bali National Park and other marine conservation areas), and the Ministry of Marine Affairs and Fisheries, which is responsible for marine conservation and fishery

management. The Balinese provincial government, and the local government or the regency (*kabupaten*) also have local responsibilities for tourism, conservation, and fisheries. These agencies seldom act in a coordinated manner and they carry out a range of regulatory, planning and management activities to serve various objectives with different, if not conflicting, priorities.

1.6.4. Non-governmental organisations

The roles of non-governmental organisations (NGOs), especially conservation NGOs, have been instrumental in creating higher awareness of marine conservation throughout the world and Southeast Asia through publications of areas of conservation significance (Spalding, Kainuma, & Collins, 2010; Spalding et al, 2007), and awareness in issues and challenges (e.g. Burke et al., 2012). Similarly, conservation NGOs in Bali have made significant contributions to the dissemination of information about conservation awareness, and to the promotion of creating MPAs and network of MPAs in Bali (Mustika et al., 2013) as well as across the Lesser Sunda ecoregion (Wilson & Green, 2011).

1.6.5. Community and traditional leaders

Community and traditional leaders include religious leaders who look after both the *adat* (customs) and religious (i.e., Hindu) matters. The *pecalang* is the equivalent to a community leader whose main task is to enforce customary and/or religious affairs. In Bali, the public must be given access to the coastal area, especially for the *Ngaben* or Hindu cremation ceremony. Other than this, most roles for traditional leaders are limited as their concerns have been focused mostly on the terrestrial side of the island. However, from the 2000s onward, several conservation organisations have promoted the *pecalang* to have a greater participation as custodians of the seas.

1.7. The purpose of this thesis

The research presented in this thesis contributes towards a better understanding and appreciation of the challenges of managing the resilience of a social-ecological system, such as MPA tourism, which is often characterised by stakeholder conflicts that cannot be resolved through technical and scientific solutions alone (Eagles & McCool, 2002). It has been suggested that these people-related problems often found in protected area tourism have unpredictable outcomes and should be solved through a series of solutions offering the best fit solutions suitable for a given point in time (Dredge, 2006; Fennell, 2004). The outcomes of this research will help MPA stakeholders to articulate their perceptions on the issues affecting the resilience of their social-ecological system; understanding stakeholder perceptions has been identified as a critical component of developing solutions that are the best fit for specific MPAs and their surrounding communities (Fennell, 2004).

While there are many studies that discuss conflicts or different perceptions amongst MPA and tourism stakeholders (for example: Oracion, Miller, M.L., & Christie, P., 2005; Satria, Matsuda, & Sano, 2006; Suman, Shivlani, & Milon, 1999), there are only five studies that have applied the resilience assessment approach to protected area tourism (Strickland-Munro, Allison, & Moore, 2010) and none of these have focused on MPA tourism.

The proposed research seeks to address this broader issue and to use the knowledge and application of resilience assessment, particularly in the context of MPA tourism, as a means of exploring the poor performance of MPAs in Bali, Indonesia. This research will have broader relevance to other regions of Indonesia and other developing countries where MPAs have been established with limited success in achieving positive outcomes for the ecosystems they seek to protect and the local communities they are claimed to benefit.

1.8. Research aim and questions

The overall research question of this thesis is: How do stakeholders perceive the impact of MPA tourism on their social – ecological system? To address this research question, the following research questions are listed below to guide the research by probing stakeholders' perceptions on related issues.

Research questions

1. How do the stakeholders perceive the conditions of marine ecosystem health?
2. How do the stakeholders perceive the impact of MPA on their social – ecological system?
3. How do the stakeholders perceive the impact of tourism on their social – ecological system?
4. How do the stakeholders envision the future of their social – ecological system?

Chapter 2: Literature Review

2.1. Introduction

The chapter provides an overview and critique of the key literature that forms the foundation of this thesis. There are four major parts of this review comprising subjects that cover social-ecological system (SES) resilience, marine protected areas (MPAs), MPA stakeholders, and marine tourism, MPAs, and MPA networks in Bali.

The first section will introduce the basic concept of systems thinking and how the idea of the social-ecological system influenced and challenged conventional approaches in natural resource management and biodiversity conservation. The suggestion to consider managing resilience as the objective of a social-ecological system rather than to consider maintaining stability or equilibrium as the objective will be explained. The chapter will highlight the significance of governance in social-ecological systems, and it will point out how several authors have promoted the idea of embracing the resilience approach in social-ecological systems for tourism. It will explain the major paradigm shift in tourism systems thinking, comparing the transdisciplinary approach for research and/or management of social-ecological systems with the conventional approach. It will also identify and explain some of the conventional management tools. It will introduce another line tourism systems thinking, the human-artefactual-natural-system (HANS), developed by Miller et al. (2014) and finish with a brief synopsis.

The second part of this chapter covers MPAs and their roles in fishery and tourism. It will explain the rationale of using the MPA as one of the natural resource management tools to support the achievement of sustainability goals in a marine ecosystem. The challenges facing MPAs, especially in developing countries, will be discussed. It will cover the push

for greater numbers and stricter forms of MPAs that are connected into a network, demonstrating the current strategies to use MPAs and MPA networks as an example of a resilience approach to addressing anthropogenic and natural disturbances. Brief discussions will also highlight MPA benefits for fisheries and tourism as well as different types of MPA governance commonly found before the section concludes with a synopsis.

The third part of the chapter will examine, define, and classify stakeholders of MPA tourism. It will also explore the relevance of stakeholders' perceptions and stakeholders' discourses that influence and shape MPA governance. The significant role of fishers in MPA tourism will be discussed with regard to examining fishers' knowledge and attitudes towards conservation and MPAs. The section will discuss the limitations stakeholders, particularly those in small communities, have in managing social-ecological systems where there are local-global influences (i.e. on multi-scale levels) that are too complex and/or impossible to handle in isolation, and close with a brief synopsis.

The fourth part of this chapter will focus on Bali as a marine tourism destination in Indonesia and the Asia-Pacific region. It examines Bali's tourism development plan, its traditional institutions, and its struggles to maintain its cultural heritage among the invasion of other cultures. With respect to marine conservation and marine tourism, this section will highlight previous studies, particularly in West Bali National Park, which provide important baseline information on the marine ecosystem health and associated socio-economic factors that have strong influences on the area, as well as more recent research with respect to the performance of MPAs in the northern part of Bali and the effect of tourism for conservation and socio-economic outcomes.

2.2. Social-ecological systems, complex adaptive systems, and resilience

The concept of resilience was introduced by Holling (1973), who published a seminal paper that described how an ecological system may experience wide fluctuations in stability due to disturbances, yet still be resilient. Walker and Salt (2006, p. viii) define resilience as "the ability of a system to absorb disturbance and still maintain its basic functions." They argue that due to the interconnectedness between human (or 'social') and natural (or 'ecological') systems, managing resilience, instead of maintaining its stability, should be the highest priority. The resilience concept has been an important contribution to the conservation and natural resource management fields which had traditionally viewed ecosystems as independent entities that needed to be managed to try and maintain stability or equilibrium. Proponents of the concept of resilience argue that both ecological and social systems comprise many components or parts that are connected and that a small change in one component or part of a system, due to pressures or disturbances, can affect the dynamics of the whole system, as all parts or components of the system will continue to adapt to changes (Brinkley, Fisher, & Gray, 2001). Hence, natural systems should be viewed as social-ecological systems which respond and adapt to a variety of complex and inter-related influences. This understanding was proven by the many attempts to manage such natural systems in a linear or static way which led to failures (Walker & Salt, 2006).

2.2.1 Social-ecological systems and the adaptive cycle

Social-ecological systems typically undergo an adaptive cycle (see Figure 1) which consists of four phases: exploitation (r), conservation (K), release (Ω), and reorganisation (α) (Holling, Gunderson, & Peterson, 2001). As a system gathers more resources or wealth (i.e., it moves from r phase to K phase), the resources tend to become more fixed and the parts of the system become more connected. This increases a system's potential for

disturbance, which releases or changes the relationship between some of the resources. Eventually the system reorganises itself, either to return to the same basic structures and functions; or, if the disturbances are too great, it crosses its system threshold and moves into different structures and functions. Once the system has crossed its threshold and cannot retain its basic structures and functions, it is said to have lost its resilience.

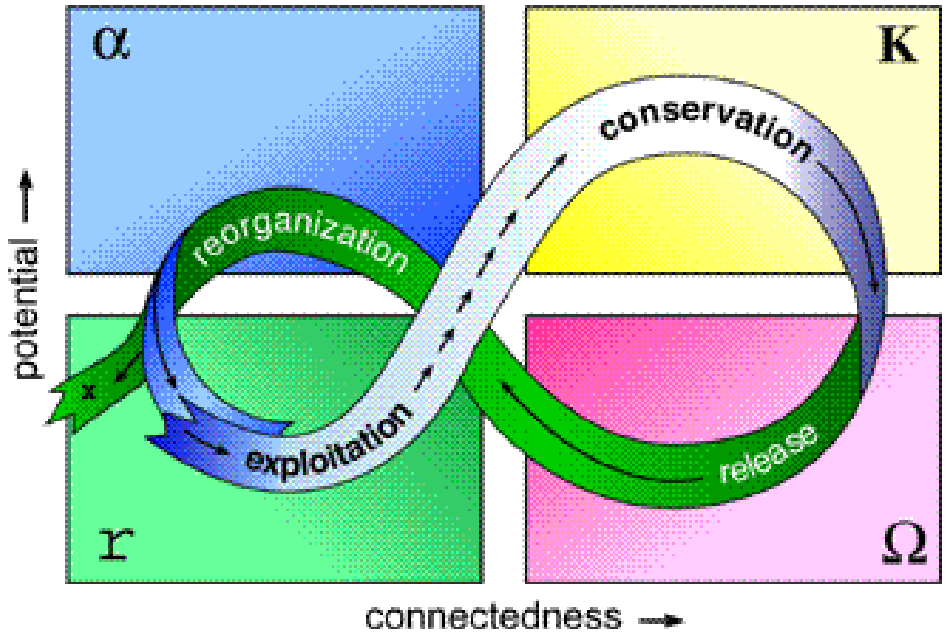

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Figure 1. Adaptive cycle of a typical social-ecological system (Walker & Salt, 2006)

According to Walker et al. (2004), important attributes that govern the dynamics of social-ecological systems are resilience, adaptability, and transformability. *Resilience* refers to a system's ability to maintain its basic functions and structures after undergoing a disturbance. *Adaptability* is the capacity of components or actors in the system to influence (or manage) resilience. *Transformability* is the capacity to create a fundamentally new system when ecological, economic, or social structures make the existing system untenable.

Maintaining equilibrium as a management objective for social-ecological systems will lead to failures. The collapse of fisheries is an example of the failure of conventional fishery management, which often still applies the maximum sustainable yield (MSY), but this approach neglects the fishery complexity, fishery ecosystems, and social considerations that are full of surprises (Walker & Salt, 2004). Hence, implementing adaptive management should be the approach for managing a social-ecological system. *Adaptive management* is an iterative process designed to build resilience through monitoring and social learning.

2.2.2. Governance to manage resilience

The previous section reviewed the rationale of how using an adaptive management approach to build resilience, instead of managing for stability or equilibrium, is the key to managing social-ecological systems. This section reviews the governance, in this thesis defined as the art of governing or managing (Bruce, 2002), that influences the management style or approach of a particular social-ecological system or complex adaptive system. A complex adaptive system (CAS) is characterised by its uncertain nature and unpredictable outcomes. For such complex systems, it is suggested that the priority of management should be to enhance resilience. Therefore, Lebel et al. (2006) proposed the following questions to consider with respect to the governance of complex adaptive systems:

- Who can make the decision on what should be made resilient?
- What is the purpose of this resilient system and who benefits from it?

After reviewing nine case studies pertaining to best practices in CAS management in the USA, Australia, Sweden, Thailand, Indonesia, and Canada, Lebel et al. (2006) proposed several governance attributes that are likely to promote capacities that will lead to social-ecological system resilience. (See

Figure 2 for a diagram of the associations between selected attributes of governance systems and the capacity to manage resilience.) These governance attributes are as follows:

- Governance is active to encourage and engage stakeholders' participation in decision-making (participatory) and is open to discussion of various ideas and oppositions (deliberations).
- Governance includes involvement of various levels of authorities within the same domain of concern (polycentric) and/or across scales (multi-layered).
- Governance is transparent and honest (accountable).

- Governance possesses a common goal to share the benefits and risks and is just in doing so.

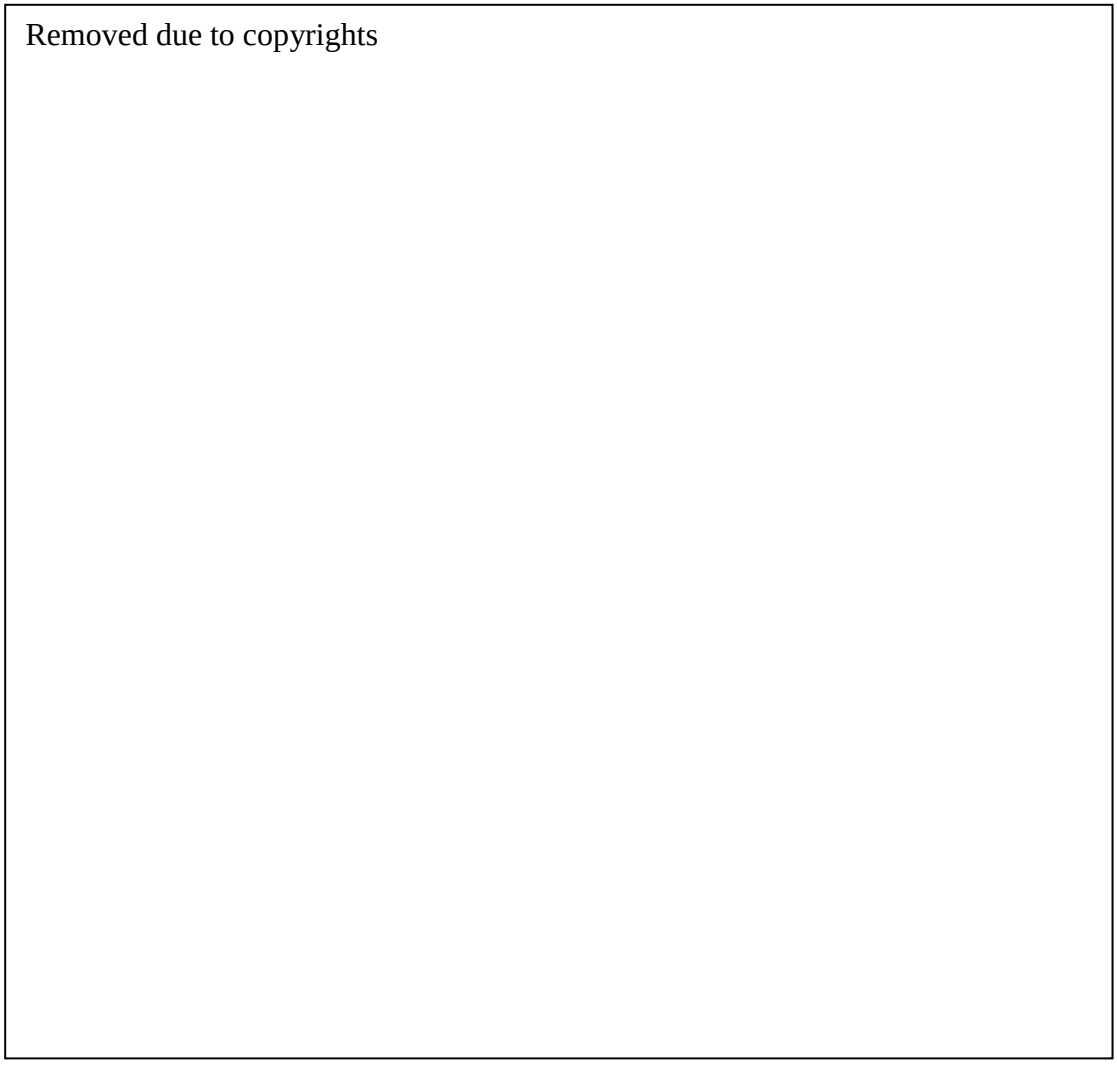

Figure 2. Associations between selected attributes of governance systems and the capacity to manage resilience (Lebel et al., 2006)

These governance attributes are expected to develop social capacities that are capable of absorbing uncertainties that result from the non-linear characteristic of complex adaptive systems, developing knowledge, understanding and identifying the limits; ensuring that there is social and ecological diversity for system renewal, creating appropriate regulations or policies to address the challenges, and addressing challenges faced in various levels of scales (Scale) (

Figure 2). The expected outcome will generate capacities for the social-ecological system to self-organise and learn and adapt from its experience. However, Lebel et al. (2006) also acknowledged there are problems in determining what constitutes good governance. They highlighted three key problems:

- **the problem of measurement** – it is not easy to measure these governance attributes and there is no standardised way to measure them,
- **the problem of experts** − there is a subjective tendency to determine the trade-off between social and ecological needs, and
- **the problem of causality** – the possibility that "the capacity to manage resilience may influence the form that governance takes and that ecological feedbacks may constrain both governance and this capacity."

However, Gibbs (2009) stated that developing and implementing policy to enhance a social-ecological system's adaptive capacities and its resilience is challenging, especially for coastal communities. In reference to social-ecological systems in the marine realm, Gibbs listed six main barriers that create those challenges (2009, p. 328):

> (1) Communities have little experience or history of explicitly managing for resilience.
>
> (2) There is no consensus view on a set of performance measures that indicate the level of resilience or adaptive capacity of a coupled social-ecological system.
>
> (3) There is no mathematical technique equivalent to optimisation methods that can be used to identify resilience and adaptive capacity outcomes.

(4) Building resilience will require at least some sectors of the community and individuals to make sacrifices.

(5) Building resilience and adaptive capacity will require decisions to be made that will be economically 'inefficient'.

(6) Communities have great difficulties preventing cumulative ecological impacts occurring and these acts to undermine resilience.

2.2.3. Paradigm shift in tourism systems thinking

There has been a paradigm shift in tourism systems thinking as scholars move away from supporting conventional tourism approaches to favouring a more integrated approach to tourism management. The tourism system resembles a CAS as there are always social-ecological interactions and/or implications. The interconnectivity of scales in tourism systems include various different spatial and temporal scales (Milne & Ateljevic, 2001), which span from a local to global level. When dealing with tourism and sustainability, several authors such as Farrell and Twinning-Ward (2004), Fennell and Butler (2003), and Fennell (2004) embraced the concept of the social-ecological system and saw its relevance in the tourism system. When specifically addressing sustainability challenges of tourism systems, Farrell and Twinning-Ward (2004, 2005) identified the weaknesses of the conventional tourism approach, which is sectoral, and which has always been dominated by "social science and business studies" and allowed little or no integration with natural sciences to address sustainability issues, particularly in the natural system and its impact on the social system. They highlighted the need for tourism planners, researchers, consultants, and others to acknowledge the complexity of the tourism system which incorporates both social and ecological problems that cannot be solved through partial solutions solely concerned with optimisation and efficiency. Similar to proponents of the ecosystem-based approach who are critical of linear approaches in assessing marine resources, such as applying the maximum sustainable yield (MSY) or using estimation to determine the

maximum population of targeted fish species that can be exploited through fishery, Farrell and Twining-Ward (2004) also criticised using conventional approaches in tourism impact assessment such as carrying capacity (CC) and limits of acceptable change (LAC). They encourage a reconceptualisation in tourism systems thinking by understanding the new approach that must be adopted based on the social-ecological system knowledge developed by ecologists (see, e.g., Walker et al, 2004; refer to Section 2.1). There are "three threads of understanding" (2005, pp. 110-111) that they recommend tourism sectors should understand and adopt in management:

1. The revised ecology thread: This explains the CAS and how human (social) and natural (ecological) systems are interconnected and have impacts on each other within the CAS.
2. The sustainability transition thread: This suggests that in the context of human and natural systems, there are continuous adjustments or changes, and that adaptive management and social learning are the ways to address the challenges of these continuous changes.
3. The non-linear tourism thread: This is an approach to develop "adaptive system thinking and scenarios" that reflect the complexity of the tourism system. UNESCO's Man and the Biosphere Programme (MAB) is one example of this integrated approach. The programme aims have been explained:

> The MAB programme develops the basis within the natural and social sciences for the rational and sustainable use and conservation of the resources of the biosphere and for the improvement of the overall relationship between people and their environment. It predicts the consequences of today's actions on tomorrow's world and thereby increases people's ability to efficiently manage natural resources for the well-being of both human populations and the environment (UNESCO, 2016).

To move towards this integrated approach for tourism management which incorporates social-ecological systems thinking, Farrell and Twinning-Ward (2004) recommended the adoption of a transdisciplinary approach involving experts (especially those with expertise and knowledge in the natural sciences) that are not usually part of tourism planning, research, and/or development. The following subsection provides a brief explanation of the transdisciplinary approach, followed by a review of the most common conventional tourism impact assessment tools.

2.2.3.1. Transdisciplinary approach

One of the earlier and more widely-cited papers on the transdisciplinary approach is Rosenfield's 1992 paper pertaining to the integration of health and social science. In this paper, she explores and categorises three different approaches in cross-disciplinary collaborative research (1992, p. 1351):

1. Level one: Multidisciplinary. This is defined as an approach where researchers work "in parallel with or sequentially from a disciplinary-specific basis to address a common problem."
2. Level two: Interdisciplinary. This is defined as an approach where researchers work jointly "but still from a disciplinary-specific basis to address common a problem."
3. Level three: Transdisciplinary. This is defined as an approach where multidisciplinary researchers work jointly, "drawing together their disciplinary-specific theories, concepts, and approaches to address a common problem," and do so under a common framework to guide the research.

Russel, Wickson, and Carew (2008) identified that public concerns regarding the environment and sustainability has led to the growth of environmental studies courses in

many universities. In addition, because of the recognition that these issues transcend the natural and social sciences, a transdisciplinary approach, whether it is used for research or management, is becoming more common practice (e.g. Russell, Wickson, & Carew, 2008; Wickson, Carew, & Russell, 2006).

The transdisciplinary approach faces some challenges. Brandt et al. (2013) reviewed 236 peer-reviewed case study papers on sustainability science studies using the bibliometric content analysis, and summarised five main challenges:

1. The term transdisciplinary is used inconsistently.
2. The methods used with chosen ontological positions are inconsistent.
3. Good examples of transdisciplinary research published in scientific journals that subscribe to the best practices advocated for transdisciplinary research are lacking.
4. Practitioners involved in the research have limited empowerment.
5. Transdisciplinary research output does not produce enough high scientific impact.

Nonetheless, Harris and Lyon's (2013) case study paper provided an example of how various stakeholders (i.e., public or government agencies, non-governmental organisations (NGOs), and industries) and researchers with different disciplinary backgrounds used the transdisciplinary approach for complex research in environmental sustainability and land use. Their results indicated that through the transdisciplinary research approach, various stakeholders developed a collaborative spirit that led to trust. It is important to highlight trust as a key attribute that is needed among the stakeholders to address issues or challenges in a CAS. The authors also found that all stakeholders who took part in the collaborative research had their incentives and disincentives in employing the transdisciplinary approach.

In addition, they also discovered that the presence of intermediaries that are trusted by all stakeholders is crucial to catalysing the trust-building process.

Furthermore, Jan, Bergmann, and Kiel (2012) propose, in the context of research in complex systems such as SES, a framework on how the scientific and societal problems can be addressed through transdisciplinary integration, which anticipates the production of knew knowledge that will provide feedback to contribute towards societal and scientific progress (

Figure 3).

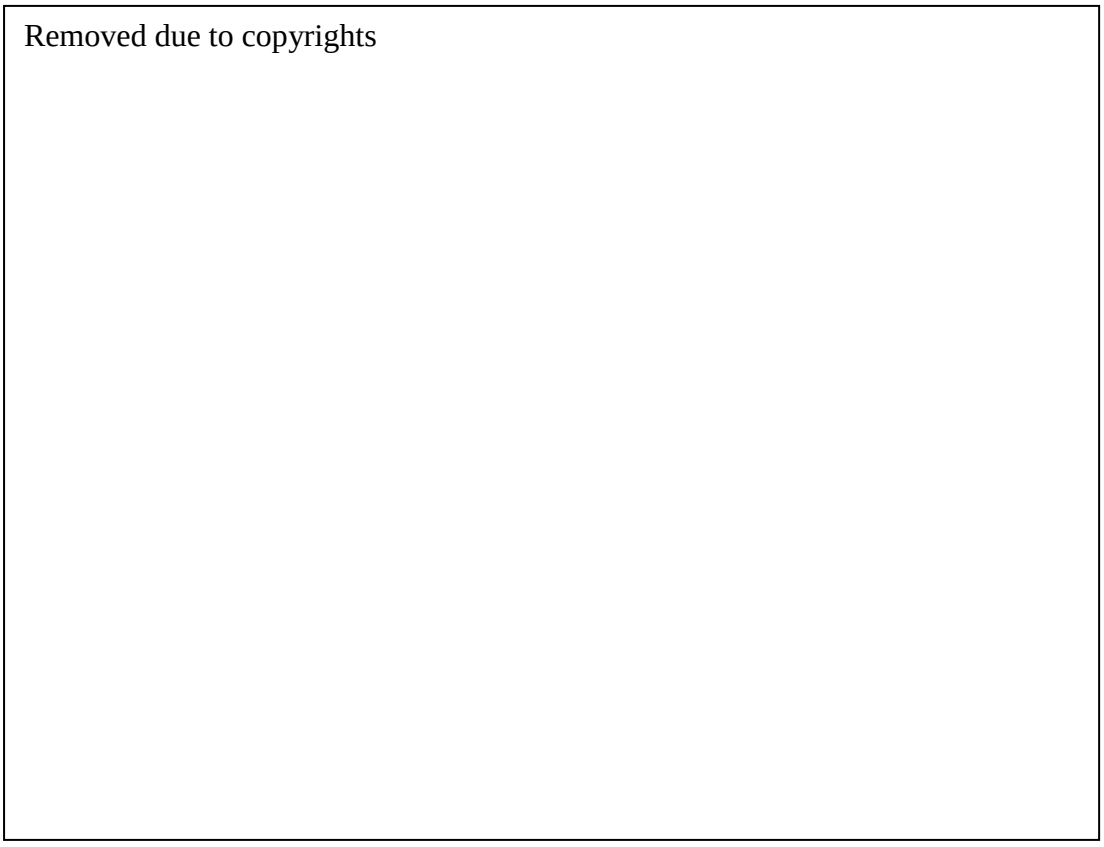

Figure 3. Transdisciplinary integration framework

Adapted from Jan, Bergmann, & Kiel (2012)

2.2.3.2. Brief review of tourism impact assessment

The most common and conventional tourism planning tool used to assess development and its impacts is carrying capacity (CC). This tool is typically used by planners and scientists

as a way of formulating problem definitions and management actions (McCool & Lime, 2001). There are several examples of coastal and marine tourism carrying capacity studies that have been conducted. For example, Sowman (1987) attempted to provide planners and administrators with standard procedures to assess coastal recreational tourism impacts in a residential area by focussing on four carrying capacity categories: physical, ecological, economical, and social. Another study by Saveriades (2000) used carrying capacity to assess the social impact of tourism upon coastal residents in Cyprus. Davis and Tisdell (1995) investigated the carrying capacity of recreational scuba diving activities regarding the social and biological thresholds of MPAs.

The above mentioned studies demonstrated – as is also suggested by proponents of carrying capacity (such as: Gartner, 1996; Inskeep, 1991; Wahab & Pigram, 1997) − the need for planners and scientists to quantify tourism impacts on tourism experiences, the environment, and the socio-economic system in order to mitigate unwanted consequences (McCool & Lime, 2001). This rational-comprehensive model has dominated decision-making processes in protected area tourism management worldwide. The basic form of this approach consists of goal setting, finding alternatives, evaluation, and implementation of the most preferred technical alternative (Plummer & Fennell, 2009). Several authors highlight the limitations of the carrying capacity concept (Borrie & McCool, 1998; Buckley, 1996; Lindberg, McCool, & Stankey, 1997; Lindberg & McCool, 1998; McCool & Lime, 2001) and criticise it as too linear or simplistic due to its over-reliance on a numerical approach. McCool and Lime (2001) summarised some of the key limitations or issues regarding carrying capacity:

- It assumes that carrying capacity is the maximum level of tourism activity before degradation occurs.

- Its linear approach that assumes the level of tourism use and the impacts of that level is either simple or predictable.
- It assumes that social-biophysical systems are stable.

As alternatives to carrying capacity, several tourism planning frameworks have been developed for planners and scientists to address tourism development and impact issues. These include Visitor Impact Management (Kuss, Graefe, & Vaske, 1990); Visitor Experience and Resource Protection framework (US Department of the Interior, 1997), Visitor Activity Management Planning (Nilsen & Grant, 1998); and Limits of Acceptable Change (LAC) (Ahn, Lee, & Shafer, 2002; Stankey, Cole, Lucas, Peterson, & Frissell, 1985). There are two differences between these alternatives and carrying capacity. First, they are all systematic decision-making frameworks instead of scientific theories. Second, they make value judgements explicit and separate prescriptive activities from descriptive ones (McCool & Lime, 2001).

Most of these alternative tourism planning frameworks were developed to minimise adverse impacts of tourism. For example, LAC, which is one of the tourism planning techniques most advocated for over the carrying capacity approach, is an iterative management process to help concerned stakeholders define a set of desired conditions when change is imminent and management actions are needed to maintain or restore those conditions (Stankey et al., 1985). Although LAC is an adaptive management framework and can be used to assess local stakeholders' or local residents' perceptions regarding tourism and its impact upon their social-ecological system (for example Ahn et al., 2002), it does not explicitly consider tourism with respect to resilience; that is, tourism is only assumed to be a factor that will lower resilience. In addition, while LAC is a useful decision-making tool for resolving conflicting goals (e.g., resource conservation vs.

resource use), it is not useful for solving issues when the goals are not in conflict or when one of the goals cannot be compromised (Cole & McCool, 1997). For example, some of the conservation and resource-use goals within MPAs are compatible, such as scuba diving or snorkelling in an MPA's no-take-zone (i.e., there is no conflict), while fishing and other extractive activities are not permitted in a no-take-zone (i.e., there is no compromise). In addition, because the establishment of an MPA is meant to limit or prohibit extractive activities such as capture fisheries, it will automatically favour non-extractive activities such as nature-based tourism. This would limit the usefulness of LAC for protected area tourism in developing countries, where nature-based tourism is regarded as an important component to achieving social-ecological system resilience (Djohani, 2009), or in some cases, where the presence of tourism itself led to the establishment of protected areas (Svensson et al., 2008).

2.2.4. Human-artifactual-natural-system (HANS)

Another alternative framework is the human-artifactual-natural-system (HANS). This framework describes the tourism system and its associations with the social-ecological system with multi scales influence. As explained by Miller and Auyong (1991) and Miller, Carter, Walsh, and Peake (2014), the social system is a human component comprising brokers, locals, and tourists. The human component is also influenced by the natural component, and by the artifactual component, which includes all the human and natural artifacts. One might consider the human component and the artifactual component (i.e., the human artifacts) to be equivalent to the social system in the concept of the social-ecological systems. Similarly, the natural component and artifactual component, which include the natural artifacts, are both included in the ecological system. Figure 3 shows the components of the HANS and its interactions with global drivers (

Figure **4**).

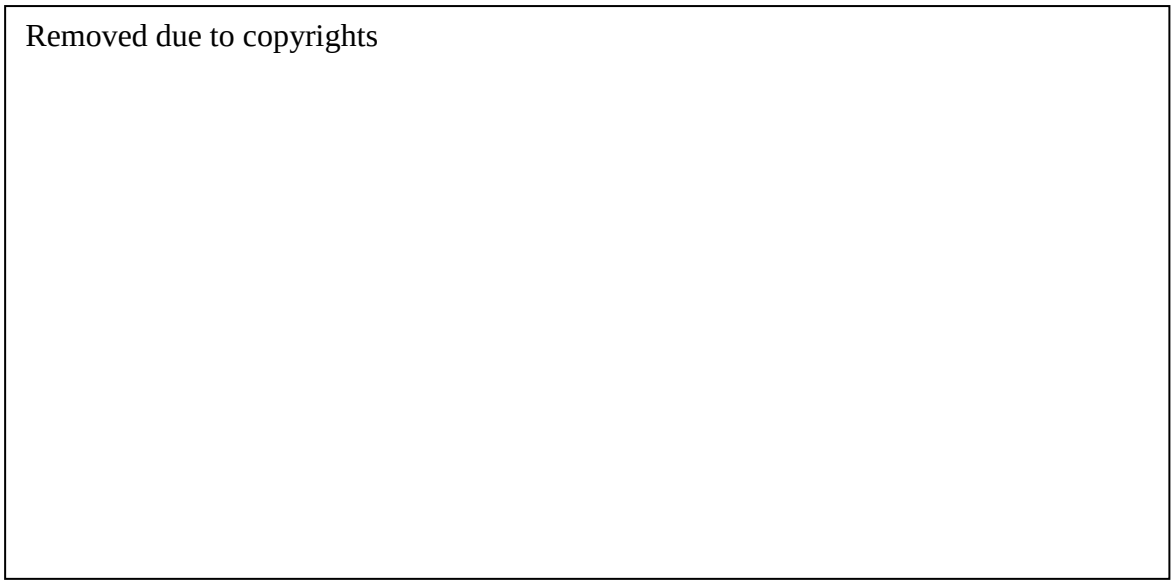

Figure 4. HANS and its interactions with global drivers

2.2.5. Synopsis

The concept of social-ecological systems explains that the interaction of human (social) and natural (ecological) systems cannot be avoided, and these interactions result in a CAS, a system that is complex and adaptive. In CAS management, managing resilience, rather than maintaining the elusive balance or equilibrium, should be the main priority. Tourism systems are also complex and adaptive as a result of human-natural interactions. Proponents of complex adaptive tourism systems (CATS) thinking propose that tourism planners, consultants, and researchers should incorporate systems thinking and the significance of managing resilience in their efforts to develop or plan tourism projects. These proponents of CATS thinking also criticise the tools conventionally used in tourism

development such as CC and LAC. Proponents also promote using the transdisciplinary approach in tourism research or management in order to address the challenges of CATS, such as unpredictability and surprises, that conventional approaches could not achieve. While there are inconsistencies in the application of transdisciplinary approaches, it is worth perfecting this approach as it develops trust among various tourism stakeholders.

2.3. MPAs and roles for fishery and tourism

2.3.1. Introduction

This section examines the key findings of the literature review related to MPAs, how MPAs provide ecosystem services for fisheries and tourism, and MPA governance typologies. First, the rationale behind MPAs is discussed along with how the establishment of an MPA network is imperative in the context of the uncertain nature of social-ecological systems. Second, the arguments for establishing MPAs for fisheries and tourism will be presented by highlighting several key case studies around the world, particularly those in the Coral Triangle. Third, different types of MPA governance will be discussed. Fourth, MPA governance frameworks in Indonesia will be described. The section closes with a synopsis.

2.3.2. MPA and MPA networks

The establishment of protected areas has been an important part of the global strategy to abate the threats of habitat and species extinction (Costello, 2014; Costello & Ballantine, 2015; IUCN, 1994). Preserving important marine ecosystems, such as coral reefs, to conserve marine biodiversity and to sustain ecosystem services (e.g., for fisheries and tourism) has been the driving force in establishing MPAs and/or improving their management (Brander, Van Beukering, & Cesar, 2007; Cesar, Burke, & Pet-Soede, 2003; Cesar, Lundin, Bettencourt, & Dixon, 1997; Pet-Soede, Cesar, & Pet, 1999).

However, Sale (2008) criticised the often haphazard approach to establishing MPAs in what he describes as “single hammer” approach. He suggested many MPA proponents used an approach to protect coral reefs that did not involve the scientific community, and they were not explicit enough in their recommendation to give specific answers to key questions, such as how big an MPA should be, or where they should be located to meet particular conservation and other objectives. Sale was also critical with the “paper park” phenomenon, where many governments and their partners placed too much emphasis on creating laws and jurisdictions, while much of the coral reefs worldwide remained insufficiently protected. To a great extent, most of the MPA establishment process was dominated by consensus-building exercises and ignored scientific justification in reaching a final decision. As a consequence and to avoid conflict among many stakeholders, (especially fishers), coastal waters have generally a lower MPA coverage and are dominated by multi-use MPAs, which allow some level of extractive use (Devillers et al., 2015).

Several authors also highlight the concern that without totally restricting extractive activities from a significant area, MPAs are not enough for biodiversity conservation, and that not many MPAs have meaningful or well-designed no-take-zones (Costello & Ballantine, 2015; Roberts & Hawkins, 2000; Sale, P.F., et al., 2005). In fact, Mora et al. (2006) estimated that “of the world’s roughly 527,072 km^2 of coral reefs, 5.3% lie inside extractive MPAs, 12% inside multipurpose MPAs, and 1.4% inside no-take MPAs.” In a later study, Costello and Ballantine (2015) pointed out that 94% of MPAs still allowed fishing. They underlined that marine reserves, which are the strictest form of MPA within which all forms of extractive activities, such as fishing, are not allowed, should be the focus for biodiversity protection and protection from fishery collapse.

Another criticism towards MPAs is that many of them are too small to provide benefits and/or be capable of withstanding anthropogenic and natural disturbances. For example, Christie, White, and Deguit (2002) discovered from their case studies of small, community-based MPAs in the Philippines that while these MPAs received strong support from their communities, they were too small and too isolated to give benefits to the nearby fishing grounds, and they were vulnerable to human disturbances (e.g., anchor damage) and natural disturbances (e.g., crown-of-thorns starfish outbreaks and storm damage). The authors recommended that for community-based managed MPAs (or small MPAs) to work, they must be part of an MPA network and co-exist with capture fishery management that promotes fishing reduction efforts.

Recent scientific developments identified that biophysical considerations, such as MPA no-take-zones, or marine reserve location, size, and spacing (with other MPAs), will contribute towards MPA resilience. Especially with the ever-present threat of climate change and its implications of thermal stress leading to coral mortality, there is a stronger call to develop more, if not bigger, MPAs that are connected into a network to support risk spreading that promotes mutually replenishing MPAs in the event of disturbances (Green et al., 2015; Green, Meneses, White, Kilarski, & Christie, 2008; McLeod, Salm, Green, & Almany, 2009). Various scientific reviews have suggested that different sizes of MPAs are required to protect the home ranges of various vertebrates and invertebrates, and thus, the size of MPA no-take-zones must accommodate specific conservation objectives (Green et al., 2015). Figure 4 shows the different sizes, or distances, required for MPA no-take-zones to protect different marine fishes.

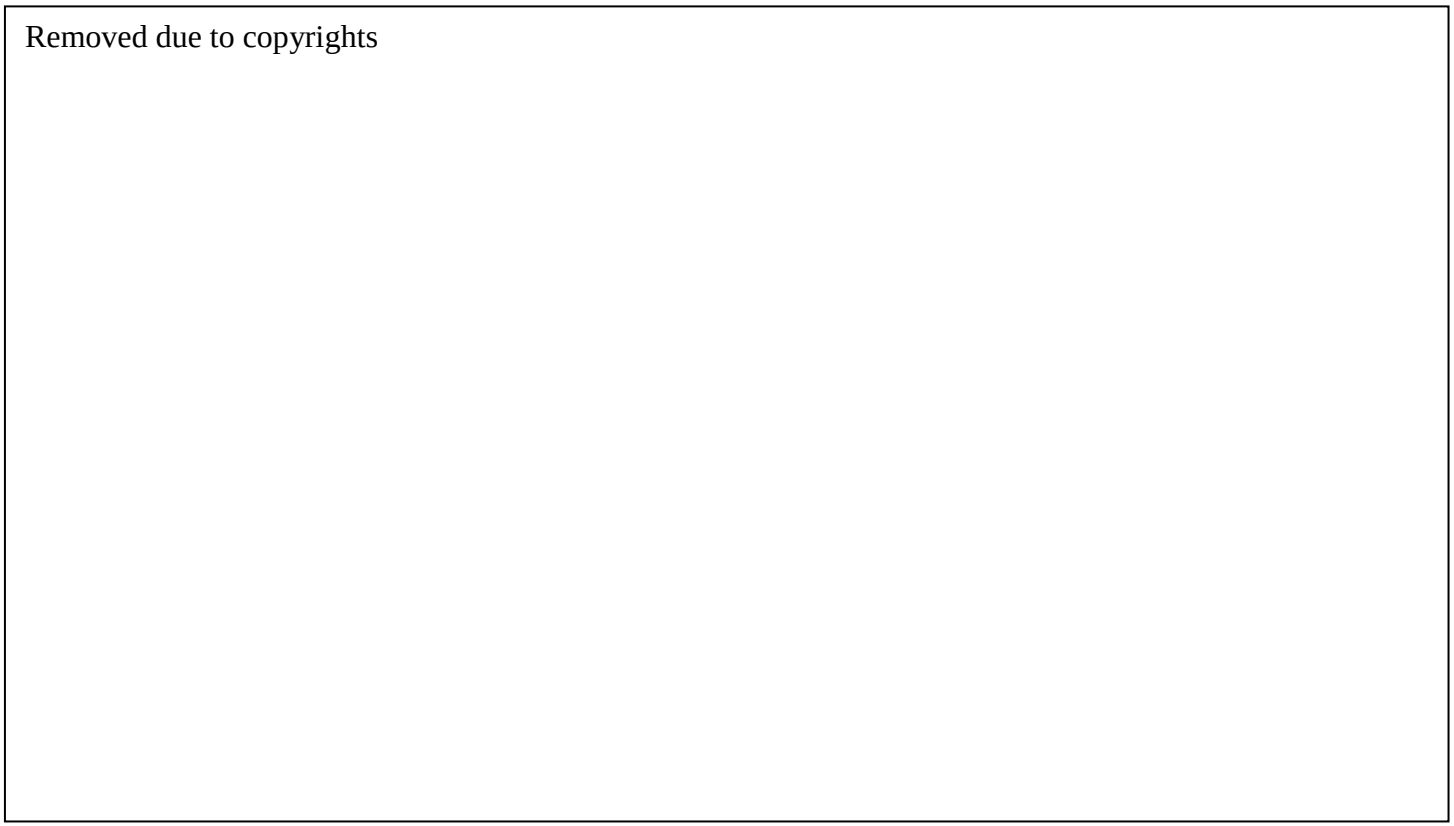

Figure 5. Various distances required for MPA no-take-zones to protect different marine fishes (Green et al., 2015, p. 1227)

2.3.3. MPAs for fisheries

Fishery, especially overfishing, affects fish population and species composition (Pauly, Christensen, Dalsgaard, Froese, & Torres, 1998) as well as creates cascading effects in the marine ecosystem (Dulvy, Freckleton, & Polunin, 2004). The rationale behind developing an MPA with a well-designed no-take-zone is that it will provide a sanctuary for targeted fishes, which in turn allows them to grow bigger, produce more eggs, and finally replenish adjacent fishing grounds through the spill-over of fish and larvae (Abesamis, Green, Russ, & Jadloc, 2014; Ballantine, 2014; Roberts et al., 2001; Roberts & Hawkins, 2000).

Sale et al. (2005) stated that for an MPA no-take-zone (reserves) to be beneficial for fisheries, it must comprise several no-take-zones or marine reserves that take into account the location, size, and spacing between them (see Figure 6). In addition, these no-take-zones must be protected for the long term, that is, for between 15 and 40 years or permanently (Abesamis et al., 2014; Russ & Alcala, 2004)

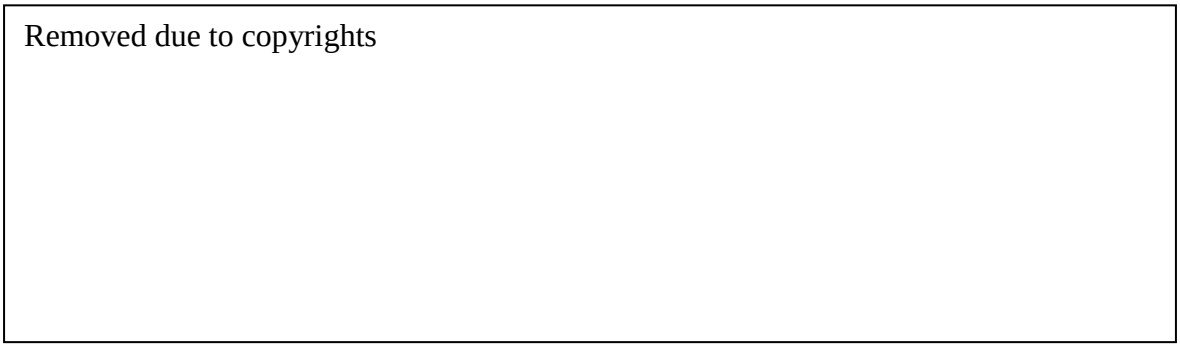

Figure 6. Required distance between MPA no-take-zone (reserves) for fishery benefit

Furthermore, Green et al. (2015) demonstrated in Figure 5 that the size of the no-take-zone must accommodate the home range and spawning area of the targeted fishery species or

groups of species to be protected. For example, for a surface area protection that covers roughly the length of 20 km will protect giant trevally (*Caranx ignobilis*).

2.3.4. MPAs for tourism

As MPAs provide ecosystem services for fisheries, its services for marine tourism are also widespread, and in tropical regions such as the Red Sea, the Caribbean, the Great Barrier Reef, and the Coral Triangle, the presence of coral reefs have created special marine tourism destinations, particularly drawing interests of scuba divers and snorkelers.

In fact, marine tourism has become a major contributor and partner for marine conservation efforts. A variety of willingness-to-pay studies conducted on MPA tourists or visitors around the world (Depondt & Green, 2006; Peters & Hawkins, 2010; Petrosillo, Zurlini, Corlianò, Zaccarelli, & Dadamo, 2007; Svensson et al., 2008) have concluded that there are certain types of nature-based tourism and recreational activities that are compatible with MPA conservation objectives, especially where the tourists show a high willingness to contribute financially to conservation. However, conflicts and/or inequity among marine resource users, whether real or perceived, still persist in many MPAs (Borchers, 2009; Hampton & Hampton, 2009; Oracion et al., 2005; Satria et al., 2006; Suman et al., 1999). For example, Fabinyi (2008) highlighted the case study MPAs in Calamianes islands, Philippines where there was different perception among the fishers, and between the fishers and the tourism sectors that jeopardise the MPAs' conservation objectives. In his paper, Fabinyi argued that fishers' motive for the MPA was to exclude other fishers from fishing in their fishing ground including the one inside the MPA, whereas the tourism sectors (or dive operators) supported the conservation objective of the MPA. This kind of challenge for

MPA managers, particularly in developing countries, is a significant one when extra revenue is required to cover management and operating costs.

Tourism in MPAs is an influential factor in a CAS. However, to expect tourism to be a universally positive influence in (marine) protected areas would be a mistake (Armitage & Plummer, 2010). Acknowledging and embracing complexity as part of tourism is essential to addressing the challenges associated with complex adaptive systems (Farrell & Twining-Ward, 2004, 2005; Fennell & Butler, 2003; Milne & Ateljevic, 2001). Similar to the issues and challenges of oversimplification and misinterpretation of the terms *sustainable tourism* (Hunter, 1997) and *ecotourism* (Björk, 2000; Orams, 1995), tourism roles and objectives in MPAs must be defined clearly and agreed upon by key stakeholder groups (Oracion et al., 2005). In a number of cases, the presence of tourism in MPAs is thought to have limited benefits for the community, especially for fishers (Goodwin, 2002; Oracion et al., 2005; Suman et al., 1999; Svensson, Rodwell, & Attrill, 2010; Walpole & Goodwin, 2001).

Several MPAs in Indonesia have initiated collaborative management using tourism as their primary financial mechanism. One of the oldest MPAs that has implemented this approach is Bunaken National Park. Bunaken National Park has established a mechanism where it supplements its central government funding allocation with revenues generated directly from entrance fees. This revenue is used to support enforcement and community awareness within the MPA (Emerton, Bishop, & Thomas, 2005). Another established conservation-tourism collaboration mechanism is in place in Komodo National Park. Here, the revenue generated from tourism is used for the benefit of marine conservation and local community development (Djohani, 2009). Thus, it is possible for tourism to provide meaningful revenue to support MPA operational activities. However, these MPAs still have limited success in achieving resilience because both their social and ecological performance

indicators are low (Burke et al., 2011; Christie, 2005; McClanahan et al., 2006). This suggests that even when strategies are in place to promote symbiotic partnerships between tourism and MPA conservation objectives, significant challenges in achieving social-ecological system resilience remain for MPAs in Indonesia and the Coral Triangle.

In the context of ecosystem protection, such as with MPAs, it is essential to adapting tourism management strategies to address resilience challenges (Plummer & Fennell, 2009). Such strategies require the establishment of constructive partnerships for MPA tourism (Eagles, 2009; McCool, 2009). The challenge of a social-ecological system is that they must be flexible enough to adapt and/or transform to address resilience issues. In a democratic society this leads to several questions, specifically: who decides what should be made resilient to what, for whom is resilience to be managed, and for what purpose (Lebel et al., 2006)? These questions are related to governance issues in social-ecological systems, such as with MPA tourism.

2.3.5. Governance of MPAs

Governance refers to the structures and processes by which societies share power and shape both individual and collective actions (Young, 2002). It is also shapes management objectives, and according to Jennings (2009), the quality of governance objectives should reflect societal and political views regarding the marine environment.

In protected areas, Eagles (2009) classified governance based on resource ownership, sources of income, and management agencies. Ownership or responsibility for protected areas can be with government agencies, not-for-profit organisations, for-profit corporations, or local communities. Income from protected areas can be generated from government grants, fees and charges, or donations. Eagles (2009) proposed the following governance

criteria to measure protected area performance: public participation, consensus orientation, strategic vision, responsiveness, efficiency, effectiveness, accountability, transparency, equity, and rule of law. Based on these governance criteria, Eagles suggested that the best models of protected area management are those that are co-managed between the public and non-profit sectors.

Brown, Gray, and Stead (2013) classified and compared four types of MPA governance: conventional management, co-management, adaptive management, and adaptive co-management. Their comparison describes an MPA governance spectrum with conventional management at one end and adaptive co-management at the other. Conventional management is characterised as a "top-down" or "command and control" management approach where the government is usually, if not always, the decision-maker. Co-management is characterised by the involvement of various stakeholders in the decision-making process or power sharing. Co-management has been promoted to build ownership among many stakeholders (Pomeroy & Douvere, 2008), but Sale (2008) warned that it is dangerous to sacrifice sound scientific information in decision making process for the sake of reaching consensus among many parties or stakeholders, which is often the case in approaches of coral reefs conservation management that involves many stakeholders. Adaptive management is characterised by a systematic, iterative approach; it is the result of an iterative process involving monitoring and adjusting management plans and their implementation. Adaptive co-management is characterised by the presence of social learning qualities, as it involves co-ownership of knowledge as the product of monitoring and adjusting; it can also be a modification of the conventional management or top-down decision-making process. Plummer and Fennell (2009) promote the adaptive co-management approach for protected area tourism. They believe this approach will provide

broad participation in governance to allow the public or multi-stakeholders to pursue better understanding about sustainability. The authors agree that adaptive co-management is not a panacea, but note that obtaining "experiences and knowledge from natural resource management raise salient prospects for the approach to be insightfully applied to protected areas for sustainable tourism."

2.3.6. MPA governance framework in Indonesia

In Indonesia, the central government has the highest authority over biodiversity conservation. Prior to the establishment of Ministry of Marine Affairs and Fishery in 1999 and the enactment of Fisheries Law No. 31 in 2004, the highest mandate for biodiversity conservation rested solely on the Ministry of Forestry (now the Ministry of Environment and Forestry) with its Law No. 5/1990.

Initially, MPA systems in Indonesia, just like terrestrial protected areas, were an adaptation of the world conservation union, or International Union for Conservation of Nature (IUCN) (also known as with its French abbreviation: UICN) protected areas system (IUCN, 2013) with national parks (IUCN Protected Areas Category II) contributing most of the area coverage. Other types of MPAs include nature reserves (IUCN Protected Areas Categories Ia and Ib) and marine recreation parks (IUCN Protected Areas Category VI). All of these MPAs (as well as terrestrial protected areas) were set aside and established by the central government. With the introduction of Fishery Law No. 31 in 2004, the central government allowed other parties (e.g., private sectors, NGOs, community groups, and local governments) to propose an MPA, but the mandate to establish it still remains with the Minister of Marine Affairs and Fisheries, meaning all MPAs must be established with Minister decrees (Indonesia, 2004).

Several changes occurred in Indonesia with respect to MPA management in the past decade. The Regional Autonomy Law 2004 stipulates that local governments (both provincial and regency governments) were allowed to manage marine resources, with regency governments having a mandate to manage up to 4 NM (nautical miles) from their shorelines, and provincial governments having a mandate to manage the boundary from 4−12 NM from the shoreline. The Regional Autonomy Law was revised in 2014 and only acknowledges the provincial governments' mandate to manage their marine resources from the shoreline to the 12-NM boundary, relinquishing the regency governments' earlier mandates to manage their marine resources up to the 4-NM boundary (Indonesia, 2014). These law changes, which stipulate management mandates of marine resources among Indonesia's governing levels, demonstrate the central government's power to maintain its grip on marine resources under the pretence of protecting the wealth of resources for the benefit of the whole nation as guaranteed in the constitution.

2.3.7. Synopsis

MPAs and MPA networks are marine resource management tools to enhance sustainability. Criticisms of MPAs include a lack of being informed by science in designing them to benefit services such as fishery and tourism, and a lack of commitment to actually establish no-take-zones or reserves to ban all extractive activities. Recent developments in MPA network research suggest that size, location, and spacing of no-take-zones will have to be adapted to the home ranges and spawning behaviours of fishes in order to ensure full protection for targeted fishes and the provision of services for fishery-adjacent fishing grounds. MPAs for tourism are very compatible with advanced recreational activities, such as scuba diving and snorkelling, that can adhere to non-extractive tourism activities. Multi-stakeholder partnership is recommended for MPAs to function and benefit tourism and

fishery, and this partnership provides options for MPA governance. Adaptive co-management of MPAs is expected to address some of the challenges and uncertainties faced in social-ecological systems. In Indonesia, while the central government has allowed more participation for other parties to nominate and manage MPAs, recent changes in the country's laws have limited the role of regency governments in managing their marine resources, while MPA establishment will still require Ministerial endorsement throughout the country.

2.4. Stakeholders in MPA tourism

2.4.1. Introduction

This section examines the key findings of the literature review with regard to stakeholders and their roles in marine resource management. First, stakeholders will be defined with comment on their importance in the context of protected area tourism. Second, the significance of stakeholder perceptions in shaping and influencing governance will be covered, followed by a discussion of the contrasting perceptions of different stakeholders (e.g., fishers vs. tourism operators) in the context of MPAs, various ideas on stakeholder image, and its relevance to governance. Third, because another aspect that influences the direction of MPA governance is the discourse adopted by stakeholders, several dominant discourses in environmental and, particularly, MPA governance will be compared and contrasted. Fourth, the roles and limitations of fishers' and local communities' participation in marine resource management will be outlined. The section concludes with a synopsis.

2.4.2. Defining the stakeholders

Mitchel (2002) defines a stakeholder as a person or group directly affected by or with an interest in a decision, or with legal responsibility and authority relative to a decision. Gray

(1989) argued that a constructive stakeholder collaboration should include the following characteristics: a) the stakeholders are interdependent, b) solutions emerge through constructive deliberations, c) joint ownership of decisions is encouraged, d) stakeholders assume collective responsibility for the ongoing direction, e) collaboration is an evolved process of joint decision making among key stakeholders. To identify who the stakeholders are, Mitchell, Agle, and Wood (1997) proposed the following factors should be considered: a) their power of influence, b) their legitimacy and relationship, and c) their urgency of claim.

In his stakeholder rainbow diagram, Chevalier (2006) categorises stakeholders into a three-by-three diagram describing the level of influence (i.e., affecting, affecting and affected, and affected) and impact of influence (i.e., least, moderate, and most) (see Figure 7). Reed et al. (2009) underline the importance of understanding stakeholders through methodical analysis in the context of natural resource use management. This analysis includes: a) identifying the stakeholders, b) categorising stakeholders through a top-down and bottom-up approach, and c) investigating the relationships among the stakeholders.

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Figure 7. Stakeholder rainbow (Chevalier, 2006)

In the context of protected area tourism, Jamal and Stronza (2009) highlighted the importance of stakeholders on tourism and partnership in protected areas that need to address the following aspects:

1. complexity of the tourism system, which is nested in the social-biophysical realm or social-ecological system;
2. the connection between local and global system;
3. the scale and structure of the collaborations; and
4. the long-term implementation and structuring challenges.

2.4.3. Stakeholder perceptions of protected areas and tourism

Several studies on local stakeholders' perceptions of (marine) protected areas and/or nature-based tourism in various developing countries were reviewed (Table 1). While this review is not exhaustive, it illustrates common issues and traits, if any, that can be detected among local stakeholders' perceptions of protected area tourism.

The impact of tourism has been found to vary; for example positive impacts have been reported in Belize (Diedrich, 2007), Peru, Ecuador, and Bolivia (Stronza & Gordillo, 2008); whereas low social-economic impact for local communities was found in studies in Nepal (Bookbinder, et al., 1998) and Mexico (Young, 1999). Other findings have indicated that in Vietnam, some stakeholder groups (i.e., fishers) within the same community had opposite perceptions of the benefits of protected area tourism because of differences in their use of gear and their fishing ground locations (Svensson, et.al, 2010). In Indonesia, protected area stakeholders were found to exhibit strong support for tourism, despite the perception of little social-economic benefits (Goodwin, 2002).

Table 1. Summary of studies on local stakeholders' perceptions of protected areas or nature-based tourism impact in several developing countries

Author(s)	**Location**	**Research design**	**Key finding(s)**
Bookbinder, et al. (1998)	Nepal (terrestrial protected area)	- Comparative case study - Quantitative - Economic survey using structured questionnaire among the hotels - Economic survey using structured questionnaire among the natural guides - Direct and indirect household income surveys	- Minimal economic impact of ecotourism on household income - Ecotourism offered little employment potential - Ecotourism without mechanism in place to distribute benefit for local community will not likely contribute towards biodiversity conservation
Young (1999)	Mexico (coastal and marine protected areas)	- Multi-site comparative case study - Political ecology, that is, conflict assessment over natural resource use among stakeholders - Key informant interview - Document review	- Alternative income from ecotourism failed to halt destructive fishing activities - Local fishing rights must be secured and non-local fishers must be prohibited from accessing the fishing ground
Goodwin (2002)	National parks in Indonesia, India,	- Multi-site comparative case study	- High community support for tourism

Author(s)	Location	Research design	Key finding(s)
	Philippines, and Zimbabwe (terrestrial and marine protected areas)	- Mixed quantitative and qualitative - In-depth and semi-structured interview with locals on attitude towards tourism	- Majority of respondents perceive that tourism has low direct benefit for local community and benefit only the wealthy
Diedrich (2007)	Belize (coastal and marine communities adjacent to marine protected areas)	- Comparative case study - Qualitative - Ethnography - Participant observation - Semi-structured interview with key informants - Household surveys	- Tourism development has a positive correlation with coral reefs conservation awareness - Tourism development has positive correlation with local perception on quality of life
Stronza and Gordillo (2008)	Peru, Ecuador, and Bolivia (terrestrial/aquatic protected areas)	- Comparative case study - Qualitative - Focus group discussion - Household survey	- Tourism is generally positive for families and communities - Noted higher conflicts regarding profit distribution and erosion of reciprocity and traditional relationships - Improve community capacity to manage resources - Conditions in which ecotourism provides to strengthen or weaken local institutions are not clear
Svensson, et al. (2010)	Vietnam (marine protected area)	- Single case study - Mixed methods - Qualitative and quantitative survey - Closed-ended and open-ended questionnaire - Random interviews with local fishers	- Fishers perception toward MPA initiated by a hotel differ according to their fishing gear and location

Stakeholder perceptions of MPAs and tourism

In assessing the socio-economic factors that influence stakeholders' perceptions in Kenyan MPAs, McClanahan, Davies, and Maina (2005) identified some of the factors that affect perception of resource users, such as profession. They found that fishers were less supportive of fishing area exclusions or no-take-zones than government officials, and government officials viewed that MPAs would benefit fishers, whereas fishers did not feel

the same way. Wealth and community participation were not significant factors among resource users in supporting or not supporting MPAs; however, fishers living in the oldest MPA had a better perception toward MPAs than those who are living in the newly established MPAs.

Assessment of stakeholder perceptions with respect to MPA tourism issues has been widely documented (for example; Breen & Breen, 2008; Christie, 2005; Cinner & Pollnac, 2004; Oracion et al., 2005; Suman et al., 1999; Svensson et al., 2010). Many studies have indicated a strong willingness among tourism stakeholder groups to contribute to MPA improvement (e.g., by paying higher entrance fees), but other stakeholder groups, notably, the fishers and fishing communities, often feel that they are either marginalised or worse off with the presence of tourism (Cruz-Trinidad, Geronimo, & Aliño, 2010; Satria et al., 2006; Suman et al., 1999; Svensson et al., 2010; Walpole & Goodwin, 2001). These assessments suggest that there is still a "use-conservation gap" among (marine) protected area stakeholders (Jamal & Stronza, 2009). Poor performance on ecological indicators (e.g., declining catch of economically-valued reef fish species and low fish biomass) in several Southeast Asian MPAs also indicates that high fishing efforts within MPAs continues to occur despite the widely acknowledged importance of healthy fish populations and marine ecosystems for tourism (Pet & Mous, 2006; Christie, 2005; McClanahan, Marnane, Cinner, & Kiene, 2006). "The purchase of land by wealthy elites and foreigners is linked to broadly-held fears about the ways in which tourism and coastal development was seen to increase the pressure on local fisherfolk to leave" (Fabinyi, 2010).

Stakeholder image

With respect to fishers as stakeholders, Jentoft et al. (2012) used the terminology stakeholders' image instead of stakeholders' perception. Their three case studies were

based on Spanish multipurpose MPAs that included tourism and fisheries. They argued that stakeholders' images of the MPA have evolved due to their changing perceptions and expectations over certain periods. The authors identified incompatible uses of MPAs between tourism and small-scale fisheries and found that while stakeholders' initial support towards these MPAs was low, it changed over time as their participation increased and they observed positive changes within their community. As Jentoft et al. (2002) stated:

> It is not the MPAs themselves and the promises they hold that determine how stakeholders receive them. Rather, it is the images that stakeholders have of them, i.e., of what the MPAs are and do, which determine how they respond. Understanding why MPAs falter in some instances but succeed in others requires an analysis of the role images play in the initiation and implementation process.

According to Jentoft et al. (2012), understanding "images is about understanding what, why, and how people think." As stakeholders' opinions are varied from one location to the other, the researcher also needs to enquire about the "who, where, and when" because Jentoft et al. (2012) believed that each stakeholder has a different stake in the MPA, and these images are "contextual," and are not stable over time, but will change with experience, learning, and interaction. The authors also stressed the importance of exploring images about MPAs to improve MPA governability because "As social institutions, MPAs are dependent on the support and compliance of stakeholders." As Jentoft et al. (2012) explain:

> Governability will also hinge upon image diversity and compatibility. Stakeholders need not necessarily agree on images, but they must at least be aware of which images are present, how they vary or concur, and they must understand where such images come from and what prospects they hold. Enhancing governability would therefore require an interactive process where stakeholders are allowed to exchange ideas and learn from each other. This also makes MPAs more robust as institutions and prepares them for situations where their objectives and outcomes are questioned by stakeholders who have not obtained what they expected.

Furthermore, as governance of marine resources is expected to address towards timely changes in environmental status, which reflect social and political complexity, stakeholders' values, images, and principles, as well as their worldviews, also represent this complexity (Song, Chuenpagdee, & Jentoft, 2013). "These elements have indefinite form and meaning, may be incommensurable, competing and incompatible, and they often go unnoticed in governance discourse." (p.167). To address these governance challenges in natural resource management, the authors suggested understanding the stakeholders' "meta-level governance elements," such as their values, images, and principles.

Mielke et al. (2016) also presented various considerations of involving stakeholders in the decision-making processes (Figure 8). These considerations take into account the type of stakeholders (i.e. functionalist, technocratic, neo – liberal; and democratic) to take part in the decision making in which they will affect the outcome of the process depending on how high or low is their influence.

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Figure 8. Critical continua of stakeholder involvement in science

2.4.4. Stakeholders and their discourses in addressing environmental problems

Another aspect that is worth recognising is stakeholders and their discourses with respect to environmental governance. Dryzek (1997) describes environmental discourse as a common approach in understanding the world within which its embedded language contains information pertaining to assumptions, judgements, and contentions that allow analysis, debates, agreements, and disagreements. Dryzek identified various terms of environmental discourse, some of which influenced natural resource management and policies in Indonesia and had implications on MPA tourism management. These discourses include administrative rationalism, democratic pragmatism, and economic rationalism.

Administrative rationalism – leave it to the experts

Dryzek labelled the "leave it to the experts" conservation approach administrative rationalism (1997). The characteristics of this approach are the over-reliance on technical experts and advisors that are employed or controlled by the government authorities. Proponents of this approach, including conservation scientists and academics, argue that central governments and/or research agencies and their scientists or experts have long-term and neutral views when it comes to managing the common goods such as marine resources. However, the arguments against this approach highlight the weaknesses of government and research agencies, which are merely tools of political regimes. In addition, central government approaches to natural resource management have often, if not always, ignored local communities' perspectives and cultural aspects, which made these approaches unpopular, and they received little support to sustain policies in the long run.

This top-down approach is typical of Indonesia's governance during the New Order period (1966–1998) of authoritarian President Suharto. Under Suharto's regime, there was a strong role of central government, with the support of its ministries, agencies, and security forces,

which enforced laws and regulations upon all citizens, and which were based on one-way directions and policies of natural resource management. As explained in Section 2.3.6, essentially all MPAs in Indonesia must be endorsed by the appointed central government agencies. Up until 2004, the mandate to endorse the establishment of MPAs rested upon the Ministry of Forestry, and it is now under the Ministry of Marine Affairs and Fisheries.

Democratic pragmatism – leave it to the people

The premise of democratic pragmatism, or "leave it to the people," discourse is that environmental administration with the highest public support has to be democratic. This implies that greater roles must be given to the public in setting up directions and policies. Hence, advocates for this discourse pushed for local communities, indigenous people, and/or local governments to have more stake or freedom in the policy directions and decision-making process of natural resource management, arguing that there is a "need to secure legitimacy for decisions by involving a broader public." (Dryzek, 1997, p.86).

As Indonesia transitioned from Suharto's regime in 1998 to a more democratic society, there was growing recognition and preference to allow greater public participation in the political arena, including greater autonomy of the local governments and legislators, who were directly elected. The governance of natural resources was also part of the domain affected by Indonesia's changing political landscape. The enactment of Fishery Law No. 31 in 2004 acknowledged the significance of the involvement of the public and other stakeholders in marine conservation, and allowed private individuals and /or organisations to nominate an area to be considered as an MPA, whereas previously, all process, from nomination to establishment, was driven by the central government. It is not clear why the government of Indonesia still requires the endorsement of a Minister for an MPA set aside by a small village. Perhaps this is to ensure the integrity of the marine ecosystem and its

representation as part of an MPA network, which otherwise would not have been addressed, as is often the case with democratic pragmatism in environmental protection (Dryzek, 1997).

Economic rationalism – leave it to the market

The undervaluation or incorrect valuation of ecosystems is thought to be one of the contributing factors leading to degradation of the environment. Economic rationalism discourse tries to address this challenge by encouraging the market to assign appropriate value to the environment or ecosystem services in order to prevent abuse of the environment, with the assumption that people will be more protective of anything that has monetary value. Approaches in economic rationalism have been adopted in payment for ecosystem services to protect watershed systems (Constanza 1997), in carbon sequestration programmes, in debt-for-nature swaps, and in concession areas of forest and marine ecosystems set aside for forestry, fisheries, mining, and tourism. The underlying argument of economic rationalism is that if biodiversity has appropriate value, then the market forces will make corrections to ensure the optimal value will be met. For example, if a shark generates more money alive from nature-based tourism than it does dead as a fishery target species (Cisneros-Montemayor et al., 2013), then it would make more sense to protect the shark for tourism purposes than for fishery purposes. Furthermore, examples of tourism revenue and/or levies used to fund marine conservation management are quite numerous, as explained earlier in Section 2.3.4. The assumption of economic rationalism is aligned with privatisation of natural resources, in which the private individuals or organisations who own a designated area or property will put some effort into protecting the integrity of the area, including its biodiversity features, for their economic benefit.

Nonetheless, (2012, p.57) warned that:

> Expressing the value of ecosystem services in monetary units does not suggest that the values should be used as a basis for establishing prices and does not mean that they should be treated as private commodities that can be traded in private markets. Most ecosystem services are public goods that cannot (or should not) be privatized. Their value in monetary terms is an estimate of their benefits to society—benefits that would be lost if they were destroyed or gained if they were restored. Thus, monetary valuations of the importance of ecosystem services to society can serve as a powerful and arguably essential communication tool to inform better, more balanced decisions regarding trade-offs involved in land use options and resource use. Ecosystem service valuations are best seen as complementary to conventional decision-making frameworks, in which the positive and negative externalities of the use or loss of many environmental goods and services are still not, or insufficiently acknowledged.

In addition, detractors of economic rationalism are not convinced that all ecosystems and/or species, for example, have the same, or any, economic value at all because many of the inherent flaws in the natural resources valuation process (Spangenberg & Settele, 2010). For example, the complex interactions of a particular targeted fishery species with other species, or the connectivity of reefs that are influenced by biophysical characteristics including water current, temperatures, and other environmental parameters will be difficult, if not impossible, to put any value on.

Sustainable development

The widely quoted "Brundlandt report" from the World Commission on Environment and Development (1987) popularised the term *sustainable development* as a concept, which is defined as development that "meets the needs of the present without comprising the ability of future generations to meet their own needs" (p.8). However, the fishery sector, as highlighted in Section 2.3.3, had introduced the concept of maximum sustainable yield (MSY) much earlier, assuming that a significant percentage of certain a fish population

could be exploited, while the remaining population should be left to allow regeneration. As the MSY concept has been widely criticised for ignoring the complexity of ocean or marine ecosystems and their processes, including the critical interaction of targeted species and other species (e.g., their prey and predators), the sustainable development concept is also widely contested (Levin, 1998). The ambiguity of sustainable development as a concept rests on its assumption that there is a possibility of continuous growth with a wishful, if not misguided, belief that the natural resources will be able to keep up, providing that their exploitation is regulated and/or monitored carefully (Dryzek, 1997).

One example of the ambiguity shown by sustainable development discourse is the design of multi-objective MPAs. These types of MPAs aim to meet several objectives (i.e., biodiversity conservation and resource use) under one management framework (i.e., the MPA management plan). However, as explained by many authors (Costello, 2014; Roberts & Hawkins, 2000; Sale, P.F., et al., 2005) and previously discussed in Section 2.3.3, the global fisheries conditions warrant stricter MPA (or marine reserves) regimes and global networks of marine reserves or no-take-zones to allow the recovery of many depleted fishery stocks. Contrary to this idea, it has been suggested that global problems with respect to marine conservation are two-fold: first, there are not enough MPAs established, and second, most of the established MPAs still allow fishing to occur (Costello & Ballantine, 2015). This suggests that the current MPAs established around the world, including those in Indonesia, are still adopting the sustainable development discourse in their conservation management approaches. The adoption of the sustainable development approach is favoured by decision-makers and NGOs, who view it as a win-win scenario for many stakeholder groups, while in reality, many stakeholder groups are still not convinced of or understand the management objectives of their respective MPAs, and many cases

suggest that these stakeholders are fishers (Oracion, Miller, & Christie, 2005; Satria et al., 2006; Svensson et al., 2010).

In short, the sustainable development discourse is as ambiguous as the terminology itself. It is adopted widely by many government agencies and private sectors including NGOs, but there is still not a consensus on its definition and as a result this terminology is often used by many stakeholder groups without solid agreement what it actually entails among many competing interests

2.4.5. Fishers' participation in marine resource management

Fishers, especially those in developing countries, are one of the most crucial stakeholders in marine resource management, especially in MPAs (Bunce, Townsley, Pomeroy, & Pollnac, 2000; Costello & Ballantine, 2015). Increasing calls for greater stakeholder participation in marine resource management were based on the assumption and evidence that incorporating traditional ecological knowledge into marine resource management proved to bring beneficial outcomes (Agrawal, 2003; Berkes, Colding, & Folke, 2000). In Southeast Asia, successes of communities in the Philippines to contribute towards marine conservation were recorded in Oriental, Batangas, and Tubbataha Reef National Marine Park. According to White and Vogt (2000), these successes were the result of intensive education and awareness in conservation, active involvement of traditional fishers, and strong cooperation between institutions. In Papua New Guinea, Hamilton, Potuku, and Montambault (2011) demonstrated that a small no-take-zone MPA that is well designed and enforced with the support of local communities could actually protect important fish-spawning aggregation sites.

Migrants are another important stakeholder group in coastal communities that have received some attention as potential contributors to environmental degradation (Curran, 2002). For example, in a study of a multi-ethnic region in Ecuador, Sierra (1999) did not find evidence of recent deforestation being associated with new migrants. Other studies highlight systems with strong land tenure or social capital where migrants do not disrupt the environment (Hanna, 1998; Palsson, 1998) or are able to develop knowledge systems that are compatible with their new environment. Certain ecological or social conditions may be conducive to migrants becoming environmental activists rather than environmental degraders (Broad, 1994). Thus, empirical evidence on the impacts of migration and migrants' resource-use and extraction on the environment is mixed, partly due to the fact that migration is an extremely complicated, non-linear process (Curran, 2002). Aswani's (1999, 2002) case study in the Solomon Islands challenges the notion that sea tenure regimes are weakened by population growth and migration alone. He hypothesises that the higher the density of reciprocal ties among close kin or neighbours, the more likely that their land- and sea-use patterns will be conservative and the potential negative impact of migration or population growth will be diminished significantly.

Despite this promise of local community achievements to deliver positive conservation outcomes, Fennell (2008) cautioned that it would be a fallacy to assume that traditional knowledge possessed by many isolated communities around the world will lead to sustainability, when in fact many records of local resource extinctions have been perpetrated by the very local communities who depend on these resources. Berkes (2007) pointed out that it is important to understand the multi-scale nature of resource management, and it would be naïve to treat community participation as a panacea for natural resource management. He suggested that community-based management in natural

resource management should be part of a multi-partnership among actors across multi-scales. That means it requires the involvement of other agencies or stakeholder groups contributing at specific levels with specific roles and efforts to address issues that cannot be tackled by a single, community-based management unit.

Another point of concern is the occurrence of a "shifting baseline," which occurs where a particular group of people or different communities may have different perceptions of the norms of ecosystem health and status due to generation gap issues (Bohnsack, 2003). In coastal communities, it is often found that younger generations are not able to detect changes in the size or species composition of their fishing grounds due to local extinctions. An example from Kiritimati, the world's largest atoll, demonstrates that due to high immigration rates, the local population has lost institutional memory regarding the marine ecosystem health and status of the area, and considers continuing to exploit fish despite the estimation of high decline in fish population (Watson, Claar, & Baum, 2016).

2.4.6. Synopsis

Defining and determining the right stakeholders to engage in social-ecological system management is vital. Stakeholders' perceptions with respect to protected area tourism are varied, and in MPAs, fishers often felt as if the presence of protected areas left them worse off than tourism operators. Understanding stakeholders' images of MPAs will aid MPA managers to improve their governance performance, and through examination of their discourses, one can understand the rationale of MPA and tourism governance. While the involvement of communities, as local community stakeholders, in governing marine resource management is crucial, this must be a part of multi-partnership that occurs across multi-scales because of the wide-ranging factors that affect a particular MPA. MPA tourism is occurring at various scales and levels, therefore to rely on local communities alone to

tackle MPA tourism-related challenges will be naïve, while at the same time, the central government must be able to delegate the management duties to relevant levels of stakeholder(s)/or stakeholder group(s) appropriately.

2.5. Bali: Development in marine tourism, MPAs and MPA networks

2.5.1. Introduction

This last section provides an overview of the tourism development policy in Bali stretching back to the Dutch colonial period. It identifies fears of tourism that corrupt local cultures, which dominate the policy setting in Bali, while economic growth dictates tourism development. It discusses the establishment of MPAs and the establishment of a network of MPAs as tourist attractions and as a conservation measure. Lastly, it will look at the performance of Bali's MPAs in protecting its marine resources.

2.5.2. Tourism development

The Dutch colonial government first initiated the tourism development in Bali in the early part of the 20th century and marketed the island as the "Gem of the Lesser Sunda Isles." It also promoted cultural conservation by imposing that Balinese youth retain their heritage traits, including language, arts, and literature (Hitchcock & Putra, 2007). Hitchcock and Putra (2007) labelled this Dutch colonial government approach to preserving Balinese culture as "social engineering" rather than an approach of an enlightened and culturally-sensitive foreign power, because the Dutch at the time "were not so much interested in preserving the culture of Bali as they found it but in restoring it to what they thought was its original integrity" (p.15). The authors also found irony in the Dutch approach because on one hand, the Dutch tried to limit Balinese contact with the outside world, and on the other hand, they encouraged tourism development on the island.

This contrasts with the Indonesian independence era in the 1980s when the World Bank sponsored an international tourism development project in Bali as part of its support for the Indonesian government's effort in diversifying revenue generation away from oil and gas (The World Bank, 1985). The project report emphasised both the World Bank and the Indonesian government's high commitment to protecting Bali's social, cultural, and environmental quality as well as maximising the economic benefits of tourism development. The project noted the uncontrolled growth of tourism in the early part 1970s that "grew at an average rate of 27%" (p.2), and selected Nusa Dua at the southern tip of Bali as the priority tourism development area for tourism infrastructures that met international standards. The development included the construction of accommodation facilities and supporting facilities. The rationale for selecting Nusa Dua included its

beautiful coastal scenery, unproductive land for agriculture, close proximity to the airport, and low resident population. The Bali Tourism Development Corporation even stated on its website that the reason for Nusa Dua's selection was because it was located far from the traditional Balinese population, and consequently, the tourism development was expected to have limited social impacts for Balinese social-cultural life (BTDC, 2016).

The above examples demonstrate how tourism governance imposed by the Dutch and Indonesian governments on the Balinese island has tried to limit the impact tourism has on Bali's social, cultural, and environmental quality, demonstrating unrealistic and linear thinking about the tourism system. Picard (1993) proposed that "tourism should be conceived not as the irruption of an external force striking Bali from without, but as a process transforming Balinese society from within." This is because the Balinese culture is a product of a dynamic process with the outside world, not limited to tourists alone, but also to the artists and scholars who "contributed to composing the touristic image of Bali." He later stated that tourism neither weakens nor propels Bali's cultural "renaissance" (2008).

> What happened is that the focus on 'cultural' tourism convinced the Balinese people that they have a 'culture', something precious and perishable that they perceive as a capital to be exploited and as a heritage to be protected. As it was being manipulated and appropriated by the tourism industry, their culture became not only a source of profit and pride, but also a cause of anxiety for the Balinese, who started wondering whether they were still authentically Balinese. Thus, it is that tourism provoked an overriding concern about identity amongst the Balinese - about what they call their "Balineseness".

However, early indicators suggested that high-cost tourism development endorsed by the World Bank and Indonesian government did not bring economic equity for the Balinese population at large (Rodenburg, 1980), while McTaggart (1980) highlighted that the low

cost of tourism development, as observed in the Kuta area, had wider economic impact for local communities because it spread the development opportunities for more households. Jenkins (1982), on the other hand, considered that mass tourism development was inevitable in Bali due to economies of scale. He argued that the costs of large-scale tourism development in the developing country could be anticipated and mitigated. His predictions proved somewhat accurate, and Bali has experienced rapid growth of a range of micro-tourism businesses, including small guest houses and food vendors throughout the island (particularly in newly-developed tourism destinations), without proper planning or central government support (Howe, 2005).

The concerns of tourism-related development are not an understatement for Bali. The government of Indonesia has set an ambitious target of attracting 20 million tourists by 2019 (GOI, 2011a). This is more than double of the number of international tourist arrivals recorded in 2014, which was 9 million tourists (BPS, 2015).

2.5.3. Traditional institutions and tourism

While concerns about negative impacts of tourism on Balinese culture were probably real, some authors (for example; Hitchcock & Putra, 2007; Lietaer & De Meulenaere, 2003; Picard, 2009; Putra & Hitchcock, 2009) proposed that Balinese society is actually more resilient in its ability to navigate these unwanted tourism impacts.

The fear of co-modification of the Balinese Hindu culture was rejected by Lietaer and De Meulenaere (2003). They argued that Balinese social structure, which has been built over 1,000 years of Hindu tradition, was resilient because of its pragmatic dual currency system. This system is comprised of the traditional world, which revolves around the community Banjar system that essentially binds an individual's life from cradle to the grave, and the

modern capitalist world symbolised by the Rupiah, Indonesia's currency, which all Balinese must embrace in their modern world.

Under the traditional currency, the Banjar way of life is very dominant. The Banjar treated all its members as equal and required every individual to contribute their time for the good of their Banjar. Activities arranged under the Banjar way of life can be religious ceremonies, renovating local schools, or village cleaning. The Banjar have certain rules and taboos that its members must not trespass; otherwise, they can be banished forever. For a Balinese, to be excluded or banished from his or her Banjar would mean lifetime punishment (Hitchcock & Putra, 2007). The Hindu priests also have strong influence in Balinese society. They decide what types of performances, such as dances and other rituals, can be performed in front of tourists, while forbidding the performance of certain types of dances and rituals that are reserved for religious ceremonies only (Howe, 2005). This dual currency system has allowed Bali to progress and embrace the modern world, but still maintain its cultural identity.

An additional important influence is the subak system under which Balinese farmers are organised. *Subak* is a system where groups of farmers work together to implement traditional water irrigation techniques and practice an agricultural regime by rotating and planting native crops, which is achieved through negotiation and consensus (Lansing & Kremer, 1993). The subak system has been carried out for hundreds of years and has proved to be both effective and environmentally sustainable (Lansing & Kremer, 1993). Both the Banjar and subak systems are important contributors to the adaptive capacity of Balinese society.

It is in this context that Bali experienced unprecedented tourism growth from the 1990s onwards (despite the 2005 Bali bombings). This rapid growth brought in investors from elsewhere in Indonesia and all over the world to develop hotels, restaurants, and other tourism attractions. This growth has led to water shortages, threatening Bali's well-established agricultural system as well as its local people's well-being (Cole, 2012).

2.5.4. Bali, MPAs, and MPA network development

West Bali National Park was the first officially established protected area in Bali that included the protection of the marine ecosystem on Bali island. Polunin, Halim, and Kvalvågnaes (1983) observed that West Bali National Park supports communities of coral reefs, with reef-associated sharks and porpoises being a common encounter in several areas of the MPA. They also recorded overexploitation of mangroves and fish, as well as the practice of blast fishing and coral mining, all of which were having a major impact on marine ecosystem health. Despite this, the MPA was considered a well-protected MPA in Indonesia during the 1980s (White, 1988).

No other MPAs had established in Bali during the 1980s. Around the early 1990s, a tourism partnership between a Balinese entrepreneur and an Australian dive operator began a tourist diving destination in the village of Pemuteran, which is located 30 km west of West Bali National Park. The dive tourism partners also established a private MPA (Bottema & Bush, 2012). Although the government of Indonesia never acknowledged privately-managed MPAs, recent expansion of MPAs and the development of an MPA network in the Lesser Sunda Ecoregion (Wilson, Darmawan, Subijanto, Green, & Sheppard, 2011), including in Bali, acknowledged the presence of the Pemuteran MPA which was incorporated into Bali's MPA network system (DKP, 2014). The MPA network

also included one of the first regency-endorsed MPAs in 2010, the Nusa Penida MPA, which is located on the Nusa Penida islands southeast of the Bali mainland.

The marine tourism sector played a significant role in the development of MPAs in Bali, such as in Pemuteran (Bottema & Bush, 2012), and stakeholders in the marine tourism sector also acted as strong partners for the establishment process of the Nusa Penida MPA.

As part of its global (e.g. Convention on Biological Diversity / CBD) and regional (e.g. CTI) commitment, Indonesia is committed to increase its MPA surface coverage areas and as one of its strategies to achieve marine sustainable development. In addition, it also launched ambitious regional economic development plans to accelerate development in the country six regional development corridors by focusing on specific economic sectors as the source of revenue (GOI, 2011b). Bali and Nusa Tenggara provinces (i.e. West and East Nusa Tenggara provinces) are grouped into the same regional development corridor (i.e. regional corridor 5), in which the targeted economic sectors are fishery, tourism, and animal husbandry. In this regional development corridor, Indonesia designated Bali as the country tourism main gateway.

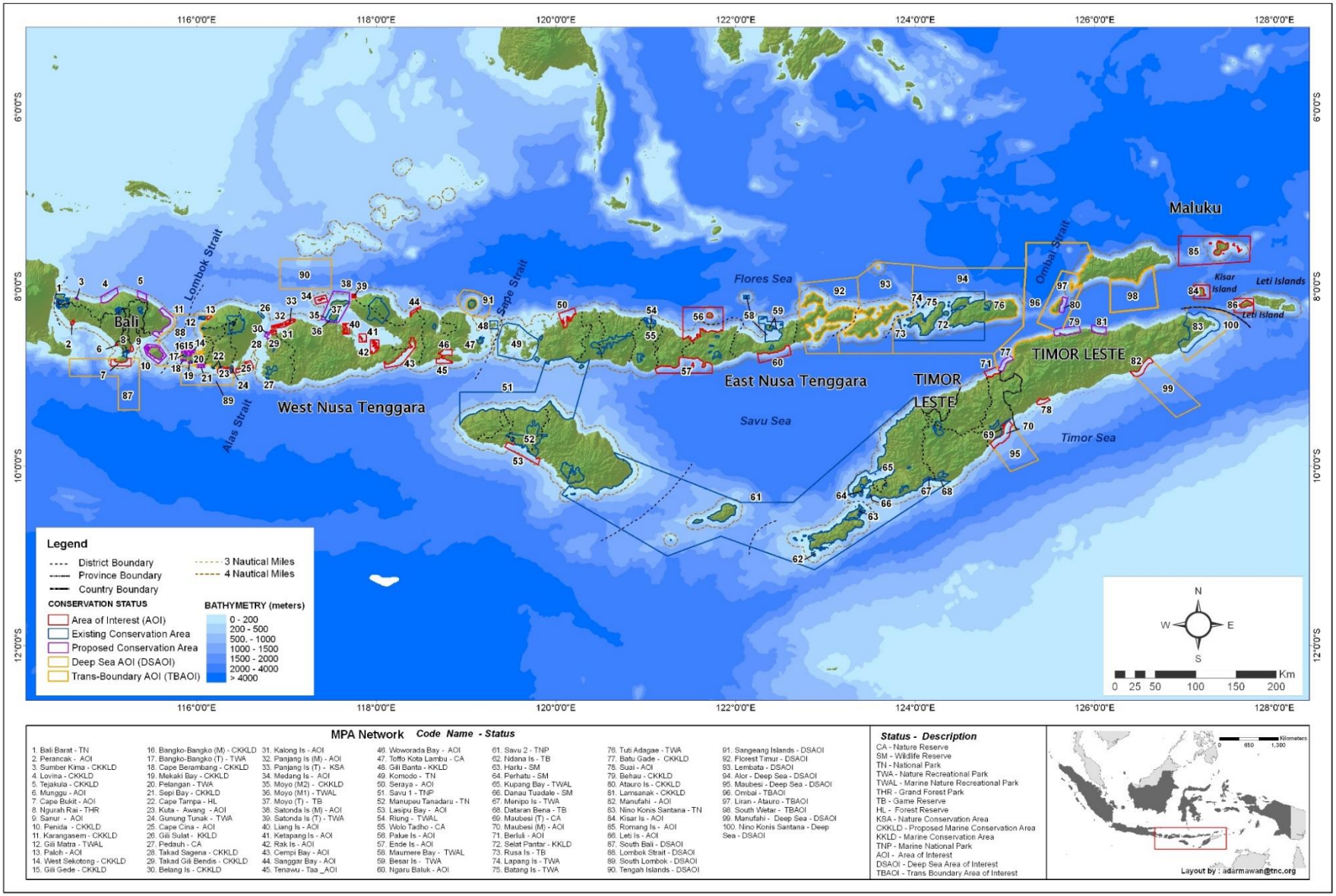

Figure 9. Lesser Sunda MPA network design (Wilson et al, 2011)

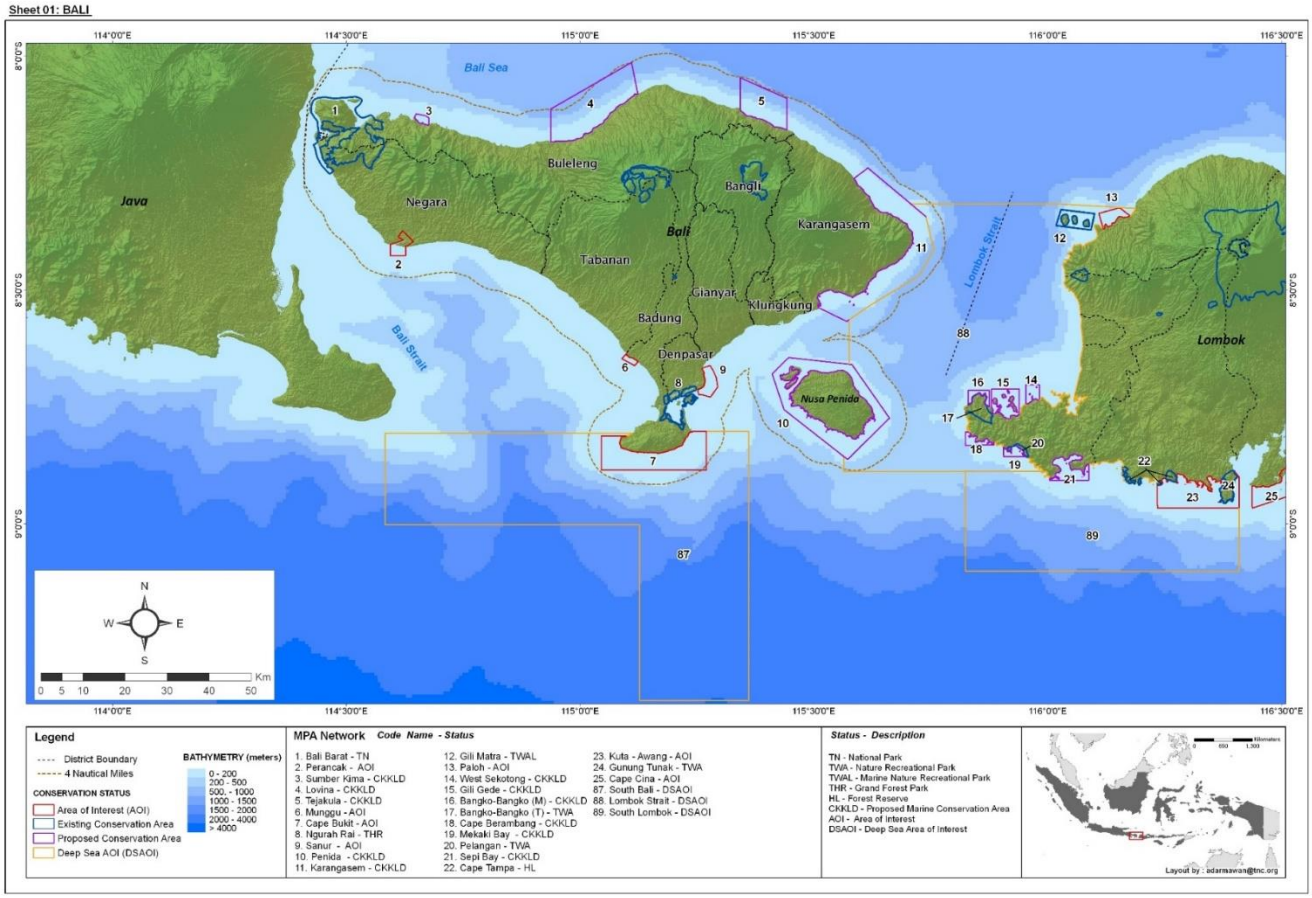

Figure 10. Bali and Lombok as part of the Lesser Sunda MPA network design (Wilson et al 2011)

2.5.5. Bali and marine resource management

However, the adaptive capacity of the Balinese with regard to resilience of the coastal and marine environment is still low. Unlike the farmers in highland areas who have been successful in applying the subak system to sustain their ecosystems, Balinese fishers or coastal communities have not preserved the integrity of their coastal and marine ecosystems. Even after the central government's establishment of MPAs in Bali Barat National Park in 1985, and the Pemuteran community's establishment of the Pemuteran MPA in 2003, ecological indicators, such as average size and biomass of fish, in these areas are low and have not shown any difference of improvement when compared with their surrounding unprotected areas (McClanahan et al., 2006; Mustika et al., 2013). McClanahan et al. (2006) found that the strong presence of tourism in Bali Barat and Pemuteran did not seem to lower fishing pressures, and suggested that increasing wealth or access to markets may be the factors that negatively affect the marine ecosystem. This study also suggested that neither the central government's nor the local community's MPA management model proved to be successful in dealing with high fishing pressures and the declining health of the local marine ecosystem. Conservation International carried out a rapid survey to assess the marine ecosystem's health in 2011, and one of their key findings was as follows:

> Though Bali hosts an astounding diversity of fishes for its size, we also found strong signs of overfishing at nearly every site, with large reefs fishes of commercial value nearly absent. In over 350 man-hours of diving, the survey team only recorded a grand total of three reef sharks (only at Gili Selang and Menjangan), three Napolleon wrasse (*Cheilinus undulatus;* observed only at Gili Selang and Tulamben), and four coral trout of the genus *Plectropomus*. Equally concerning, the team only recorded a grand total of five marine turtles observed during the survey. (Mustika et al., 2013, p. 4)

2.5.6. Synopsis

Tourism development in Bali has always been dominated by external forces, from the Dutch colonial governments in the early part of the 20th century to the present Indonesian government. While early attempts have been employed by these two governments to limit the impact of tourism upon the social-cultural life of Bali, such efforts were unrealistic, even ironic, because by opening Bali to tourism, it inevitably exposed local culture to the outside world and its influences. While tourism is perceived as a threat to Balinese culture, many opinions suggest that this is not the case, and even highlight the duality traits of Balinese culture that can help maintain the balance of modern and traditional life. However, recent findings of the impact of tourism on Bali's water quality caused concerns that there are threats to the island's food security and to people's well-being.

Ever since the establishment of the first MPA in Bali, West Bali National Park, anthropogenic pressures on the marine ecosystem have been recorded. Despite the marine tourism sectors' support for the establishment of MPAs, findings of marine ecosystem health surveys around Bali island showed that apparent overfishing and lack of edible reef fishes of commercial value.

2.6. Summary

In summary, important characteristics that impact social-ecological systems are resilience, adaptability, and transformability. The island of Bali has adapted adequately to large-scale tourism development and has proved to be a resilient society despite tourism and modernisation pressures. This adaptive capacity and associated resilience is related to influential cultural constructs such as the Banjar and subak systems. However, this adaptive capacity seems to be missing from Balinese coastal communities. The lack of success of the West Bali National Park MPA and the Pemuteran MPA is evidence of

limited adaptive capacity and transformability. The development of tourism does not seem to alleviate fishing pressures, and the quality and resilience of the marine ecosystems have declined. Addressing this issue by assessing the stakeholders' perceptions on the impacts of tourism on MPA resilience will be an important contribution to understanding this apparent lack of success.

Chapter 3: Research Design

3.1. Introduction

In trying to better understand stakeholders', and primarily fishers', perspectives with regard to the effects of MPA tourism on social – ecological systems, it is important to understand the dynamic, inter-related, and complex nature of the MPA tourism system. Walker and Salt (2006) suggested that the key to effective management of any social-ecological system is to appreciate its complex and adaptive nature and understand its resilience attributes. Assessing the resilience of social-ecological systems is challenging because there are both ecological and social components of the system that need to be examined in an integrated manner (Gibbs, 2009). For example, the presence of MPAs intended to enhance fishery productivity and, particularly in Bali, also benefit tourism, has created complex and adaptive interactions among the three social sectors (i.e., fishery, conservation, and tourism) with its marine social-ecological systems. Because of this complexity, a range of research approaches were needed to provide data that helped answer the research questions.

This chapter outlines how the design of this research attempted to address the complex and adaptive nature of the social-ecological systems of the MPAs. It provides the rationale for selecting pragmatism as the research paradigm, for using a comparative multi-case study design as the methodology to compare and contrast the three different types of MPAs, and for using mixed methods to capture both quantitative and qualitative data explaining fishers' perspectives on the potential of switching to tourism for their livelihood.

3.2 Research paradigm

As a research paradigm, pragmatism's ontological positions can be seen as both objectivist and subjectivist, or as Creswell, Plano, and Clark (2011) describe, as acknowledging both singular and multiple realities in the research. A pragmatic approach is suitable for the assessment of social-ecological systems because it "rejects traditional dualisms such as subjectivism vs. objectivism; it recognises the existence and importance of the natural or physical world as well as the emergence of social and psychological world that includes language, culture, human institutions, and subjective thoughts; and knowledge is viewed as being constructed and based on the reality of the world" (Johnson & Onwuegbuzie, 2004, p. 18).

I was aware and had anticipated that the research participants would have multiple perspectives on the various domains (e.g., marine ecosystem, marine biodiversity, MPA, and marine tourism) of social-ecological systems relevant to this research. As a consequence, a pragmatic ontology and, following from that, an epistemological position based on adopting a practical range of research approaches allowing the collection of data that addressed the research questions was appropriate (Creswell & Plano Clark, 2011). Such an approach is consistent with the views of Miller et al. (2008), who explained that the challenge of adhering to a specific epistemological position when conducting an assessment of a social-ecological system can lead to inflexibility that can undermine the outcome of the assessment.

As explained in the previous chapter, the theoretical aspect of this research hinges on the importance of managing resilience of social-ecological systems, which are essentially complex adaptive systems (Walker & Salt, 2006). To understand resilience attributes of a particular social-ecological system, I adapted the Resilience Assessment Framework (RAF)

developed by the Resilience Alliance (2007a, 2007b) as well as the protected area tourism resilience assessment developed by Strickland-Munro et al. (2010) for application in this research. The RAF (Resilience Alliance, 2007a, 2007b), proposed the following four guiding questions pertaining to social-ecological system resilience that need to be addressed:

- What is the system that needs to be made resilient ("resilience of what")?
- What are the factors or disturbances that can lower the system's resilience ("resilience to what")?
- Who decides what should be made resilient?
- What are the plausible future scenarios of the system?

These guiding questions were adapted and utilised in the research design to understand stakeholders' perceptions of MPA tourism impacts on social-ecological systems.

The utilisation of the case study as a methodological approach for this research is compatible with the social-ecological system assessment approach that requires a well-defined scale or delineated unit of study area within the context of the research (Walker & Salt, 2004; Resilience Alliance, 2007a, 2007b). In this research, the context of the study refers to the overall research question, which is: How do stakeholders perceive the MPA tourism impacts on the social – ecological system?

Finally, the research employed mixed methods to allow the collection and analysis of both qualitative and quantitative data. The objectives of using mixed methods in research are to obtain convergence and completeness of the data collected (Yu, 2006). Yu (2006, p.42) explained that convergence serves "as a cable that links various arguments and evidence."

Miller et al. (2008) proposed that different results generated from "methodological pluralism" in research involving social-ecological systems should be retained so that a "more complete picture of the phenomenon under investigation could be seen."

Table 1 outlines the theoretical background, research design, and research methods used in this research.

Table 1. Summary of research design and structure

Paradigm	Pragmatism
Ontology	Singular and multiple realities
Epistemology	Practicality (collect data that works to address research questions)
Theoretical lens	Social-ecological systems
Methodological approach	Case study
Methods	Mixed methods – qualitative and quantitative

Adapted from Creswell & Plano Clark, 2011; and Crotty, 1998

3.3 Methodological approach and methods used

3.3.1 Case study

I conducted this research using a multi-case study format (Yin, 2009). The same research approach was applied among the three MPAs, and the units of analysis were the fishers and non-fishers. The aim of using a multi-case study format is to allow the researcher to explore differences within and between cases (Yin, 2009). RAF was used to aid

comparison among the research sites, hence, this research can be classified as a comparative multi-case study.

An assessment of a social-ecological system using the RAF is normally applied using a case study format (Strickland-Munro et al., 2010). As case study research can be both qualitative and quantitative in nature, this encourages the use of mixed methods in its implementation (Yin, 2009). Figure 1 shows the three MPAs chosen for this multi-case study: West Bali National Park, Pemuteran, and Nusa Penida.

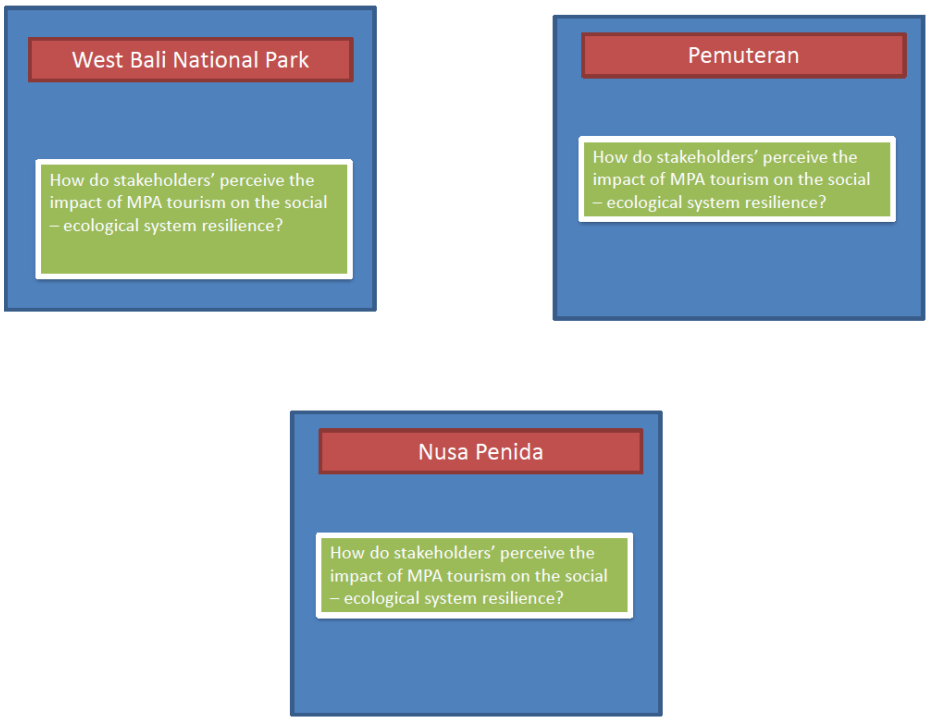

Figure 11. Multi case study format

3.3.2. Research sites and selection rationale.

Bali is by far the most established and the biggest island tourism destination in the coral triangle region. Its marine tourism destinations feature well known surfing locations such as *Kuta* beach, *Uluwatu*, and *Padang – Padang*. In fact, the discovery and development of surfing tourism and its related industries since early 1970s has helped Bali to become the major surf tourism destination in the Asia – Pacific region (Lueras, 2002). Other marine tourism features found in Bali include sports and recreation activities such as kite surfing, snorkelling, and game fishing. Bali also offers a range of nature based activities such as mangrove tours, cetacean watching, and scuba diving. It has also become the hub for international and domestic tourists who are visiting other destinations in the Lesser Sunda region, that is the chain of islands East of Bali including Lombok, Sumbawa, Sumba, Flores, and West Timor, or otherwise known as the Nusa Tenggara provinces.

I selected three MPAs in Bali for the comparative case study of this research. The rationale for the MPAs selection was:

I. MPA governance structures. Currently the following MPA governance structures exist in Indonesia:
    - National Parks (which can include MPAs) are centrally managed by the Indonesian national government agencies; the Ministry of Environment and Forestry, and the Ministry of Marine Affairs and Fisheries. The Ministry of Environment and Forestry manage all national parks, including those national parks that have both terrestrial and marine areas (e.g. Komodo,

Ujung Kulon, and West Bali). However, at the time this research was carried out, the Ministry of Environment and Forestry was in the process of handing over the responsibility for managing MPAs that were not part of a terrestrial national park (i.e. comprised 100% marine area) to the Ministry of Marine Affairs and Fisheries.

- Regency MPA. In order to increase the number, and extent (coverage) of MPAs in Indonesia (a national strategic priority), the Ministry of Marine Affairs and Fisheries encouraged regional governments (termed 'Regencies') to establish and manage local MPAs with their own budget and technical assistance from the central government (i.e. the Ministry). As a result, many Regency MPAs were designated and established from 2004 onwards.
- Community – private sector initiated MPAs. While not all of these MPAs are recognised by the central government, their presence here is usually motivated by economic activities such as fisheries, mariculture, and tourism. In tourism, the growth of surfing and scuba diving in Indonesia has created the incentive for a number of private resorts or commercial tourism operators to establish MPAs. Typically, these MPAs are created solely to protect tourism assets on which the business depends, such as nearby coral reefs (house-reefs) or surf breaks (house-breaks). Many of these protected house-breaks and house-reefs have become ratified by either the central government and/or regency governments into a wider formal MPA

management regime, for example, as found in Wakatobi National Park, Raja Ampat, and in Bali.

II. MPAs that are operational. Basically, this means that the MPAs' management is operational (or at least demonstrates some basic evidence that it is). In addition, during research design and field work phase, Bali province was developing a network of MPAs surrounding the island, but most of them were still in the preparatory stage.

From the above governance approaches, three MPAs representative of each of the three approaches were selected as research sites: (a) West Bali National Park, which is the only national park MPA managed by central government (i.e. the Ministry of Environment and Forestry) present on the island; (b) Pemuteran, an MPA co-managed by the tourism sector and the local community since the mid-1990s ; and (c) Nusa Penida, a district-managed MPA, which started its MPA development process in 2008, and was also the first district MPA established in Bali based on the Indonesian Fisheries Act no 31 (2004). Another important reason to select these MPAs was that each MPA displayed strong interactions among the three components or sectors being examined in this research, namely fisheries, tourism, and conservation.

3.3.2.1. West Bali National Park

The Ministry of Forestry of Indonesia declared West Bali National Park in 1984. The national park is located in northwest Bali (Figure 12), and it is comprised of terrestrial and

MPA with a total coverage of 19,002.89 hectares; this includes 15,588 hectares of terrestrial area and 3,415 hectares of marine area (Ministry of Forestry, 2010). According to the national park management plan (Ministry of Forestry, 2010), the national park is categorised as a multi-purpose protected area and is managed according to zoning systems. There are three key zones for the marine area, these include the following:

1. The core zone, which covers 455 hectares, is the most strictly regulated marine area of the national park. No human induced changes are allowed within this zone.

2. The marine protected zone, which covers 222 hectares, is a buffer zone that allows limited tourism activity.

3. The marine utilisation zone, which covers 2,417 hectares, is allocated to accommodate limited livelihood, cultural, and tourism activities that contribute towards biodiversity conservation. Within this zone, the construction of supporting infrastructures is allowed, subject to park authority regulations.

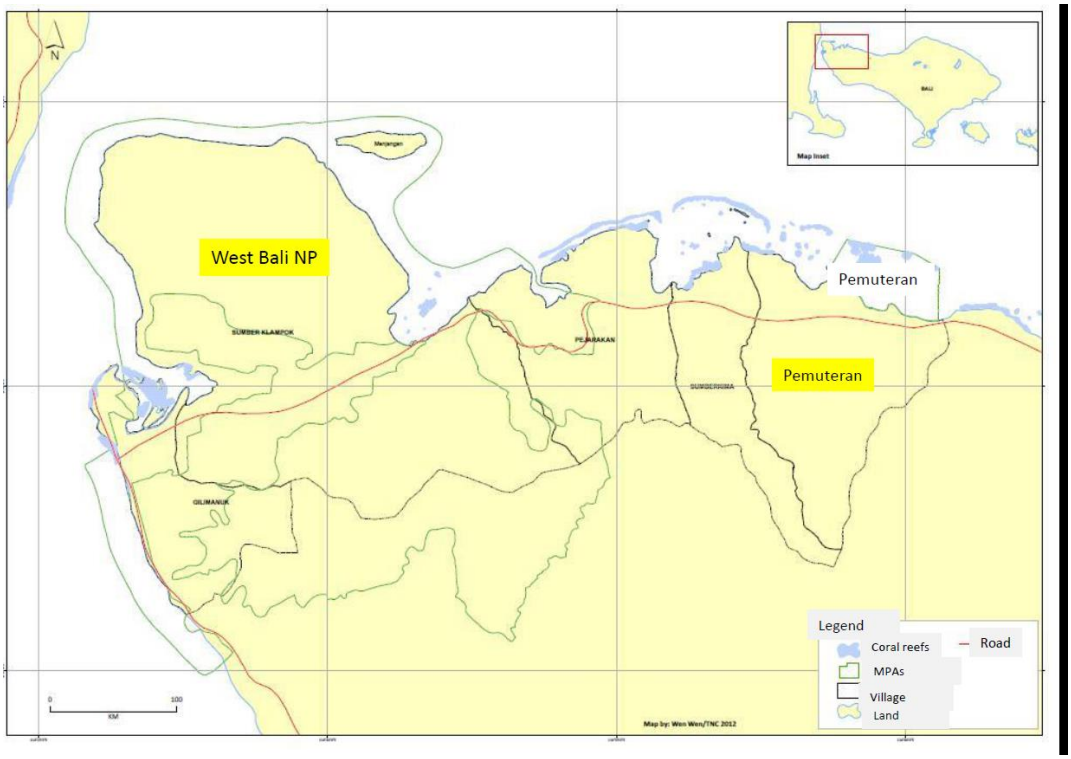

Figure 12. West Bali National Park (top left) and Pemuteran (top right).

Located within and around West Bali National Park, there are six villages with a total population of 38,699 people, of which 603 people were identified as fishers (Ministry of Forestry, 2010), with over 90% of the fishers living in the villages of Gilimanuk and Melaya. In 2012, the total population of all six villages reduced slightly to 37,642; however, fishers dropped significantly to 323 people (BPS Jembrana, 2013; BPS Buleleng, 2013). Motives for fishing included both subsistence and commerciality (McClanahan et al., 2006), with gillnetting and hook-and-line fishing being the common fishing gears used, and fishers had high ownership or access to both motorised and non-motorised fishing vessels. Fishers targeted both demersal species (i.e., bottom dwellers coral reef associated fishes) and pelagic species (*Sardinella* and other small pelagics).

Marine tourism and recreation, such as diving, was introduced in West Bali National Park in the early 1980s (White, 1984), and today the marine area is one of the main diving destinations in Bali (Pickell & Siagian, 2010). Menjangan Island and its surrounding area is one of the popular diving spots in northwest Bali. Divers wanting to visit Menjangan Island enter West Bali National Park from Labuan Lalang to pay a small park entrance fee. The Ministry of Forestry had given three concessions permits to private sectors over the 1998–1999 period to operate resorts within the national park and surrounding area (i.e., outside the park border). The total area managed by these private sectors covered 575 hectares. Table 2 shows tourist arrivals in West Bali National Park for each year from 2000 to 2011.

Table 2. Tourists to West Bali National Park from 2000–2011 (WBNP, 2012)

Year	Domestic tourists	International tourists	Total
2000	11,001	20,168	31,169
2001	21,010	20,895	41,905
2002	19,663	21,008	40,671
2003	56,408	5,148	61,556
2004	38,651	11,278	49,929
2005	35,374	3,660	39,034
2006	14,364	1,222	15,586
2007	3,580	6,181	9,761

Year	Domestic tourists	International tourists	Total
2008	2,745	7,506	10,251
2009	4,726	6,981	11,707
2010	25,136	16,480	41,616
2011	10,141	19,059	29,200

3.3.2.2. Pemuteran

Pemuteran is a coastal village located in Gerokgak, a sub-district of the Buleleng district, northwest Bali, which is about 30 kilometers east of West Bali National Park. The population of Pemuteran village in 2012 was 8,926, comprising 2,279 households with an average of four people per household (BPS Buleleng, 2013). In 2012, there were 366 people registered as fishers, while 600 people worked for the tourism sector. Tourism in the Pemuteran village started in the early 1990s and has since been the biggest contributor to tourism in the Gerokgak sub-district. Tourist arrivals in the Gerokgak sub-district have increased steadily in the past five years (

Table 3). In 2012, there were 28,388 tourist arrivals in Pemuteran; of these, 26,383 were international tourists and 2,005 were domestic tourists, or Indonesians.

Table 3. Domestic and International Tourist Numbers, Gerokgak Sub-district, 2008–2012. Adapted from BPS Buleleng (2013)

Year	Domestic tourists	International tourists	Total
2008	2,993	12,688	15,681

Year	Domestic tourists	International tourists	Total
2009	7,795	22,296	30,091
2010	7905	22,460	30,365
2011	8,012	22,774	30,786
2012	5,016	34,282	39,298

The marine environment in and surrounding Pemuteran Bay features gentle currents and decent diving, suitable for novice divers (Pickel & Siagian, 2010). The village also provides easy access for divers to visit West Bali National Park, and over the past 20 years the number of accommodation facilities has increased from one in the 1990s to 15 in 2012; these include two star-rated hotels, nine non-star-rated hotels, and four guest houses (BPS Buleleng, 2013).

The arrival of tourism investors, hotels, and dive operators in the early 1990s spearheaded marine conservation awareness and initiative in Pemuteran, with various conservation activities including environmental education, construction of artificial reefs, and reef cleaning and removal of coral-eating species, such as *Drupella* and crown-of-thorns starfish (*Acanthaster planci*) (Pickel & Siagian, 2010). The partnership between community and tourism operators (i.e., the resorts and dive operators) resulted in a community-led patrol of the marine resources in Pemuteran Bay since the early 2000s, primarily to deter destructive fishing practices. In 2011, the district of Buleleng designated the 651 hectares of Pemuteran Bay area (DKP Buleleng, 2011) as an MPA for tourism. The official name of the protected area is *Taman Wisata Perairan Buleleng Barat* (West Buleleng aquatic tourism park). This designation is part of Bali's MPA network development (Conservation International, 2012).

3.3.2.2. Nusa Penida

Nusa Penida, the third MPA in this study, is a sub-district of the Klungkung District. The sub-district comprises three main islands, Nusa Ceningan, the smallest of the three, Nusa Penida, the biggest island, and Nusa Lembongan. Total population of the Nusa Penida sub-district in 2012 was 45,806 (BPS Klungkung, 2013). Sub-district statistic data, such as that provided by BPS Klungkung (2013), did not provide an official number of recorded fishers. However, according to one of the key informants for Nusa Penida, there were 829 fishers and 1,600 seaweed farmers. Still, it is important to note that the key informant claimed that these numbers were not accurate, because most fishers also worked on their farms or as seaweed farmers.

The Nusa Penida sub-district is one of the most popular marine tourism destinations in south Bali, with Nusa Lembongan as the sub-district's centre of tourism. Tourism began in the 1970s, while mass tourism operations began in Nusa Lembongan in early 1990 (Long & Wall, 1996). The number of tourists per year visiting the Nusa Penida sub-district in the 2008–2011 period was between 100,000–150,000 (BPS Bali, 2013).

In 2008, a couple of nature conservation organisations facilitated the process of establishing a MPA in Nusa Penida. The district government of Klungkung designated the boundary of Nusa Penida's MPA, which covered 20,057 hectares, in 2010. The MPA was finally declared by the central government in 2014 (GOI, 2014).

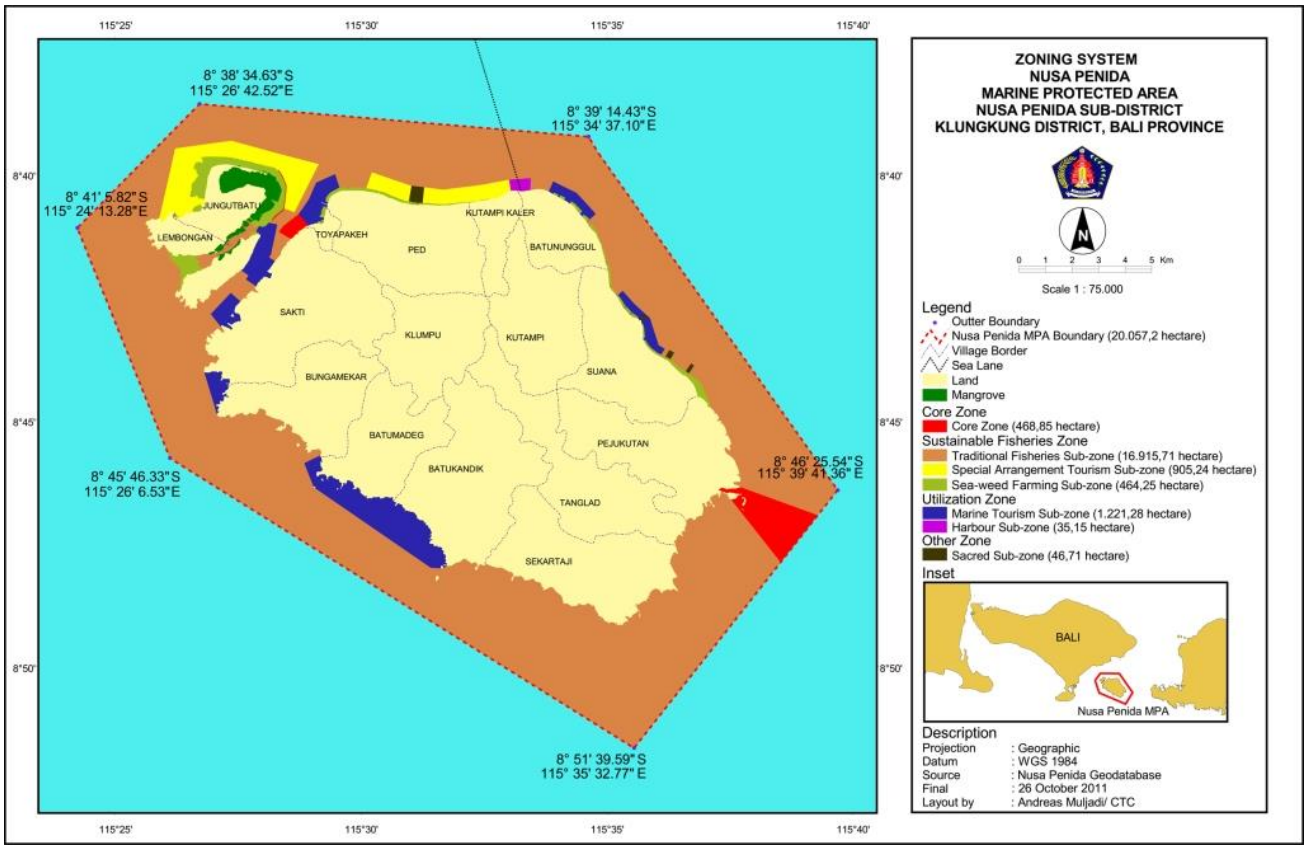

Figure 13. Nusa Penida MPA and its zoning plan (Coral Triangle Center, 2011).

3.3.3. Mixed methods

Mixed methods were used in this research because the use of mixed methods allows the flexibility of combining quantitative and qualitative approaches (Johnson, R.B., & Onwuegbuzie, 2004). The benefit of using a mixed methods approach is to assist the researcher to incorporate insights and understanding that might be missed when only a single method is used and to produce more complete knowledge necessary for informing theory and practice. For this research, I used a convergent parallel design, which is shown in Figure 14 (Creswell & Plano Clark, 2011; Johnson, R.B., & Onwuegbuzie, 2004). According to Creswell & Plano Clark (2011, p.78), this design is an efficient method that permits researchers to collect both quantitative and qualitative data at the same time and to analyse both types of data "separately and independently."

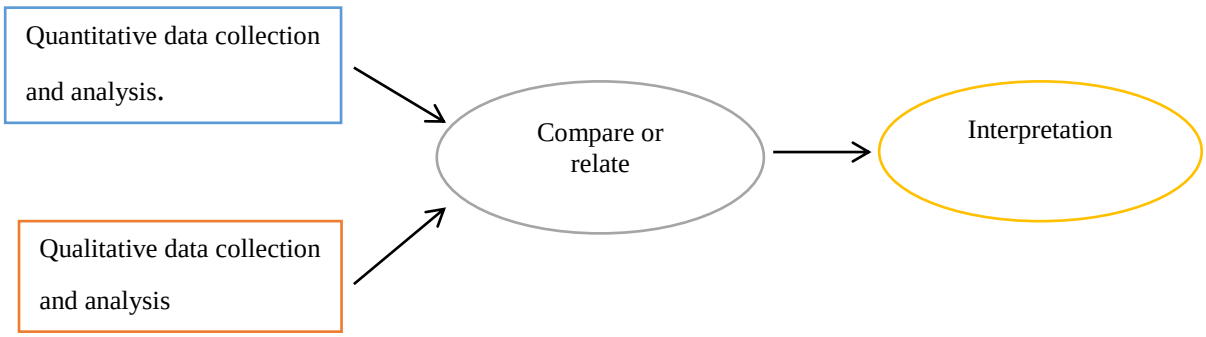

Figure 14. Convergent parallel design.

Adapted from Creswell and Plano-Clark (2011, p.69)

However, Creswell and Plano Clark (2011, p.80) also highlighted several challenges of carrying out convergent design, which include the following:

- It demands effort and expertise.

- Considerations must be made for consequences of different samples and sample sizes.
- Meaningful interpretation of data derived from two different types of data sets must be achieved.
- Quantitative and qualitative results may contradict each other.

To overcome these challenges, I implemented the following measures:

Field work effort and assistance

With respect to field work effort and data collection, I acquired the services of two research assistants, who were both experienced and competent in assisting my research in their respective areas of expertise and experience. These researchers helped me to conduct structured interviews, transcribing work, and supported me in facilitating group interviews. Both research assistants agreed to and signed the research confidentiality agreements as required by AUT's ethical protocols to protect the anonymity of the research participants.

Difference in samples and sample sizes

Different samples and sample sizes between quantitative and qualitative data obtained were planned for and accepted in this research. The nature of the pragmatic paradigm used in this research acknowledged the potential existence of single and multiple realities. As such, it was important to capture the range of participants' perceptions towards certain issues. In the context of understanding fishers' (or research participants') opinions about their changing social-ecological system; this was best done through a combination of quantitative and qualitative approaches, comparing and contrasting data with individuals and groups of individuals. The use of qualitative methods in this research provided more

in-depth knowledge, rich in quality, that otherwise would not have been captured by using a quantitative method alone (Decrop, 2004).

Meaningful interpretation of data derived from two different data sets

Based on the earlier work of the Resilience Alliance (2007a, 2007b), Strickland-Munro et al. (2010) proposed the RAF for examining protected area tourism.

Hence, I used these RAF categories to guide the development of the questions in the structured, semi-structured, and group interviews (or focus group discussions) and to maintain consistency in data collection and analysis. The interpretation of both quantitative and qualitative data referred to these RAF derived themes. The application of mixed methods allowed richer discussion to occur about a particular topic in the focus group interviews; it also helped me to compare, contrast, and explore the contradictions obtained from the data sets.

Quantitative and qualitative data may contradict each other

The application of a convergent mixed method design allows different data sets to be analysed separately and independently. I had anticipated that contradiction between data sets may occur. For example, the results of structured interviews demonstrated an overwhelming rejection from fishers of the idea that fisheries activities may have a negative effect on the marine environment. In contrast, results from the semi-structured interviews and group interviews suggested that (unsustainable) fisheries activities were a factor in the deterioration of the marine ecosystem and, especially in causing a decline of fishing resources. In my 15 years of experience as a marine conservation practitioner in Indonesia, I learned that there is a tendency among fishers, villagers, and even among national politicians or senior government officials to have a naïve perception that fails to take into account the adverse impact of fisheries upon the environment, and especially upon the fish stocks themselves, despite numerous studies that suggest unsustainable fishing activities have led to the collapse of many fisheries in fishing grounds in Indonesia (e.g. Mous et al., 2006; Sangeeta et.al., 2010; Wiadnya et al., 2004). Many Indonesian fishers and other stakeholder groups tend to blame destructive fishing and foreign poachers as the culprit of declining fishery resources failing to understand that all types of fishery can lead to overfishing if there is no control on fishing effort. This demonstrates the anticipated contradiction between the different data sets that I collected.

3.3.5. Reconnaissance and pilot study

3.3.5.1. Reconnaissance

I carried out a reconnaissance survey in each MPA prior the start of my research. The objectives of the reconnaissance survey were to help me understand the area, the people, and logistical requirements for the research. As I was already quite familiar with the area and the people from previous visits in the 1990s and early 2000s, it did not take much to get accustomed to the research sites.

3.3.5.2. Pilot study

Neuman (2007) suggests that it is best practice to carry out a pilot study prior to data gathering. During reconnaissance surveys, I took the opportunity to gain permission from local leaders to conduct a pilot study in one of the research sites (Pemuteran). The pilot study was conducted in Pemuteran on 20 April 2012 to fine-tune the research instruments. During the pilot study, I learned that a self-administered questionnaire was not effective because many participants were unfamiliar and uncomfortable with this format. As a consequence, I amended my approach to ask participants face-to-face the questions from the questionnaire and to record the answers myself. As a consequence, this research instrument is referred to as the *structured interview*. Pilot testing of the additional research instruments proved successful and they were not amended. These are referred to as the *semi-structured in-depth interview* and *focus group discussion*.

3.3.4. Research assistants

I acquired two research assistants to support field work and to assist with the processing of data (e.g. transcribing the results of interviews). Both research assistants agreed to and

signed the confidentiality agreement (Appendix 2 and Appendix 3). One research assistant was Balinese, with previous experience in assisting similar research and working with non-governmental marine conservation organisations in northwest Bali. This assistant was familiar with the area and the communities surrounding West Bali National Park and Pemuteran village. Working with a Balinese research assistant helped me tremendously in gaining access to local communities and leaders, especially during the initial phase when I had to obtain verbal permission before commencing research.

3.4. **Data analysis, validity, and reliability**

I used a convergent data parallel design to implement the mixed methods approach to collect and analyse quantitative and qualitative data. The convergent parallel design is suitable for concurrent quantitative and qualitative data collection, where both methods are equally prioritised, analysis of the data strands is conducted independently, and the results are later mixed for overall interpretation (Creswell & Plano Clark, 2011).

3.4.3. Quantitative data

I coded all quantitative data manually using an excel spread sheet, as is common practice in preparing quantitative data for analysis (Creswell & Plano Clark, 2011; Neuman, 2007). The quantitative data generated from the structured interviews were then processed to provide descriptive and inferential statistical information. For the inferential statistical analysis, I used IBM SPSS software to perform cross-tabulation to compare participants' responses according to the MPAs they were associated with. As the quantitative data are described as categorical data, the contingency table or cross-tabulation calculation provides chi-square values to test the independence of two or more categorical variables (Field,

2013). Results are presented in tables, graphs, and statistical statements in the next chapter of this thesis.

As the data were gathered through a non – probability sampling regime, I performed non – parametric statistical tests, which allow statistical procedures that do not rely on normal distribution of samples (Field, 2013). This helps to ensure the validity of the quantitative data, or the meaningful indicators of the construct being measured based on the scores provided by research participants and to avoid or minimise Type I and Type II errors (Creswell & Plano Clark, 2011)

I worked with an external statistical expert to help with assessing the internal and external validity of the data generated. The results were satisfactory; I was able to demonstrate that I minimised factors that could threaten internal validity, such as participant attrition, selection bias, and maturation of participants, so that I could draw valid and reliable cause and effect relationship from the data.

3.4.4. Qualitative data

I used a digital recorder to record qualitative data from all the semi-structured in-depth interviews and focus group discussions and transcribed them with the support of the research assistants. Except for two semi-structured in-depth interviews that were conducted in English, all semi-structured in-depth interviews were conducted in Indonesian.

Saldana (2009) describes a code in qualitative research as a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data. In this research, the transcripts were the source of data to be coded. I chose manual coding for the qualitative analysis component, based

on practicality and suitability of the data and because the data was relatively manageable and in a semi-structured form (Basit, 2003; Neuman, 2007; Sale, E., 2003).

The nature of the semi–structured in-depth interviews allowed the categorisation of questions that subsequently helps in thematic analysis. These categorisations or groupings of questions were structured and adapted from RAF (Resilience Alliance, 2007a) and in this research are divided into five categories, these are: Marine ecosystem; anthropogenic pressures; MPA, MPA tourism; and expectations. Questions grouped under marine ecosystem probed participants' perceptions regarding the spatial and temporal status and/or conditions of the natural system. These questions allowed participants to describe their perceptions and understanding about the issues surrounding their marine ecosystem. The anthropogenic pressures refer to the questions that investigate participants' perceptions of spatial and temporal changes that might have occurred and the causes of such changes in the marine ecosystem. Questions pertaining to MPA and MPA tourism refer to adaptive learning processes that have occurred such as governance and intervention. The last category is expectation, which refers to transformability or capacity to transform.

The codes generated from the semi-structured in-depth interviews were then grouped into categories, which were later merged into themes. These themes were then organised under relevant descriptive labels for a system and/or issues.

In addition, both the semi-structured in-depth interviews and the focus group discussions generated timeline data (Bunce et al., 2000). The timeline data were useful for assessment of information based on research participants' perceptions, knowledge, and understanding

of the changes that had occurred in their social-ecological system; the timeline was also useful to validate the data provided by the participants.

With regards to validity and reliability of the qualitative data, Creswell and Plano Clark (2011) suggested that the focus should be more on validity than reliability, while Sale (2003) explained that the expression of "trustworthiness" is more appropriate to describe accuracy of the data presented by the researcher and research participants. Reliability, as explained by Creswell and Plano Clark (2011), has little relevance in qualitative research and is only a factor if there is a team of researchers who need to agree on codes to be applied to the transcripts or text. Thus, I focused on the trustworthiness of the data (Sale, E., 2003).

To ensure trustworthiness of the qualitative data for this research, I applied two measures. First, I incorporated non-fishers as research participants to complement or "disconfirm the evidence." Second, I worked with a colleague who had experience in carrying out similar research, had a relevant academic qualification (i.e. held a doctoral degree), and understood the local area. Having a colleague helped in examining and confirming themes and subthemes used for the qualitative data.

3.4.5. Merging the data

The final part of the data analysis was to merge both the quantitative and qualitative data.

As I used consistent categories of questions for both quantitative and qualitative analysis, the convergence of both data strands was straightforward, suitable for presentation in a side-by-side comparison format (Creswell & Plano Clark, 2011). I used the popular

approach of presenting the quantitative results followed by qualitative results in the form of quotes (Creswell & Plano Clark, 2011). This enables commentary that either confirms or disconfirms the quantitative and qualitative findings.

The only difference was that the qualitative results of the semi-structured in-depth interviews and focus group discussions were a lot richer, and they either enriched or contradicted the findings of quantitative information. Similar to semi-structured in-depth interviews, the focus group discussions enhanced information, particularly on the historical and socio-ecological aspects with regard to marine resources exploitation and conservation; they also provided information on fishers' expectations, collectively as a group, for the future state of their social-ecological system.

With regard to validity in mixed-methods research design, Creswell and Plano Clark (2011, p.239) suggest "employing strategies that address potential issues in data collection, data analysis, and the interpretations that might compromise the merging or connecting of the quantitative and qualitative strands of the study and conclusion drawn from combination." They suggested several best practices to enhance the validity of the mixed methods research design, which I attempted to apply consistently for this research. These best practices include the following:

- Addressing data collection issues by drawing quantitative and qualitative samples from the same population to make data comparable.
- Addressing data analysis issues by developing a joint display with quantitative categorical data and qualitative themes, using quotes that match statistical results; using

straightforward transformation (e.g. count of themes), and examining the distribution of scores and considering the use of non-parametric statistics if needed.

- Addressing interpretation issues by attending to each mixed methods question, presenting results in balanced way, using the theoretical lens as a basis for interpretation, and using the theory as stages to connect the stages of the project.

3.5. **Ethical considerations**

3.5.1 Harm

I strictly followed AUT's ethical guidelines to ensure that no harm was done to the research participants and their communities, to my research assistants, or to myself over the course of this research. This research did not employ, nor did it require, any manipulation or deception, as this is highly discouraged in social research (Neuman, 2007). All research participants were over 21 years of age, the acceptable age of maturity by AUT's ethical procedures.

Confidentiality of participants' identities and the information they provided was guaranteed. The research assistants who worked with me during the research had to sign a confidentiality agreement to protect the information of research participants (Appendix 2. Research assistant confidentiality agreement). Codes were used to protect participants' identities.

3.5.2 Freedom

All research participants had the right to withdraw from this research as informed in the research information sheet (Appendix 5) and consent sheet (Appendix 4). I also provided them with my email address and Indonesian phone number, and the email address of

Professor Mark Orams, my primary supervisor, should they wish to enquire about the research and its outcome.

3.5.3. Informed consent

I explained and provided the Indonesian version of the research participant consent form to all participants. If the participants were Balinese and did not speak Indonesian, my research assistant explained the research consent form contents to them and solicited their consent to participate. All potential participants understood that participation in this research was voluntary and they had the right to withdraw their information should they choose to do so.

3.5.4. AUT ethical approval

I applied and obtained ethical approval on 18 November 2011 (Appendix 6) from the Auckland University of Technology Ethics Committee (AUTEC), which is accredited by the Health Research Council of New Zealand. The approval indicated that all research procedures and instruments used complied with AUT's ethical standards and best practices, and also included approval for the research participants consent forms and research assistants' confidentiality agreement.

3.6. Research framework: Connecting research objectives, research instruments, and data analysis.

Table 4 summarises the relationship of research objectives, research instruments used, and the data analysis carried out.

Table 4. Research framework: Connecting research objectives with research instruments and the data analysis.

Questions	Data collection methods	Data analysis
Research question: How do stakeholders perceive the impact of MPA tourism on their social – ecological system?		
Objective 1: How do the stakeholders perceive the conditions of marine ecosystem health?	• Structured interview • Semi-structured in-depth interview • Focus group discussion	• Inferential statistics • Thematic analysis • Comparative analysis
Objective 2: How do the stakeholders perceive the impact of MPA on their social – ecological system?		
Objective 3: How do the stakeholders perceive the impact of tourism on their social – ecological system?		
Objective 4: How do the stakeholders envision the future of their social – ecological system?		

3.7. **Summary**

In this chapter, I justified the use of pragmatism as the research paradigm and discussed the structure of the research that is based on the theoretical lens of the social-ecological system. The application of comparative multi-case study was used, selecting three MPAs with different governance systems, which had a close association amongst the fishery, tourism, and conservation sectors. The use of mixed methods, which was central to my data collection regime, allowed me the freedom to obtain and analyse quantitative and qualitative data strands. Specifically, I used a convergent parallel design that allows for concurrent data collection, independent analysis, and merging of data for interpretation of findings. I briefly discussed the limitations of mixed methods research, especially with regards to its validity and trustworthiness, and provided the solutions used to address these challenges.

Chapter 4: Results and Analysis

4.1. Introduction

This chapter presents the results and analysis of the field data collected from the three case study sites: West Bali National Park, Pemuteran, and Nusa Penida. The collected data were generated from structured interviews, semi-structured in-depth interviews, and focus group discussions. Semi-structured in-depth interview participants held various occupations; they included fishers, religious leaders, tourism operators, and local and central government officials who were involved with marine protected areas and/or tourism management and marine conservation NGOs. Structured interview and focus group discussion participants were entirely comprised fishers from each marine protected area (MPA). The rationale is the fishers would have the most intimate knowledge about the marine ecosystem in the MPA (all participants had been fishing in the local fishing area for 10 years or more). In addition, long-term fishers were present at each of three study sites thus allowing comparisons across the three MPA sites. With respect to the decision to use 10 years or a decade, this period was selected because it is a reasonable time-frame over which the fishers would notice changes that may have occurred in their social – ecological system.

This chapter presents the results according to three case studies or MPA sites. In each case study, the characteristics of the participants, and descriptive statistical information regarding the participants who took part in the three types of research instruments or interviews (i.e. structured interviews, semi-structured in-depth interviews and focus group discussions) are presented. The presentation of results is organised according to the five groups or categories of questions from all three research instruments. These categories are adapted from the Resilience Assessment

Framework (Resilience Alliance, 2007a) and they relate to the well-defined area where there is a strong interaction between the social (or human) system and the ecological (or natural) system. It also looks into the system dynamics, and adaptations that have taken place. The final category is to probe the participants' perceptions regarding the likelihood transformation that will occur in their SES. These five categories are: (i) Marine ecosystem; (ii) anthropogenic pressures; (iii) MPA; (iv) MPA tourism; (v) expectations. Discussion about the rationale of these categories is discussed in the next section.

The semi-structured in-depth interviews, based on a set of questions (Appendix 8), were conducted with key fishers and also including broader stakeholder groups such as tourism operators, NGO and government officials, and community leaders covered the same systems and/or issues discussed in the structured interviews pertaining to the marine ecosystem, social system, marine protected area, marine protected area tourism, and expectations. However, they were able to provide more in-depth information if and when the participants had direct experience or knowledge relating to a particular question(s).

The focus group discussions focused mainly on the historical profile of each study site. Focus group participants informed about key social-ecological events that took place in the past three to five decades. Information some participants gave during semi-structured interviews confirmed information given by other participants, while some information was contradictory. Likewise, the focus group discussions yielded information that both confirmed and contradicted information gathered from structured interviews. They also provided detailed accounts of particular events that took place and/or of the behaviour of particular actors in each study site.

The final section of this chapter presents the comparison of results from the three study sites. It also provides the statistical comparison of the structured interviews based on participants' MPA as well as summaries of the themes generated based on the semi–structured in-depth interviews and focus group discussions. All field work was conducted between March to December 2012. I used Indonesian as the main language to interview research participants, who were mostly Indonesians, with the exception of two Australians, in which English was used during the interview.

4.2. Case Study 1: West Bali National Park

4.2.1. The research participants

4.2.1.1. Structured interviews

There were 131 fishers that took part in the structured interviews

Table 5). All participants claimed fishing was their main occupation, with 42% (n = 55) stating fishing was their only occupation. Of the participants, 90% (n = 117) were 30 years old or older, and 28% (n = 36) of the participants were over 50 years old. Most participants, precisely 97% (n = 127), had fished in the surrounding area for more than 10 years. Only 12% (n = 16) of the participants claimed to be Balinese, with the majority of ethnic Javanese fishers making up 60% (n = 79) of the total participants interviewed. The remaining 88% (n = 115) of participants claimed to be Muslims on an island that is predominantly Hindu. Of the participants, 85% (n = 115) were either born or had lived in their respective villages for more than 10 years.

Table 5. Characteristics of Structured Interview Participants in West Bali National Park.

Characteristics	**Description**	**n**	**%**
Gender	Male	131	100
Age group	20–29	14	11
	30–39	47	36
	40–49	34	26
	50–59	19	15
	>60	17	13
Fishery as main occupation		100	100
Secondary occupation	Seaweed farming	6	5
	Agriculture	17	13
	Tourism	12	9
	Other	41	31
	No other work	55	42
Length of fishing career	1–5 years	4	3
	5–10 years	17	13
	10 years or more	110	84
Income per month	< USD 100	55	42
	USD 100–299	73	56
	USD 300–499	3	2
Religion	Islam	115	88
	Christian	1	1
	Hindu	15	11
Ethnicity	Balinese	16	12
	Madurese	21	16
	Javanese	79	60
	Indonesian-other	15	11
Education level	No formal education	15	11
	Primary school	65	50
	Junior high school	25	19
	High school	25	19

Characteristics	Description	n	%
	Post-high school	1	1
Length of time living in village	Since birth	65	50
	< 5 years	10	8
	5–10 years	10	8
	10–20 years	26	20
	20 years or more	20	15

4.2.1.2. Semi-structured in-depth interviews

Eleven participants took part in semi-structured in-depth interviews (Table 6). Of these participants, four were fishers or heads of fishing groups, one was a national park official, two were Ministry of Forestry officials from Jakarta, one was a tourism operator, and two were dive operators. Both the tourism operator and the dive operators had worked in the area for 15 years or more.

Table 6. Characteristics of Participants from Semi-structured in-depth interviews

No	Key Informant ID	Nationality/ Ethnicity	Status	Location	Relevant MPAs
01	TNBB1001	Javanese	Head of fisher group	Sumber Klampok	West Bali National Park
02	TNBB1002	Javanese	Head of fisher group	Sumberkima	West Bali National Park
03	TNBB1003	Javanese	Fisher/Religious leader (Muslim)	Gilimanuk	West Bali National Park
04	TNBB1004	Javanese	Head of fisher group	Gilimanuk	West Bali National Park
05	TNBB1006	Balinese	West Bali National Park officer	Gilimanuk	West Bali National Park
06	PHKA001	Javanese	Ministry of Forestry officer	Jakarta	West Bali National Park

No	Key Informant ID	Nationality/ Ethnicity	Status	Location	Relevant MPAs
07	PHKA002	Sundanese	Ministry of Forestry officer	Jakarta	West Bali National Park
08	P1001	Australian	Tourism operator	Pemuteran	Pemuteran & West Bali National Park
09	P1003	Balinese-Pemuteran native	Dive operator	Pemuteran	Pemuteran &West Bali National Park
10	Bali1001	Sundanese	NGO	Denpasar	Bali MPA network
11	Bali1002	Australian	Dive operator	Denpasar	Nusa Penida, Pemuteran, & West Bali National Park

4.2.1.3. Focus group discussions

Seven participants took part in the focus group discussions. Out of these seven participants, one participant also took part in a structured interview. All focus group participants were fishers or ex-fishers who had fished in West Bali National Park and/or the surrounding areas.

4.2.2. Data analysis

4.2.2.1. Marine ecosystem

Structured interviews

The majority of the participants indicated that they perceived that fishery productivity and marine ecosystem health had deteriorated in the past decade. Of the 131 participants, 89% (n = 116) believed that fish populations had declined in the last 10 years, while 81% (n = 106) thought the health of the marine environment had also declined in the same period.

Semi-structured in-depth interviews

Most participants regarded coral reefs and ornamental fishes (especially the mandarin fish) as the important habitat and/or species in their marine ecosystem. Fishers, including a dive operator who used to be a fisher, also identified reef fishes as important species of the marine ecosystem, especially economically important reef fishes such as snapper and grouper. Dive operators and government officials, however, perceived turtles and megafauna (e.g., dolphins and sharks) to be important species for West Bali National Park. Research participants and participants who were fishers perceived that the health of the marine ecosystem and the abundance of certain species was much better prior to and during the 1980s compared to the present.

Table 7 presents illustrative examples of participants' comments about the condition of the coral reefs and associated ecosystems as well as illustrating their perceptions of high fishery productivity from 1970 – 1990.

Table 7. Highlights of Participants' Perceptions of West Bali National Park's Marine Ecosystem Health from 1970–1990s

Key Informant	Perception of Ecosystem, Species, and Fishery Productivity
TNBB1001	• *Back then, sharks and dolphins enter the bay area, whale also present, and every day we saw dolphins.*

	• *Fish was easy to find, in* [one fishing trip] *I could get 50–100 kg per day between 5:00 and 11:00 p.m.*
TNBB1002	• *Dugong and sharks were* [commonly] *caught by fishers.* • *Seagrass and mangroves were dense, and fishes were abundant.*
TNBB1003	• *Coral reefs were much healthier.* • *Dugong and sharks used to be plenty prior* [to] *1987.* • *The composition of fish did not change much from 1990s to now.* [However] *the fish population was much higher.* • *Certain species of crabs and sea cucumbers were easy to find in the 1980s and 1990s.* • *In* [the] *1980s mangrove*[s] *was* [were] *thicker and abundant and the trees were taller, but by* [the]*1990s it's* [the density] *declined significantly.*
TNBB1004	• *Between 1976 and 1980,* [fishing] *was easy…it was as if the fishes were lining up row after row.* • *Butterfly fishes were around, and sharks were plentiful.*

Focus group discussions

Participants who took part in the focus group discussions identified two significant periods between 1960 to 1970, when they believed marine ecosystem condition was still good, and the 1980s, in which anthropogenic pressures have started to negatively influence the marine ecosystem health.

1960–1970

Participants were of the view that between the 1960s and the 1970s the coastal and marine ecosystem in West Bali was still of high quality with limited disturbance prior the establishment of the national park (1982). Research participants provided anecdotal information about the weight of targeted species, such as grouper (*Epinephelus* species), that could reach up to 100 kg, and about the high abundance of lobsters, sea cucumbers, and various species of crabs. Marine fauna were reportedly quite diverse and included dugongs, sharks, manta rays, and saltwater crocodiles.

1980s

Local extinction of key habitats (e.g., coral reefs and mangroves) occurred due to overexploitation including destructive activities (e.g. the use of home-made bombs for blast fishing), but indicator species such as sharks, dolphins, and whales were still around.

4.2.2.2. Anthropogenic pressures

Structured interviews

The majority of the participants did not think that fisheries or tourism posed a threat to the marine environment. Of the 131 participants, 85% (n = 112) did not think that fisheries posed a threat to the marine ecosystem. Similarly, 82% (n = 108) did not think that tourism posed any threat to the marine ecosystem.

Semi-structured in-depth interviews

The participants stated that the primary factors influencing changes in their marine ecosystem were destructive fishing (i.e., the use of dynamite and cyanide to fish), overfishing, coral mining, and anchor damage caused by both fishing and tourism boats.

Participants commonly stated that fishers from other areas or non-resident fishers were responsible for these primary factors, but one key informant stated that resident fishers were also to blame for the unsustainable and destructive fishing practices:

> *In the past, initially local fishers performed blast-fishing.* [This was] *before the* [conservation] *regulations were enforced, and because most fishers did not know the* [negative] *impact that* [blast fishing had upon the marine ecosystem]. (TNBB1003)

Furthermore, another key informant admitted that overfishing was also a concern due to the increasing number of resident fishers:

> *That's true we know there are no more fish now, this is the consequence of our actions. There are too many fishers in the sea* [now] *and it is hard to manage* [the fishery]. *Fishers think that the sea belongs to them.* (TNBB1002)

This key informant believed that part of the problem in managing the fishery was because fishers thought the sea belonged to them, and the informant stated that the community and fishing group leaders "were [reluctant] to get into conflicts with the fishers" (TNBB1002), and this added to the difficulty of addressing the overfishing problem.

Research participants from the fishing communities perceived there had been a significant decline of marine ecosystem health in West Bali National Park. The period between 1980 and 1990 was perceived by the fishers to be a critical period, as they believed fishing intensity increased rapidly along with destructive fishing practices. The fishers believed these unsustainable fishery practices led to low fishery productivity, primarily in fishing grounds associated with the coral reefs area. They also perceived dramatic reductions in megafauna, such as sharks, dugongs, and dolphins, in the last two or three decades.

However, several participants also suggested that both fishers and the local community have to be accountable to "take care of the marine ecosystem health." One participant stated that in their fishing community, "some have [had] started to embrace sustainable ways to fish, while others were [just] ignorant."

Participants also perceived that the fishers from outside their MPA were to blame:

> *There aren't many fishers who use gillnet[ting]. Javanese fishers who come and fish here are welcome as long as they do not destroy* [the reefs]. *If they use cyanide and dynamite, we will kick them out.* (TNBB 1002)

Focus group discussions

According to participants in the focus group discussions, there were several incidents in the past, stretching back to 1970s, when unsustainable practices had started to take place. This resulted in the destruction and loss of key important species and/or ecosystems.

Participants observed the use of cyanide for fishing in the 1970s. They also reported that uncontrolled exploitation of mangrove woods led to the disappearance of the mangrove habitat on one of the satellite islands (i.e., Kalong Island) in 1977.

Participants reported a sharp increase in the population of fishers in the 1980s prior the establishment of the national park.

Participants perceived that in the 1990s, targeted sea cucumber species were overexploited and became locally extinct, and sightings of sharks, whales, and dolphins became rare and almost non-existent. In addition, during this time a crown-of-thorns starfish outbreak occurred, plastic waste became abundant, river flooding became more frequent and the population of fishers around Gilimanuk village increased rapidly.

Participants reported that destructive fishing practices incidents decreased in the 2000s. In particular, the use of blast fishing decreased, as it was prohibited after the Bali bombing in 2002 (a terrorism incident at a popular bar that killed many tourists). Participants also observed tourists using spear guns and engaging in spearfishing.

4.2.2.3. MPA

Structured interviews

As the West Bali National Park was established in 1982 by the central government, the majority of the participants interviewed (92 %, n = 120) claimed that they knew of the presence of the

park near their village. However, a lower proportion (69%, n = 91) stated that they understood the purpose of this MPA.

Of the structured interview participants, 90% (n = 118) responded that they supported the purpose of the MPA near their village, while 79% (n = 104) stated that they believe the MPA benefits the fishery. Only 54% (n = 71) thought that the presence of the MPA increased their fishery related income, and 59% (n = 77) of participants stated that the marine protected area authority regularly sought their input.

Semi-structured in-depth interviews

All of the participants were aware of the presence of the MPA. According to these participants, key stakeholders that were important for the MPA included the West Bali National Park Authority, fishing groups, fishers' forum, conservation organisations, traditional village heads, tourism operators, local regency governments in Jembrana and Buleleng, and the provincial government.

The participants provided a range of views about the MPA. Positive views were evidenced by participants commenting on the support and perceived benefits that the MPA had for fishers. The presence of a conservation NGO to assist fishers and the community to manage their marine resources sustainably was also praised. This is evidenced by the following comments:

> *The people*['s] *support for the national park is good. Although there are restrictions within the national park, they still let us find food there.* (TNBB1002)
>
> [The fishers] *perceive the presence of national park is beneficial for them. The national park authority provides guidance and do* [does] *not disturb traditional fishers.* (TNBB1003)
>
> *There are also other conservation NGOs who helped us broaden our understanding and taught us how to fish sustainably.* (TNBB1002)

However, many participants also criticised the West Bali National Park for its approach in managing the MPA. Fishers primarily objected to any effort to limit their fishing grounds or their access to fishing grounds. One participant complained as follows:

> [Access to] *the* [fishing grounds] *for fishers cannot be limited, but destructive behaviours must be dealt upon* [with]. (TNBB1001)

Another participant understood about fishing restrictions being imposed upon them, however, he perceived the regulations of core zones (which are zones within the national park where extractive activities such as fishing are prohibited) were very harsh as evidenced by the following comment:

> *While the fishers understand* [understood] *about the fishing restrictions inside the national park, we objected* [to] *the rules of not allowing us to pass through.* (TNBB 1003)

Another participant was critical about the added value of the conservation NGO in the MPA. This participant stated that a representative from the conservation NGO "[inappropriately] came and told us what we can or cannot do."

Criticism towards zoning allocation was also noted. One participant highlighted the need to allocate more zones for community benefits. He criticised the West Bali National Park Authority for not allocating enough space for seaweed farming, as evidenced in the following comment:

> *There was supposed to be zones for the local community to conduct mariculture, but the national park authority said this* [required a] *permit from the Minister. Until*

today, we never heard anything, nor did the Minister ever [issue] *a permit*. (TNBB1003)

In the early part of the 2000s, various communities and fishing groups were formed and were endorsed by West Bali National Park to help with marine conservation efforts in the area. The national park authority also engaged several members of the community to carry out surveys to inform the rezoning process. However, several participants disagreed with the outcome of this rezoning process; they believed that the second revision of West Bali National Park's zoning plan still lacked community engagement and that not enough information was disseminated.

Focus group discussions

Focus group participants stated that since it was established in the 1980s, the West Bali National Park had never engaged its stakeholders in meaningful discussion about its zoning plan. They considered that even after the zoning plan was revised in the early part of the 2000s, the park's level of engagement with local communities and fishers was still inadequate.

The discussions from the focus group suggested that after the growth of unsustainable fishing practices in the late 1980s, the establishment of West Bali National Park did not contribute much towards marine ecosystem health recovery. One participant was even cynical towards the creation of the park, as evidenced by the following comment:

After the park was established, how come the situation [has] *just gotten worse?*

4.2.2.4. MPA tourism

Structured interview

Structured interview participants offered positive viewpoints regarding tourism benefits in the MPA. Of the participants, 66% (n = 87) believed that the presence of tourism in the MPA

benefited the fishery, and 72% (n = 94) perceived that tourism improved marine ecosystem health.

The structured interviews also showed that 70% of participants (n = 92) believed that tourism provided job opportunities, while only 50% (n = 65) of them thought it increased their income. Regarding tourism socio-economic benefits, 71% of participants (n = 93) believed that tourism increased social harmony in their communities.

Semi-structured in-depth interviews

Several participants thought that tourists, especially westerners, were more appreciative towards marine ecosystem health and hence contributed positively towards conservation efforts in the MPA. This is indicated by the following comment:

> *With tourism, the coral reefs and marine environment have slightly better protection…because tourists* [care more] *about the corals and the fishes* [than we do]. (TNBB1002)

One participant also tried to be realistic regarding the ability of local communities or fishers to take part directly in the tourism sector:

> *If the fishers can be allocated with* [a concession] *to manage tourism and handle tourists, we will be willing to do it. However, there is a perception that if tourists want to* [acquire our services] *we ended* [end] *up avoiding them or decline their requests*. (TNBB1003)

A dive tourism operator vented his frustration with regard to "too many dive operators who either operate illegally or had no standard in providing safe and reliable diving and marine related tourism activities." He also considered that uncontrolled numbers of dive tourism operators operating in a small area negatively impacted marine ecosystem health and gave the example of a bad practice as tourism boats crews deploying their anchors haphazardly, which damaged the coral reefs.

Participant's responses indicated that there was a belief that the tourists and fishers had competing interests. One participant stated that "tourists sometime[s] told fishers not to fish." Local fishers considered this type of view expressed by non-locals to be inappropriate, particularly when some of local communities and fishers believed that "the presence of tourism does not involve local fishers. [There are] only limited benefit[s]for the local fishers, such as tourists who rent [our] boats for the mangrove tour provide [providing] direct benefits for our fishers."

Another aspect of tourism that the communities in the Gilimanuk area did not appreciate relates to what the tourists wear, which was mostly informal and exposes a lot of the body (e.g. bikinis and bare torsos). This created uncomfortable situations for many, predominantly Muslim, fishing communities in and around West Bali National Park. This is evidenced by the following comment:

> *The presence of tourism may deteriorate the moral value of the Muslim community in Sumberkima. As Muslims we had to cover our bodies, but the outside traditions are much more liberal, we have to discuss this thoroughly to get a consensus regarding tourism development in Sumberkima.* (TNBB1002)

Focus group discussions

The focus group discussions yielded no specific information on the subtheme of benefits of MPA tourism for marine ecosystem and fishery.

In the focus group discussions, participants reported that tourism arrived in Gilimanuk with hotels and dive operators starting their businesses in the village and surrounding areas. They noted that the tourism had various positive impacts in West Bali National Park. These positive impacts included many local people gaining improvements in English language skills, obtaining

scuba diving skills, and obtaining tour guiding skills. There was also an increased sense of pride for the area because of the presence of international visitors, a higher awareness of hygiene and waste management, and improvements in the local economy.

On the other hand, participants also perceived that tourism had negative impacts. These negative impacts included a reduction in the fishing grounds area, a corruption of morality, especially among children, as they often observed tourists wearing minimal clothing and revealing outfits, tourists spearfishing illegally at night, and coral damage caused by novice divers and careless anchoring.

4.2.2.5. Expectations

Structured interviews

When asked about their expectations for the future, 55% of participants (n = 72) reported they would consider exiting the fishery and working in the tourism sector if possible, while 88% (n = 105) of participants reported they would prefer their children to work in the tourism sector instead of in fisheries.

Semi-structured in-depth interviews

Participants provided several statements that demonstrate reluctance to work in the tourism industry either for themselves or their children.

> [Working in the tourism sector] *will* [would] *be much better….However, I personally disagree if my children go to the sea* [becoming fishers], *and both my family and I also don't agree if they work in the tourism sector. I much prefer that they work as public servants as long as they don't go* [to] *the sea. The sea is dangerous and pose*[s] *a lot of risks.* (TNBB1001)
>
> *I personally do not have any interest to work in the tourism sector, however I encourage my children to be entrepreneurs, including in the tourism business if that's what they choose. In addition, my friends are interested to join the tourism*

> *business and will be willing to let go their status as fishers. But for some reasons [the fishers] are afraid of the tourists.* (TNBB1003)

Focus group discussions

Research participants perceived that in the future, the marine ecosystem would offer nothing for their livelihood, and as a consequence, the number of fishers would be reduced significantly. They expected all levels of government to offer services and performance to improve community welfare, facilitate the strengthening of community-based organisations, and create job opportunities. Participants envisaged the type of tourism that should exist would feature cultural and culinary experiences, and anticipated that five-star accommodation could be developed in Gilimanuk village.

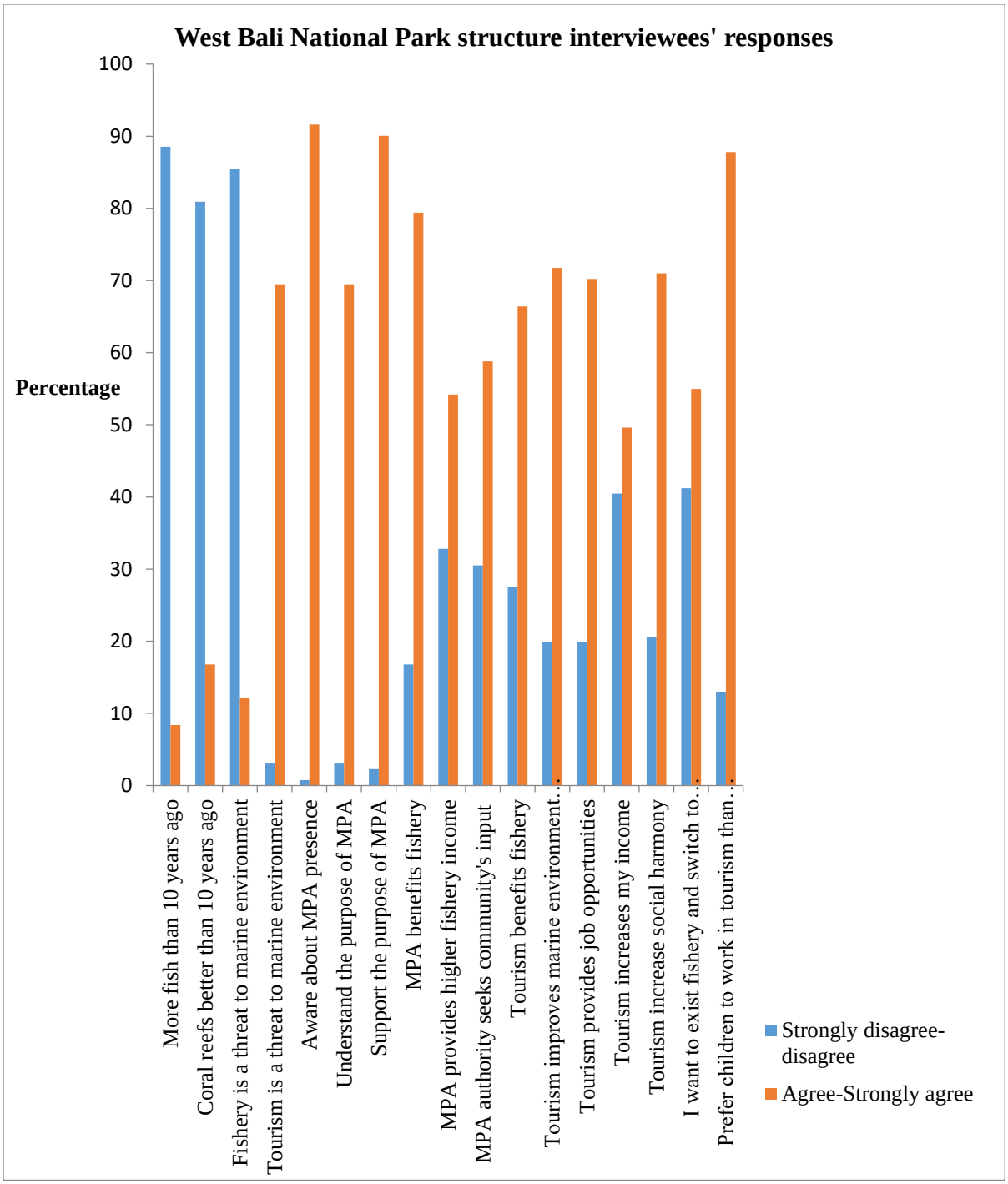

Figure 15. Summary of structured interviews responses in West Bali National Park

4.2.3. Synopsis

- Structured interview participants suggested there was a decline in ecosystem health and fishery productivity in the past 10 years. However, they rejected the idea that fisheries activities and tourism were the causes of ecosystem degradation.
- Information gathered from participants in both the semi-structured in-depth interviews and focus group discussions also provided evidence of perceptions of a reduction of marine ecosystem health and fishery productivity. This was based on their direct observations, experiences, and anecdotal information. These participants also suggested that unsustainable fisheries practices committed by both locals and visiting fishers had contributed towards the decline of marine ecosystem health and fishery productivity. They also believed that tourism contributed to coral reef damage through bad anchoring being practiced by tourism boats. Some participants even accused tourists of having committed illegal activity by carrying out spearfishing in the no-take-zone area.
- While most participants in the structured interviews claimed they knew of the presence of the MPA, a lower proportion of them knew the purpose of the MPA. Several participants believed that the marine protected area authority allowed traditional fishing to take place. However, several others criticised the inflexible approach of the marine protected area authority, which forbade entrance to several areas within its jurisdiction, while others complained that West Bali National Park simply did not implement enough enforcement.
- Structured interview participants had positive views on marine tourism. Participants, however, saw tourism as competing with fishers' interests and as a threat towards the community's moral values.

- A large number of structured interview participants did not want to leave fishery and enter the tourism sector even if it were possible. However, they preferred that their children enter tourism rather than work in the fishery sector. Participants from semi-structured in-depth interviews indicated a similar view of wanting their children to enter tourism rather than fishing for their livelihood in the future.

4.3. Case study 2: Pemuteran

4.3.1. The participants

4.3.1.1. Structured interviews

There were 42 fishers that took part in the structured interviews (Table 8). All participants claimed fishing was their main occupation, with 40% (n = 17) also stating that they worked in the agricultural sector. Of the participants, 86 % (n = 36) were 30 years old or older and 29% (n = 12) were over 50 years old. Most participants (91%, n = 38) had been fishing in the surrounding area for more than 10 years. In terms of ethnicity, 67% (n = 28) claimed to be Balinese, 67% (n = 28) claimed to be Hindu, and 33% (n = 14) were ethnic Javanese, Madurese, and other ethnicities. Most participants (91%, n = 38) were either born in or had lived in their respective villages for more than 10 years.

Table 8. Characteristics of Structured Interview Participants in Pemuteran

Characteristics		**n**	**%**
Gender	Male	42	100
Age group	20–29	6	14
	30–39	13	31
	40–49	11	26
	50–59	8	19
	>60	4	10
Fishery as main occupation		42	100
Secondary occupation	Seaweed farming	0	0
	Agriculture	17	40
	Tourism	7	17
	Other	3	7
	No other work	14	33
Length of fishing	1–5 years	4	10
	5–10 years	3	7
	10 years or more	35	83
Income per month	< USD 100	15	36
	USD 100–299	27	64
	USD 300–499	0	0
Religion	Islam	14	33
	Christian	0	0
	Hindu	28	67
Ethnicity	Balinese	28	67
	Madurese	9	21
	Javanese	1	2
	Indonesian-other	4	10
Education level	No formal education	6	14
	Primary school	30	71
	Junior high school	1	2
	High school	5	12

	Post-high school	0	0
Length of time in village	Since birth	30	71
	< 5 years	1	2
	5–10 years	3	7
	10–20 years	4	10
	>20 years	4	10

4.3.1.2. Semi-structured in-depth interviews

Eleven participants participated in semi-structured in-depth interviews for the Pemuteran MPA, including three dive operators, two tourism accommodation owners, two fishers, and two Buleleng Regency government officials (Table 9).

Table 9. Characteristics of Participants for Semi-Structured In-depth Interviews.

No	Key Informant ID	Nationality/ Ethnicity	Status	Location	Relevant MPAs
01	P1001	Australian	Tourism operator	Pemuteran	Pemuteran and West Bali National Park
02	P1002	Balinese-Pemuteran native	Head fisher	Pemuteran	Pemuteran
03	P1003	Balinese-Pemuteran native	Dive operator	Pemuteran	Pemuteran West Bali National Park
04	P1004	Balinese- non Pemuteran	Accommodation owner	Pemuteran	Pemuteran
05	P1006	Balinese-Pemuteran native	Accommodation owner	Pemuteran	Pemuteran
06	P1007	Javanese	Fisher	Pemuteran	Pemuteran
07	BL001	Bugis	Regency fishery official	Buleleng regency	Pemuteran
08	BL002	Indonesian–non-Balinese	Regency tourism official	Buleleng regency	Pemuteran
09	NPenida001	Indonesian–non-Balinese	NGO	Nusa Penida	Nusa Penida
10	Bali1001	West Javanese	NGO	Denpasar	Bali mpa network
11	Bali1002	Australian	Dive operator	Denpasar	Nusa Penida, Pemuteran, West Bali National Park

4.3.1.3. Focus group discussions

Seven participants took part in the focus group discussions. All of them were fishers or ex-fishers who fished in Pemuteran and/or surrounding areas.

4.3.2. Data analysis

4.3.2.1. Marine ecosystem

Structured interviews

Of structured interview participants, 67% (n = 28) believed that the fishery had been declining in the past 10 years, but 78% (n = 32) believed that coral reefs had improved within the same period.

Semi-structured in-depth interviews

Participants stated that coral reefs were an important habitat, and ornamental fish (e.g., mandarin fish) and turtles were the important species in the marine ecosystem in Pemuteran. Dive tourism operators also highlighted the importance of nudibranchs and sharks as tourist attractions, while the fishers emphasised the importance of edible fishes and commonly targeted fishes such as grouper, snapper, and tuna.

Regarding changes in the marine ecosystem, participants consistently mentioned unsustainable fishing practices, coral mining, and anchor damage as the sources of negative changes leading to ecosystem degradation and reduction of important species, such as sharks and turtles. One informant blamed climate change as a factor negatively affecting the marine ecosystem by causing coral bleaching and subsequent decline in fish population. In addition, the crown-of-thorns starfish outbreak in the 1990s was mentioned. Fishers noted that the declining health of the marine ecosystem in the past two decades had also affected fishery productivity in the

surrounding reefs and fishing grounds, which in turn required fishers to increase their fishing efforts accordingly. The increasing number of fishers sharing the same fishing grounds in Pemuteran and its surrounding areas was also a major concern for the fishers. With respect to positive changes in the marine ecosystem, most research participants considered the arrival of diving tourism in the 1990s as a turning point for marine conservation efforts in Pemuteran. While one participant claimed that the fishers had already noticed the decline of marine ecosystem health and fishery productivity, he believed the arrival of P1001, the dive tourism operator, spearheaded marine conservation actions in Pemuteran.

Table 10. Highlights of Key Informant Perceptions of Marine Ecosystem in Pemuteran MPA

Key Informant	**Perceptions of Marine Ecosystem**
P1001	• *In* [the] *mid-1990s, between '95 to '98, there was a big explosion* [of crown-of-thorns starfish] *and we collected 70,000 cot*s] *in a single year. After '98 we collected probably around 6,000 cot*[s], *so the number* [of cots has] *have decreased* [significantly].
P1002	• *Back then our parents did not need to go far to catch fish, they only needed a line or string of nylon, unlike now, we use tasi, which was* [is] *very expensive.* • *We had plenty of fish to find then, such as anchovies and snappers. There were also many turtles.* • *Sharks were around, they started to disappear in the 1990s.*
P1003	• *Pemuteran fishers targeted edible fish such as snapper, grouper, anchovies,* [skipjack] *tuna, and flying fish. In West Bali National Park* [it] *is quite similar, the only difference is there were a lot more fish there.* • *After the coral bleaching incident, the fishes declined in Pemuteran and also in West Bali National Park.*

Key Informant	Perceptions of Marine Ecosystem
P1007	• *People said that about 20 years ago it was easy to fish around here, even if the fishing had to be done close to shore. Thirteen years ago* [i.e., 1989] *when I started to fish, fishing was easier than now. In those days, catching fish was still easy*.

Focus group discussions

Participants considered that during the period of the 1970s–1980s targeted fishery pelagic species (e.g., *Sardinella* and anchovies) and demersal species (e.g., groupers and snappers) were abundant. During the period of the 1990s–2000s, all targeted fishery species, most notably *Sardinella*, were in drastic decline. From the 2010s onward, the marine ecosystem condition was severely degraded. Demersal species such as groupers and snappers became extremely rare.

4.3.2.2. Anthropogenic pressures

Structured interviews

Of the structured interview participants, 86% (n = 36) did not think that fishery caused any threat to marine ecosystem health, and 81% (n = 34) also believed that tourism was not a threat to marine ecosystem health.

Semi-structured in-depth interviews

According to participants from semi-structured in-depth interviews, unsustainable fishery practices were the primary factor negatively affecting the marine ecosystem, as overfishing and destructive fishing had taken place in Pemuteran over the past three decades, as illustrated by the following comments:

> *As the number of fishers increased, more fishes were also taken out of the sea. There used to be two fishers using gillnet*[ting], *now there are at least seven from this village, not to mention other fishers visiting from different villages.* (P1002)

Other ex-fishers explained how destructive fishing had changed the fishery productivity:

> *Fishers had it easy then to make money from fishing, there were more fish and the coral reefs was* [were] *healthy. Between 1990–1995, there were many more* [fishers] *who started blast and cyanide fishing. After that fishers' catch*[es] *declined* [significantly]. (P1003)
>
> *Due to unsustainable fishing since* [the] *1980s, the marine ecosystem suffered a lot of damage. It got to a point where the fishers had no options to find any work.* (P1002)
>
> *Because of nature, such as climate* [change], *the number* [of] *fish declined and the corals bleached. Human factors also influenced the* [marine ecosystem health], *fishing practices, for example, the use of purse seine,* [cyanide], *bomb, and overfishing*. (P1003)
>
> *There are a lot more fishers now looking for tuna. They came from Bima and Bugis – South Sulawesi. From here to Singaraja* [there are many tuna fishers]. *Many fishers now operate outboard engines. To catch tuna, we have to go three hours to the deeper area. If there is no tuna, I look for reef fishes in the nearshore coral reefs area.* (P1007)

Focus group discussions

In focus group discussions, participants reported that during the period of the 1970s–1980s, the fisher population and the village population was small. By the period of the 1990s–2000s, blast fishing was rampant and peaked after 1998. Fishery income dropped drastically and the number of fishers increased. From 2010 onward, there were more than 7,000 people in Pemuteran, and the number of fishers was reduced to just about 40% of what it had been previously as many went to work in farming because fishing was no longer enough to fulfil household needs.

4.3.2.3. MPA

Structured interviews

Of the structured interview participants, 83% (n = 35) were aware of the presence of the MPA close to their village, and 64% (n = 27) stated that they understood the purpose of the MPA.

Eighty-one percent (n = 34) of the participants believed that the MPA benefits the fishery, and 62% (n = 26) stated that it increased fishery related income. However, only 40% (n = 17) thought that the MPA authority regularly sought their input for management.

Semi-structured in-depth interviews

According to participants in semi-structured in-depth interviews, marine conservation and the approach to establish the MPA in Pemuteran was initiated by dive tourism operators. The motivation driving the establishment of the MPA was to secure a marine tourism destination in the village. For example, one fisher (P1002) who supported the establishment of the MPA believed that it would benefit fishery productivity and be part of the solution to limiting destructive fishing practices that was blamed on fishers from neighbouring villages. Another fisher (P1003) liked the idea of an MPA, stating that it "allows marine tourism to thrive, which in turn opens up job opportunities for fishers, who now can be involved in tourism." However, another fisher (P1007) was not convinced about the benefit of an MPA; this fisher thought it was there only to benefit marine tourism and claimed the presence of the MPA limited fishers' fishing grounds.

According to some participants, the arrival of marine tourism in Pemuteran, especially the arrival of the marine tourism operations provided by P1001 and accommodation provided by P1004, that promoted marine ecosystem protection and community development had brought about positive changes towards the social system and the marine ecosystem. These marine tourism pioneers improved, if not created, an adaptive learning process within the village community by initiating an MPA to conserve the marine ecosystem and facilitate the development of a code of

conduct in marine tourism as well as in tourism in general for Pemuteran. This is illustrated in the following comment:

> *We decided to protect the sea, without really knowing how to protect the coral reefs*, [so we did it] *by reporting misbehaving fishers to the police to apprehend the dynamite and cyanide fishers. And we also persuaded fishers in the village to stay away from destructive fishing practices.* (P1002)

Focus group discussions

Participants in the focus group discussions perceived that the benefits of the MPA must be prioritised for the villagers and fishers. They know that the protected area (or no take zone) is located in front of the resorts. They did not mind about MPA and its coverage because most of them fish in the deeper area beyond the MPA boundary. But they did not exactly know about the objectives of the MPA.

4.3.2.4. MPA tourism

Structured interviews

Of the structured interview participants, 57% (n = 24) believed that tourism in the marine protected area benefits fishery, while 69% (n = 29) thought that it improved marine ecosystem health.

Only 36% (n = 15) believed that tourism improved their income, but 86% (n = 36) believed that tourism provided job opportunities. Just over half of the participants (57%, n = 24) agreed or strongly agreed that tourism in the marine protected area improved social harmony in their village.

Semi-structured in-depth interviews

Results from semi-structured in-depth interviews with participants showed that participants' perceptions of tourism were generally positive. As mentioned previously, most participants saw tourism as helpful for conservation action and awareness in Pemuteran, and perceived that it also brought job opportunities for the villagers. One ex-fisher who had been in charge as head of a fishing group and also worked security for one of the leading resorts in Pemuteran, commented as follows:

> *The villagers are more interested to work in the tourism* [sector] *than* [the] *fishery sector because there is a guarantee of monthly income.* (P1002)

Another participant who was an accommodation owner highlighted:

> *In* [the] *1990s most people had to go out of this village to find work. Now they have returned because the village is more developed, and the young people who finished their studies can easily find work here because there are varieties of tourism enterprises.* (P1006)

But the research participants also had some doubts and concerns about tourism's impact on their social and ecological system. Several research participants complained that tourism "drives land prices up" and people who owned land were easily tempted to sell it to tourism investors, subsequently using the money "for partying and gambling" or the purchase of ostentatious goods. Another participant blamed tourism as a main contributor towards the water shortage and the drying up of freshwater wells in the village.

> [During the] *dry season there is no water and already we see problems* [because there] *are too many hotels took* [that take] *so much water, and the local people's shallow well are* [is] *drying up and going salty so they can't use it. So fresh water is a problem.* (P1001)

Pemuteran' s attraction as a marine tourism destination, especially for scuba diving and snorkelling, had attracted many dive operators to either establish operation in the area or visit the area regularly. One participant commented on some of the negative impacts as follows:

> *There are many illegal dive operators operating in Pemuteran. The government must intervene so this won't create* [an] *unhealthy business environment. The government must conduct sweeping against dive operators without permit*s *because the local village or Banjar does not have the mandate to carry out sweeping.* (P1003)

Other dive operators, such as P1001 and P1002, agreed that dive operators who were not from Pemuteran, including those who set up their operations in Pemuteran illegally or without a proper permit, had created inequity for those dive and other tourism operators who contributed towards the stewardship of the marine ecosystem daily.

One fisher was not enthusiastic towards tourism, citing the following reason:

> *I think tourism is compatible with fishery,* [and] *I support the presence of hotels, but their presence never benefits fishers*. (P1007)

Even a proponent and pioneer of tourism in Pemuteran believed that tourism had a negative impact on the fishers:

> *The fishing grounds normally frequented by local fishers to catch fish are now slightly changed* [due to conservation and tourism]. (P1004)

This tourism pioneer believed the changing fishing grounds would drive fishers to look for work on land and abandon fishing completely. As a result, there would be less fish in the market, leading to higher fish cost. He proposed dedicated fishing zones in Pemuteran allocated for local fishers.

Pemuteran tourism operators and several other research participants believed that P1001, and to some extent P1004, were the pioneers for both the MPA and marine tourism in this village. The

introduction of marine tourism, especially scuba diving, initiated marine conservation in Pemuteran, and P1001 was the first scuba dive operator who saw the potential for tourism to be developed in the early 1990s, but at the same time, also noted the degradation of marine ecosystem health due to unsustainable fishing practices. This is illustrated in the following comment:

> *Had it not been for dive tourism to come here and stop the destructive* [fishing practices], *this* [tourism destination] *would never* [have] *existed*. (P1001)

P1001, in partnership with P1004, initiated conservation awareness by holding dialogues with the local fishers, villagers, and traditional leaders as well as showing documentary films to show the importance of the coral reefs system for healthy fish stock. From the outset, these two pioneers shared a similar vision of the type of tourism to be developed in Pemuteran, which included protection and rehabilitation of the marine ecosystem and a family- and spiritual-oriented (e.g. meditation and yoga) tourism destination.

Participants provided contrasting comments regarding the role of tourism in shaping the social system in Pemuteran village. Decreased poverty and increased job provision were suggested as the benefits of tourism for this village as the following quotes illustrate:

> *In 1989, a Pemuteran villager could only eat once a day. The men* [had] *to go away to look for money, and come back to* [their wives] *and kids just for the weekends.*
>
> [Tourism] *reduced unemployment. It improved* [the local] *economy. Before, you can* [could] *count with your fingers the number of motorbikes and cars in this village; now* [almost all] *households have one.*

However, one of the pioneer tourism operators in Pemuteran had a different opinion regarding the influence of tourism in this village. He believed tourism had eroded some of the traditional influences that used to be very strong in this village, as the following quote shows:

> *I think* [the presence and roles of *banjar* and *adat*] help [the communities] *a lot, because it ties* [the villagers] *together. But I think, it's being eroded to some extent, and tourism has something to do with it.* (P1001)

He also noticed that the growth of tourism seemed to diminish community spirit:

> *Well, the village* [used to] *function much more as a community, they had* "*gotong royong*" [a collaborative spirit] *and the village* [and the Banjar] [was] *were doing much more to run things in the village, but* [after many] *years it seems to have change*[d] *a lot. Now they* [the village and the Banjar] *are more concerned about money.* (P1001)

> *In the first decade of tourism in Pemuteran* [1990–2000], [the villagers] *had a lot less but people seemed much happier. Life was simpler for them, and even though they had nothing they still managed to smile a lot.* [It was a very] *friendly atmosphere around here.* (P1001)

Focus group discussions

Research participants believed tourists who visited Pemuteran had a genuine interest in protecting the marine ecosystem.

Focus group participants suggested that the economic impacts of tourism were limited in the western part of Pemuteran, as investors were only interested in the eastern part of the village. They were interested in participating in the tourism sector but realised they did not have the adequate skills, especially in English communication, to do so.

4.3.2.5. Expectations

Structured interviews

Of the structured interview participants, 60% (n = 25) did not want to leave fishery and enter tourism should it be possible to do so; however, almost all (98%; n = 41) wanted their children to take employment in the tourism sector instead of fisheries.

Semi-structured in-depth interviews

P1007 stressed his lack of desire to work for the tourism sector. He said, "If I work in the resort then my boat will just sit idle." While he found life as a fisher was getting harder and income from the tourism sector could be substantially higher and more reliable, he claimed that if he was given the option to exit fishery, he would still choose to be a fisher simply because of the freedom that he enjoyed being a fisher. However, he stated that he hoped for his children not to be a fisher like him, but to find "work with steady" income, if it was not in the tourism sector.

Focus group discussions

Research participants believed that they could not expect to live from being fishers anymore in the future. However, they also thought that if all villagers worked in tourism, they could not expect Pemuteran fishers to still be granted fishing access. The research participants also expected the government to create alternative livelihoods, and trusted that their *adat* (customary) institution would always work for their best interests. Participants felt that not everyone could work for the tourism sector, and fishers must be given enough area to fish.

4.3.3. Synopsis

- Structured interview participants noticed a decline in fishery productivity in the past 10 years. They did, however, state that the condition of coral reefs improved during the same period. Participants did not consider fisheries or tourism as a threat to marine ecosystem

health. In contrast, participants from the key informant in-depth interviews and focus group discussions suggested that both unsustainable fisheries and tourism threatened marine ecosystem health.

- Participants in the structured interviews demonstrated that they had high levels of awareness about their MPAs. The presence of tourism operators spearheaded the creation of a small MPA in Pemuteran and awareness of marine conservation. Participation of local communities, especially of the *adat*, in marine conservation was thought to have influenced wide constituent support for the protection of marine resources. Several participants in semi-structured in-depth interviews and the focus group discussions did not really understand the purpose of the marine protected area. They considered that it was just used as a tool to enhance the aesthetic appeal of the village's marine ecosystem for tourism interests only.
- In general, participants in the structured interviews perceived marine tourism as beneficial for both the marine ecosystem and the social system. Contrasting views among participants, however, existed about the benefits of tourism for the social-ecological system. Proponents of tourism stated job creation, improvements in standard of living, and better protection of marine resources as demonstrative of the benefits. Opponents stated that community spirit had diminished, and the influence of the *adat* had been affected by the money-driven community. The presence of illegal dive operators was also a concern as they did not contribute much for conservation and increased the risk of damage to the coral reefs as well as overcrowding.
- A high number of participants in the structured interviews indicated that they did not want to leave fishery to take jobs in the tourism sector if that were possible. However, they would

rather have their children work in the tourism sector than work in fishery. Semi-structured in-depth interviews and focus group discussions with key informant fishers confirmed similar findings with the structured interview participants. They still expected access to fishing grounds to be made available for fishers in the future as not all of them could take jobs in the tourism sector.

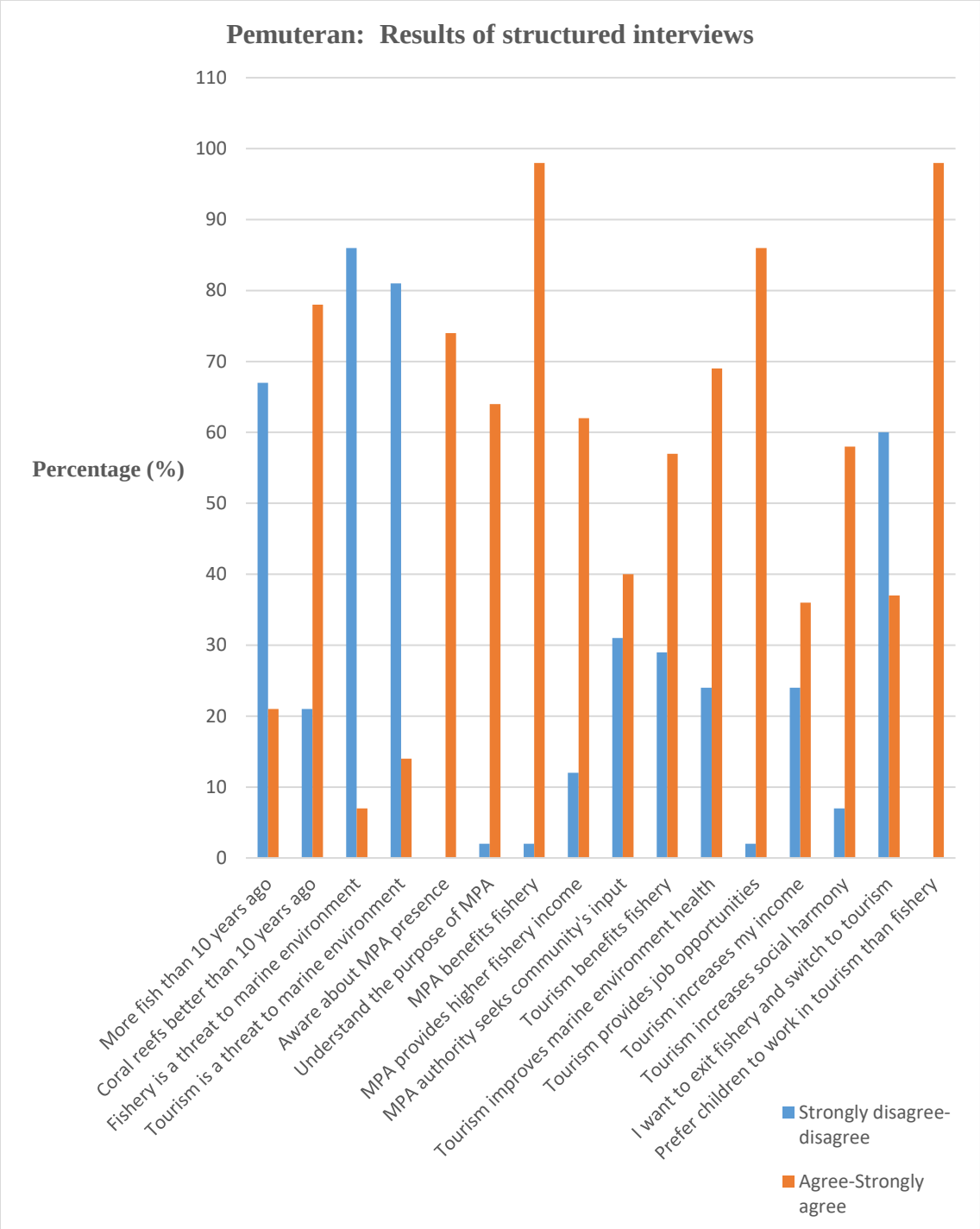

Figure 16. Summary of structured interview responses in Pemuteran.

4.4. Case Study 3: Nusa Penida

4.4.1. The participants

4.4.1.1. Structured interviews

There were 57 fishers that took part in the structured interviews (Table 13). All participants claimed fishing as their main occupation, with 42% (n = 24) also stating that they worked as seaweed farmers. All participants were 30 years old or older, and 40% (n = 23) of the participants were over 50 years old. In terms of how long they had been fishing, 91% (n = 52) of the participants had fished in the surrounding area for more than 10 years. All participants were ethnic Balinese, followed the Hindu faith, and had lived in the village since they were born.

Table 11. Characteristics of Structured Interview Participants in Nusa Penida.

Characteristics		**n**	**%**
Gender	Male	57	100
Age group	20–29	0	0
	30–39	15	26
	40–49	19	33
	50–59	20	35
	>60	3	5
Fishery as main occupation		57	100
Secondary occupation	Seaweed farming	24	42
	Agriculture	3	5
	Tourism	17	30
	Other	8	14
	No other work	5	9
Length of fishing	1–5 years		
	5–10 years	5	9
	10 years or more	52	91
Income per month	Less than USD 100	6	11
	USD 100–299	44	77
	USD 300–499	7	23
Religion	Islam	0	0
	Christian	0	0
	Hindu	57	100
Ethnicity	Balinese	57	100
	Madurese	0	0
	Javanese	0	0
	Indonesian-other	0	0
Education level	No formal education	6	11
	Primary school	33	58
	Junior high school	6	11

Characteristics		**n**	**%**
	High school	10	18
	Post-high school	2	4
Length of time in village	Since birth	57	100
	Less than 5 years	0	0
	5–10 years	0	0
	10–20 years	0	0
	20 years or more	0	0

4.4.1.2. Semi-structured in-depth interviews

Of the seven participants that took part in the semi-structured in-depth interviews, two belonged to conservation NGOs, one was an Australian dive operator, and the rest were fishers.

No	Key Informant ID	Nationality/ Ethnicity	Status	Location	Relevant MPAs
1	NPenida001	Indonesian– non-Balinese	NGO	Nusa Penida	Nusa Penida
2	NPenida002	Balinese– Nusa Penida native	Fisher	Nusa Lembongan	Nusa Penida
3	NPenida003	Balinese– Nusa Penida native	Fisher	Jungut Batu	Nusa Penida
4	NPenida004	Balinese– Nusa Penida native	Fisher	Nusa Penida	Nusa Penida
5	NPenida005	Balinese– Nusa Penida native	Fisher	Samayana	Nusa Penida
6	Bali1001	West Javanese	NGO	Denpasar	Bali MPA Network
7	Bali1002	Australian	Dive operator	Denpasar	Nusa Penida, Pemuteran, West Bali National Park

4.4.1.3. Focus group discussions

Of the seven participants that took part in the focus group discussions, all were fishers or ex-fishers who fished in Nusa Penida and/or surrounding areas.

4.4.2. Data analysis

4.4.2.1. Marine ecosystem

Structured interviews

Of the structured interview participants, 74% (n = 42) believed that fishery productivity had declined in the past 10 years, whereas 51% (n = 29) believed that the health of the coral reefs had improved over the same period.

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Semi-structured in-depth interviews

According to participants, coral reefs, mangroves, seagrass, edible pelagic fishes, such as *tongkol* or mackerel tuna (*Euthynnus affinis*), and ornamental fishes, as well as megafauna (e.g., sharks, sunfish (*Mola mola*), dolphins, manta rays, and whales) were the key habitats and species that are important for fishery and tourism.

Focus group discussions

Participants reported that in the 1970s–1980s, the marine ecosystem was in good condition, fishing was easy, and target pelagic fish, such as tuna and mackerel, as well as demersal species, such as grouper, were abundant and easy to catch. The typical catch size of red snapper was about 3 kg. During the period of the 1990s–2000s, fishing became harder and the yield started to decline along with fishing derived income. Research participants noted that blast fishing started in the 1998–1999 period. This was also the period when blast fishing occurred in high intensity in Bali Barat and Pemuteran.

4.4.2.2. Anthropogenic pressures

Structured interviews

Of the structured interview participants, 98% (n = 56) rejected the idea that fisheries were a threat to marine ecosystem health, and 88% (n = 50) thought that tourism was a threat to marine ecosystem health.

Semi – structured in-depth interviews

Participants believed that changes to the marine ecosystem were influenced by fishery, marine tourism, waste disposal, and unregulated coastal development. They believed that damage to the marine ecosystem was caused by destructive fishing and overfishing, as well as by careless

anchoring techniques, which damaged corals, and construction of water platforms (pontoons) for marine tourism activities.

Participants in the semi-structured in-depth interviews reported that increased fishing pressures from the 1990s and onward had created fishery collapse in the Nusa Penida fishing grounds. One informant (NPenida005) stated, "Between 1991–2000 it was good to be fishers. In a month we can [could] get up to 10 tons of fish." He blamed overfishing using gillnets that targeted spawning fishes as the source of fishery collapse, and observed drastic decline in fishery catches after 2008. NPenida005 estimated a 60% reduction in catches that caused over 50% of fishers to abandon fishing. Fishers' incomes from fishery had also declined steadily, as illustrated by the following comment:

> *In 2009,* [a] *fisher's income used to be 400,000 rupiah* [the Indonesian currency] *per month, now we have nothing. And now fishers gamble* [if they want] *to fish, luckily, they also own piece*[s] *of land to farm; they can't rely completely to be fishers.* (NPenida005)

Seaweed farming was introduced in the late 1970s by a government sponsored program to help alleviate poverty on the island. It turned out to be a successful livelihood and many islanders adopted the seaweed farming practices. Today, according to NPenida001, there are about 1,600 seaweed farmers out of a total population of 4,600 people in Nusa Penida. The use of plastic bottles in seaweed farms is common and contributes to waste problems, which creates problems both ecologically and aesthetically. In addition, Bali1002 stated that seaweed farming is to blame for the erosion that occurred on the island.

Mass tourism started to take place in Nusa Penida by the late 1980s, and marine tourism that featured scuba diving to observe sunfish and manta rays became popular as the number of dive tourists steadily increased in the mid-1990s and beyond. The arrival of tourism in Nusa Penida created jobs and wealth for the islanders. Bali1002 believed that tourism in general created positive net effects for the local communities in Nusa Penida and in other areas like Pemuteran and West Bali National Park. However, Bali1002 was critical about the waste disposal problems that tourism created in Bali's marine tourism destinations, including Nusa Penida. He also criticised the lack of visitor management to avoid overcrowding in popular dive sites, such as Crystal Bay, that created ecological and safety issues. Bali1002 stated that tourism had caused land prices to increase rapidly on Nusa Penida and the surrounding islands, and the land owners became rich and reinvested their money in tourism enterprises that had substandard qualities. He believed that these tourism benefits would soon become liabilities, as they would negatively impact the quality and experience of Nusa Penida as a tourism destination.

Some fishers, such as NPenida005, believed that tourism activities such as careless scuba diving could damage coral reefs caused by accidental trampling, but he thought that tourism brought more benefits than costs to Nusa Penida's communities and marine ecosystem. He also did not worry that fishers would lose access to their fishing grounds due to competition with tourism.

4.4.2.3. MPA

Structured interviews

Of the participants, 96% (n = 55) stated that they supported the purpose of the MPA, 91% (n = 52) and believed that it benefits the fishery, and 79% (n = 45) thought that the presence of the

MPA increased income from fishing. In terms of the marine protected area authority seeking input from the community, 86% (n = 49) believed that the marine protected area authority regularly sought the community's input.

Semi-structured in-depth interviews

Participants reported that the concept of an MPA in Nusa Penida was quite new and was promoted by a Bali-based conservation NGOs. NPenida001 explained that although his conservation NGO had introduced the concept of an MPA to the local communities, the local government, and the marine tourism operators, it took them 33 stakeholder meetings to build agreement on the idea of establishing an MPA in Nusa Penida. The Klungkung Regency endorsed the idea and issued a decree and budget allocations in 2010 dedicated to supporting MPA activities. Key members of the community provided their support in kind by donating their time and efforts at community meetings and related events. Bali1002 welcomed the idea of an MPA for tourism in Nusa Penida, but criticised the marine protected area tourism development process facilitated by NPenida001. According to Bali1002, the process encouraged lower quality tourism products and services to thrive in an already overcrowded tourism destination, which threatened the safety and experience of this popular marine tourism destination.

The presence of an MPA was expected to address barriers to conservation and sustainable development, such as government bureaucracy, conflict among resource users, most notably between fishers and tourism operators, and lack of awareness about the marine environment among the local population.

Adat (traditional rule) plays an important part in Balinese Hindu society on Nusa Penida. Proponents of the marine MPA, such as conservation NGOs and the Klungkung Regency

government worked closely with the local *adat* leaders to ensure the goals and objectives of the MPA were compatible with local customs or *adat*. In fact, the *adat* in Nusa Penida has already protected a small part of the marine area. In this area, fishing is prohibited because it is considered sacred, and fishers are bound to observe *adat* and religious ceremonies in their village or *banjar*.

NPenida005 compared Balinese fishers and other ethnic groups from Indonesia:

> *Balinese fishers' efforts are limited to our adat obligations, unlike other Indonesian fishers who can go on fishing journey*[s] *for extended period*[s], *Balinese fishers have to fulfil their religious and adat commitment*[s], *so we can't go very far from this island*. (NPenida005)

In addition, NPenida001 explained that in Nusa Penida, the local *adat* observed what they refer to as *nyepi segara* once a year every October, which is intended to give the marine ecosystem a break, and all activities in the marine area are prohibited. The presence of *adat* rules encouraging conservation and local community adherence to the *adat* created relatively easy partnerships between marine protected area promoters, the local community, and *adat* leaders. Key informant fishers in Nusa Penida strongly supported the idea of a no-take-zone and the establishment of the MPA in their marine district.

<u>Focus group discussions</u>

Focus group discussion participants conveyed their strong support for the establishment of the MPA. They felt that the zoning plan was adequate and that they were properly consulted during the stakeholder review process. They also thought conservation would give net benefits for the seaweed farmers, and participants were also beginning to see that the fish population was rapidly increasing.

4.4.2.4. MPA tourism

Structured interviews

Of the structured interview participants, 77% (n = 44) believed that the presence of tourism benefited fishing, while only 56% (n = 32) thought that tourism improved marine ecosystem health. While 91% (n = 52) of the structured interview participants believed that tourism provided job opportunities, 68% (n = 39) believed that it improved their income. Seventy-two percent believed that tourism helped to increase social harmony in their communities.

Semi-structured in-depth interviews

Tourism is a major part of the Nusa Penida MPA, and it is concentrated primarily on Nusa Lembongan. Bali1002 suggested that the construction of pontoon facilities by several leading tourism operators to accommodate visiting tourists and day trippers from mainland Bali has seriously damaged the coral reefs in Nusa Penida. Overcrowding in several popular dive sites poses risks to the marine ecosystem and public safety, which in turn will affect tourists' experience.

NPenida005 believed that tourism activities such as careless scuba diving could damage coral reefs by accidental trampling, but he thought that tourism brought more benefits than costs to Nusa Penida's communities and marine ecosystem.

To address the challenges and consequences of unsustainable tourism practices, NPenida001 stated that his conservation NGO managed to facilitate the development of a code of conduct for diving and observing fragile species, such as *Mola mola* and manta rays, and assisted dive operators in Nusa Penida to adopt this code of conduct.

Semi-structured interviews with participants revealed that tourism operators are very diverse in terms of scale (e.g., small, medium, or large), location (e.g., marine vs. land), and the owners' ethnicity (e.g., Nusa Penida, Balinese, Indonesian, or foreign). They are financially significant and have substantial power to influence property prices in Nusa Penida. They are, however, disorganised; according to NPenida001, it is difficult to manage tourism in Nusa Penida for two reasons. First, there is a lack of authority on these islands, and second, there is no tourism association that can facilitate dialogue to build a common vision among tourism operators in Nusa Penida.

Focus group discussions

Focus group participants did not identify any major issue pertaining to tourism's impact on the marine ecosystem. They also did not see any pressing issue between marine tourism and their professions as fishers or seaweed farmers. In general, participants believed the benefits of tourism outweighed the costs. They believed there were minor problems associated with tourism, such as waste disposal. However, they were convinced that such issues would be overcome.

4.4.2.5. Expectations

Structured interviews

Of structured interview participants, 42% (n = 24) did not want to switch to tourism even if it were possible for them to do so, while 35% (n = 20) wanted to take the option. The majority of participants 89% (n = 51) preferred that their children seek employment in tourism rather than in fishing.

Semi-structured in-depth interviews

In semi-structured in-depth interviews, participants signalled that the difficulty nowadays was with fishers, as with the presence of tourism on their island, they hinged their future hopes on tourism. While some of them believed they may not be suitable for work in the tourism sector, they did not wish for their children to follow their footsteps and become fishers or seaweed farmers, as evidenced by the following quote:

> *Given the option to be fishers or working* [work] *in* [the] *tourism sector, obviously we preferred* [prefer] *to work in the tourism sector. Whatever happened* [happens], *my kids cannot be fishers and I will do whatever I can within my power so they can be farmers or office workers, but not fishers. My motto is I don't want to let* [allow] *my kids to be fishers. Because to be fishers* [a fisher] *here are* [is] *difficult.*

Focus group discussions

Research participants compared their past and present quality of life. They used the following indicators as measures of progress:

- The quality of their house — in the past, they had dirt floors and presently had properly tiled floors.
- The number of motorbikes — uncommon in the past, but presently commonly owned by just about everybody.
- Education opportunities for their children — access to educational opportunities was low in the past, but is now wide open as people can obtain university degrees.
- Food adequacy — in the past they had to find fruits in the mangrove forest, but food is currently adequate.

Based on the above indicators, the research participants believed that their social trajectory was improving, especially as educational opportunities were widely available for their children.

People, especially the young, were getting better education, and the educated preferred to work in tourism rather than in seaweed farming or fisheries.

4.4.3. Synopsis

- Structured interview participants indicated a decline in fishery productivity. The semi-structured in-depth interviews and focus group discussions with participants validated this finding. The structured interview participants, similarly to those in Pemuteran, believed that coral reef health had improved considerably in the past decade. Similar to participants in the other two MPAs, the structured interview participants believed that neither fishing nor tourism posed a threat to the marine ecosystem. Results of interviews with participants and results from focus group discussions suggested that unsustainable fishing did occur, although participants mainly blamed fishers from the neighbouring island of Lombok for the destructive fishing practices that were committed in the fishing grounds surrounding Nusa Penida. Participants believed that tourism was to some extent causing damage to the marine ecosystem, particularly from the construction of pontoons and the use of careless anchoring techniques.
- Research participants widely understood and supported the presence of the MPA in the Nusa Dua district. The strong and respected *adat* institution that also produced measures compatible with conservation goals made forging a partnership between the marine protected area authority and the *adat* a strategic decision.
- In general, structured interview participants viewed tourism as beneficial for both the marine ecosystem and the social system. However, popular island destinations such as the Nusa Penida district had attracted many dive operators, which often created

overcrowding issues, especially on popular dive sites. Participants believed that the effects of overcrowding would have wide-ranging implications for animal welfare (e.g., for the welfare of manta rays and *Mola mola* as featured animals often sought after by scuba divers), marine ecosystem health, and public safety. Eventually, this would negatively affect Nusa Penida as tourist destination. To address these problems, one participant conservation NGO had facilitated best practices for tourism operators, and together with various dive and boat operators, created a code of conduct for watching wildlife to ensure the welfare of the animals and the safety of tourists or visitors was not compromised.

- Despite the declining fishery productivity, Nusa Penida fishers still wanted to retain their profession as fishers, even if it were possible for them to take up jobs in the tourism sector. Similar to fishers in the other two MPAs, the fishers in Nusa Penida preferred that their children work in the tourism sector instead of following in their footsteps and becoming fishers.

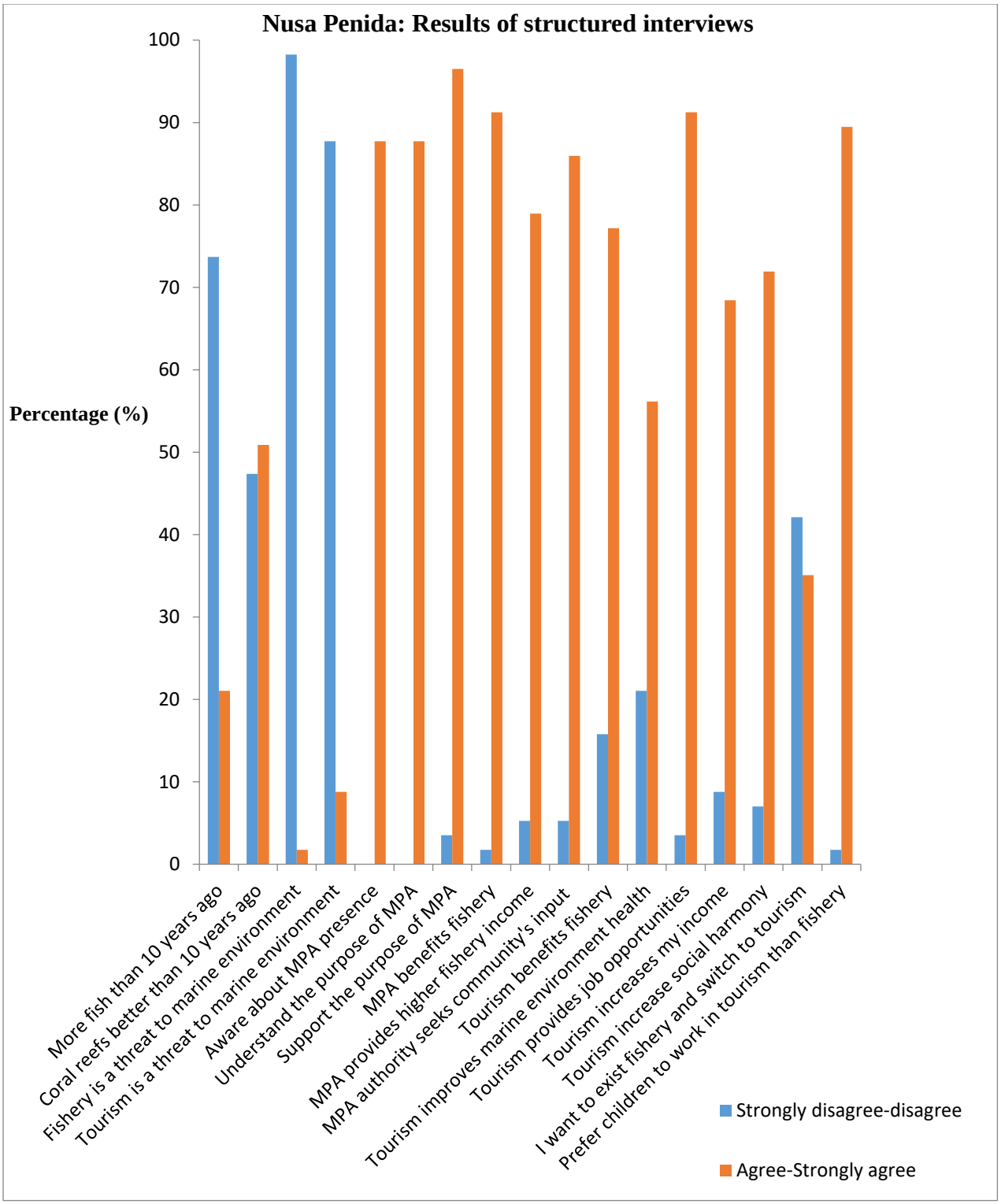

Figure 17. Summary of structured interviews responses in Nusa Penida

4.5. Comparison of the three study sites

This section will present summary of themes generated from the qualitative data analysis from the three study sites. The semi-structured in – depth and focus group discussion data were grouped according to their corresponding categories, i.e. marine ecosystem, anthropogenic pressures, MPA, MPA tourism, and (participants') expectations.

Comparisons were carried out to compare participants' responses from structured interviews according to the categories. Cross-tabulations were performed based on participant responses according to their MPA locations

4.5.1. Summary of corresponding systems/issues

Marine ecosystem

Information pertaining to the marine ecosystem explained key features of the marine species and communities that participants considered important for ecosystems in general and their livelihood (e.g. fishery and/or tourism). Marine ecosystem discussion refers to the health of the ecosystem using the status of coral reefs as its proxy, and the population of fish correlates to fishery productivity. In all three MPA sites, participants reported significant (and unwanted) changes have occurred in their marine ecosystem in the past two to three decades. A common theme developed from this interview or category was 'declining marine ecosystem health'.

Anthropogenic pressures

Discussion under this category provided information related to the marine ecosystem. Increasing fishing pressures, which included overfishing and destructive fishing practices, were widely reported by participants in all study sites. However, participants also reported that tourism

contributes towards marine ecosystem degradation. The theme generated from these data is "unsustainable exploitation of marine resources".

MPA

Data gathered pertaining to MPA system measures informed participants' awareness about the presence of MPA and its purpose, their level of support, perception of MPA's benefits for fishery their income (especially related to fishery), and the level of engagement of MPA authorities. This information produced a theme of "knowledge and attitude about MPA".

MPA tourism

Participants' perceptions towards tourism in their MPA suggested that it has both positive and negative consequences for the social and (marine) ecological system. Participants acknowledged the benefits that tourism brought into SES which included: Contribution towards improvement in ecosystem health and fisheries, influence in increasing job opportunities, income, and social harmony. Likewise, participants also noted that tourism had cost implications for their marine ecosystem and local communities. In this category, there are two themes that emerged, they are: "Benefits of tourism", and "threats of tourism".

Expectations

The discussion under the expectations categories sought to probe participants' aspirations regarding their MPA for their future. Most, if not all, participants perceived the ability to provide livelihood as their priority. However, all participants perceived that their source of livelihood from fisheries will not be the same for the future generation. This category produced

two themes: "Livelihood for the present generation"; and "livelihood for future generations". the data.

Table 12 summarises the themes generated from the data.

Table 12. List of Corresponding system/issues and Themes from Structured Interviews

Corresponding system/issue(s)	Themes
Marine ecosystem	1. Declining marine ecosystem health
Anthropogenic pressures	2. Unsustainable exploitation of marine resources
Marine protected area	3. Knowledge and attitude about MPA
MPA tourism	4. Benefits of tourism 5. Threats of tourism
Expectations	6. Livelihood for the present generation 7. Livelihood for the future generations

4.5.2. Marine ecosystem

At all three study sites participants disagreed with the statement "There are higher fish populations in my fishing ground than 10 years ago." However, there were significant differences ($L\chi 2$ (10, n = 229) = 20.590, p=0.024) when comparing the level of disagreement across the sites. Eighty-eight percent (88%, n = 116) of participants in West Bali National Park disagreed or strongly disagreed, compared to sixty-seven percent (67%, n = 28) in Pemuteran and seventy-three percent (73%, n = 42) in Nusa Penida (see Appendix 12. Structured interviews cross - tabulation data based on

Table 13). A significant difference (L*X2 (*8, *n* = 229) = 65.578, p=0.00) was also found in participants' responses to the statement: "The coral reef health condition in my fishing ground is better than 10 years ago." Eighty-one percent (81%, *n* = 106) of West Bali National Park participants strongly disagreed or disagreed with the statement, in comparison to only twenty-two percent (21%, *n* = 9) in Pemuteran and forty-seven percent (47%, *n* = 27) in Nusa Penida

Table 13). Thus, the majority of Pemuteran and just of half of Nusa Penida participants indicated that they perceived that coral reef conditions in their respective MPAs had improved.

Semi-structured in-depth interviews and focus group discussions in all three MPAs were consistent with these results with a predominant view that there had been declining fishery productivity in their fishing grounds in the past decade at least. However, with respect to perceptions on coral reef health, only participants from West Bali National Park indicated that they perceived that there had been a decline in coral reef health in their fishing ground.

4.5.3. Anthropogenic pressures

There was a consistent response across all three sites to the level of agreement/disagreement to the statement "Fishery is a threat to the marine environment." Ninety-eight percent (98%, *n* = 56) of participants in Nusa Penida disagreed or strongly disagreed with the statement, in comparison to eighty-five (85%, *n* = 112) in West Bali National Park and eighty-six percent (86%, *n* = 36) in Pemuteran (Table 13). However, despite this consistent disagreement there was a significant difference ($L\chi 2$ (10, *n* = 229) = 27.776, p =0.002) in these responses. In contrast, there was no significant difference ($L\chi 2$ (10, n=229) =9.646, p=0.472) in participants' responses to the statement: "Tourism is a threat to the marine environment." Eighty-two percent (82%, *n* =108) of participants in West Bali National Park disagreed or strongly disagreed with the statement, in comparison to eighty-five (85%, *n* = 35) in Pemuteran, and eighty-eight percent (88%, *n* = 50) in Nusa Penida (Table 13).

Participants who participated in semi-structured in-depth interviews and focus group discussions in West Bali National Park and Pemuteran suggested that fisheries activities, primarily destructive fishing practices, caused significant damage to the marine ecosystem. In Nusa Penida, the participants blamed fishery-related problems on the neighbouring fishers from Lombok; according to participants, these fishers still carried out unsustainable fishing practices surrounding their islands.

Regarding perceptions of tourism inducing threats to the marine ecosystem, participants in West Bali National Park and Nusa Penida mentioned that anchor damage from tourism boats was the source of the problem. In all MPAs, the participants also blamed growing numbers of dive operators, who were either unregulated or practiced unhealthy competition by offering low prices to their visitors. One particular dive operator criticised these unregulated diving industries as he felt they contributed to overcrowding, damage to the environment, and safety issues.

Table 13. Cross-tabulation of participants' responses according to their MPA location pertaining to themes of declining marine ecosystem health and unsustainable marine practices.

Themes	**Indicators**	**Participants** **MPA location**
Declining marine ecosystem health	More fish than 10 years ago	s.d. (Lχ2 (10, *n* = 229) = 20.590, p=0.024)
	Healthier reef than 10 years ago	s.d. (Lχ2 (8, *n* = 229) = 65.578, p=0.00)
Unsustainable exploitation of marine resources	Fishery is a threat to marine environment	s.d. (Lχ2 (10, *n* = 229) = 27.776, p =0.002)
	Tourism is a threat to marine environment	n.s.d. (Lχ2 (10, n=229)=9.646, p=0.472)

Note: s.d. denotes significant difference; and n.s.d denotes no significant difference.

4.5.4. MPA

The majority of participants at all sites were aware of the presence of the MPA. However, there was a significant difference (Lχ2 (8, *n* = 229) = 16.723, p = 0.033) in participants' responses to the statement: "I am aware about the presence of marine protected area." Ninety-two percent (92%, *n* =92) of participants in West Bali National Park agreed or strongly agreed with the statement; compared to eighty-five percent (85%, *n* =35) in Pemuteran and eighty-eight percent (88%, *n* =50) in Nusa Penida.

Similarly, there was a significant difference (Lχ2 (10 n = 230) = 26.269, p = 0.003) in participants' responses to the statement: "I understand the purpose of marine protected area." Eighty-eight percent of participants in Nusa Penida (88 %, *n* = 50) agreed or strongly agreed with the statement, compared to sixty-nine percent (69%, *n* = 91) in West Bali National Park, and sixty-four percent (64%, *n* = 27) in Pemuteran (Table 14).

The responses of participants from semi-structured in-depth interviews and focus group discussions were consistent with the responses from structured interviews regarding knowledge of the MPAs surrounding or close to their villages. Several participants in West Bali National Park and Pemuteran were sceptical about the purpose of the MPA or accused the marine protected area authority of only benefitting tourism.

There was no significant difference ($L\chi 2$ (6, n = 229) = 16.083, p = 0.109) in participants' responses to the statement: "Marine protected area benefits fishery." Ninety percent (90%, n =118) of participants in West Bali National Park; ninety percent (90%, n =37) in Pemuteran; and ninety – six percent (96%, n =55) in Nusa Penida all stated agreed or strongly agreed with this statement.

However, there was a significant difference ($L\chi 2$ (10, n = 229) = 29.395, p = 0.001) in participants' responses to the statement: "Marine protected area provides higher fishery income." Seventy-nine percent (79%, n = 45) of participants in Nusa Penida agreed or strongly agreed to this statement, in comparison to sixty-three percent (63%, n = 26) in Pemuteran and fifty-four percent (54%, n = 71) in West Bali National Park. There was also a significant difference ($L\chi 2$ (10, n = 229) = 46.369, p = 0.000) in participants' responses to the statement: "Marine protected area management authority seeks input from community." Five percent (5%, n = 3) of Nusa Penida participants disagreed or strongly disagreed with the statement, in comparison to thirty-one percent (31%, n = 40) in West Bali National Park and thirty-two percent (31%, n = 13) in Pemuteran.

The results of semi-structured in-depth interviews and focus group discussions with participants did not yield indicators that suggested MPA influences towards fishery income. However,

regarding the marine protected area authority's engagement with key stakeholders, participants in Nusa Penida seemed content with the active level of engagement committed by the marine protected area authority and its partners, whereas in West Bali National Park and Pemuteran, the participants had mixed feelings towards their respective marine protected area authorities. In addition, participants in Pemuteran and Nusa Penida stated the importance of *adat* in their traditional life, including in the governance of marine resources. The presence of *pecalang laut* in Pemuteran is a manifestation of *adat* roles and contribution in marine conservation management in that village. In Nusa Penida, a special or sacred zone has been allocated, which is intended for spiritual worship, and *segara nyepi*, a dedicated day where no activities are allowed in the marine area, is observed; all of this is compatible with conservation initiatives and goals for both MPAs.

Table 14. Cross-tabulation of participants' responses according to their MPA location pertaining to marine protected area theme and subthemes: Knowledge of marine protected area and attitude towards marine protected area.

Themes	**Indicators**	**Participants** MPA location
Knowledge of marine protected area	Aware of MPA presence	s.d. Lχ2 (8, n = 229) = 16.723, p = 0.003
	Understand the purpose of MPA	s.d. Lχ2 (10 n = 229) = 26.269, p = 0.003
	Support MPA purpose	s.d. Lχ2 (10 n = 229) = 26.269, p = 0.003
Attitude towards marine protected area	Marine protected area benefits fishery	n.s.d. Lχ2 (6, n = 229) = 16.083, p = 0.109
	Marine protected area improves fishery income	s.d. Lχ2 (10, n = 229) = 29.395, p = 0.001
	Marine protected area authority regularly seeks input from community.	s.d. Lχ2 (10 n = 229) = 46.369, p = 0.000

4.5.5. MPA tourism.

MPA tourism and marine ecosystem health

There was no significant difference (L$\chi 2$(10, n = 230) = 10.142, p = 0.428) in participants' responses to the statement: "Tourism in marine protected area benefits fishery." However, there was a significant difference ($\chi 2$ (8, n = 230) = 27.956, p = 0.000) in participants' responses to the statement: "Tourism in the marine protected area improves the health of the marine environment." Seventy-two percent (72%, n = 94) and sixty-nine percent (69%, n = 29) of participants in West Bali National Park and Pemuteran, respectively, agreed or strongly agreed with the statement in comparison to only fifty-six percent (56%, n = 32) in Nusa Penida.

Generally, participants from semi-structured in-depth interviews and focus group discussions considered tourists, especially international tourists, to be environmentally educated with high awareness of and support for the upkeep of the marine ecosystem. In Pemuteran, participants highlighted and appreciated the contribution and initiative toward protecting the coral reefs ecosystem that pioneer tourism operators offered. However, participants were critical of the performance of many reckless dive operators who were indifferent to the management of the marine area, as was the case in Pemuteran. Participants were also critical of the competition that led to overcrowding, as highlighted by one dive tour operator in Nusa Penida. Several focus group discussion participants in West Bali National Park also accused tourists of having performed spearfishing inside the no-take-zone, which forbade all forms of extractive activities.

MPA tourism and local communities

There was a significant difference ($L\chi 2(8, n = 230) = 22.28, p < 0.00$) in participants' responses to the statement: "Tourism in marine protected area provides job opportunities." Two percent (2%, $n = 1$) of participants in Pemuteran and four percent (4%, $n = 2$) in Nusa Penida disagreed with the statement, in comparison to twenty percent (20%, $n = 26$) in West Bali National Park.

There was a significant difference ($L\chi 2$ (10, $n = 230$) = 42.62, $p = 0.00$) in participants' responses to the statement: "Tourism in marine protected area increases my income." Fifty percent (50%, $n = 65$) of participants in West Bali National Park and sixty-eight percent (68%, $n = 39$) in Nusa Penida agreed or strongly agreed with the statement, in comparison to only thirty-six percent (36%, $n = 15$) in Pemuteran.

There was a significant difference ($L\chi 2$ (10, $n = 230$) = 35.72, $p = 0.00$) in participants' responses to the statement: "Tourism in marine protected areas increases social harmony in my village." Seven percent (7%, $n = 3$) of participants in Pemuteran and in Nusa Penida (7%, $n = 4$) disagreed or strongly disagreed with the statement, in comparison to twenty-one percent (21%, $n = 27$) in West Bali National Park.

Table 15. Cross-tabulation of participants' responses according to their MPA location pertaining to marine tourism theme and its subthemes: Benefits for ecosystem and fishery and benefits for social system.

Subthemes	Indicators	Participants MPA location
Benefits for ecosystem and fishery	Tourism benefits fishery	-
	Tourism increase marine ecosystem health	s.d
Benefits for social system	Tourism provides job opportunities	s d
	Tourism increases my income	s.d
	Tourism tourism increases social harmony	s.d

4.5.6. Expectations

There was a significant difference (L$\chi 2$ (10, n = 230) = 37.22, p = 0.00) in participants' responses to the statement: "I want to exit fishery and switch to tourism." Sixty-one percent of Pemuteran participants (61%, n = 25) disagreed or strongly disagreed with the statement, in comparison to forty-one percent (41%, n = 55) in West Bali National Park and forty-two percent (42%, n = 24) in Nusa Penida.

There was a significant difference (L$\chi 2$ (10, n = 230) = 44.80, p = 0.00) in participants' responses to the statement: "I prefer my children to work in tourism than in fishery." One hundred percent (100%, n = 42) of Pemuteran participants agreed or strongly agreed with the statement, in comparison to eighty-eight percent (88%, n = 115) in West Bali National Park and eighty-nine percent (89%, n = 51) in Nusa Penida.

Table 16. Cross-tabulation of participants' responses according to their MPA location pertaining to expectation theme.

Sub-themes	Indicators	Participants MPA location
Fishers	Wanting to exit fishery and switch to tourism	s.d
Children	Prefer children to work in tourism than fishery	s.d

4.5.7. Synopsis

- Perceptions of declining fishery productivity in the past 10 years was a consistent view in all three case study sites, particularly in West Bali National Park. While fishers in Pemuteran and Nusa Penida claimed there was an improvement of coral reef health in their respective MPAs, fishers in West Bali National Park reported a decline in coral reef health.
- The majority of research participants who took part in the structured interviews at the three case study sites rejected the idea that fisheries and tourism posed a threat towards marine ecosystem health; Nusa Penida fishers had the highest percentage of participants who expressed this view. Results from participants and focus group discussions at the three case study sites contradicted the results from the structured interviews, as participants suggested that fisheries and tourism indeed posed a threat to marine ecosystem health.

- Participants in Nusa Penida expressed the highest rate of comprehension regarding the purpose of the MPA, and Nusa Penida had the highest percentage of participants agreeing with the idea that the MPA provided higher fishery derived income compared to participants from the other case study sites. Fishers from Nusa Penida also expressed the highest agreement with regard to being regularly consulted by the marine protected area authority and/or its appointed partners or agencies.
- Participants in Nusa Penida also expressed the least agreement regarding the benefits of tourism for marine ecosystem health. Participants in West Bali National Park expressed the highest disagreement regarding tourism's contribution to job opportunities and social harmony in their villages.
- Fishers in Pemuteran, regarding expectations to exit fishery and enter the tourism sector, had the highest percentage of respondents disagreeing with the idea of switching to tourism, but the highest percentage of respondents agreeing with the statement that they would prefer their children join the tourism sector instead of choosing to become fishers.

4.6. Summary

This chapter presented quantitative and qualitative results of the interviews in all three study sites. The interviews were grouped into five categories of questions, and the resulting data generated eight themes, which were analysed and compared. Quantitative comparison based on the structured interviews was also performed to assist with the data analysis.

Chapter 5: Discussion

5.1. Introduction

This chapter discusses the findings presented in the results chapter. The discussion is based on the seven themes generated from participant interviews that cover five categories of issues. The discussion is structured on how each theme relates to each MPA and is summarised with comparative discussion. The chapter concludes with a proposed research contribution for SES knowledge based on the examples of three MPAs case studies in Bali but with generic applicability to other MPAs in Indonesia and other developing countries.

5.2. Declining marine ecosystem health

5.2.1. West Bali National Park

Results of structured and semi-structured interviews showed that most of the fishers surveyed, as well as the fishers who participated in the focus group discussion, perceived significant decline in marine ecosystem health. They perceived this based on the local extinction of several species and/or the reduction of the population abundance of particular species. An overwhelming number of fishers also saw major reductions in key habitat features such as coral reefs and mangroves. These perceptions fit the broader picture of declining marine ecosystem health throughout Indonesia (Cesar et al., 1997), and across the coral triangle region (Burke et al., 2011) such as in Papua New Guinea (Cinner & McClanahan, 2006) and in the Philippines (Lavides et al., 2009).

Fishers' reluctance to acknowledge that their fishing activities negatively impacted the marine ecosystem is quite common (e.g. Edgar, Bustamante, Farina, & Calvopina, 2015). This is

demonstrated by fishers who took part in the structured interviews and who overwhelmingly indicated that they did not see the connection between fisheries and the loss of habitat and species. However, fishers who took part in the semi-structured in-depth interviews and focus group discussion participants admitted that they themselves were responsible for the marine ecosystem degradation in West Bali National Park.

5.2.2. Pemuteran

Fishers who took part in the structured interviews believed that the condition of coral reefs was better than 10 years ago before the creation of the Pemuteran MPA. This was a time when a lot of reefs were damaged by blast fishing using home-made dynamite. However, McClanahan et al. (2006) compared the condition of reefs inside and outside the Pemuteran MPA and did not find any difference in reef quality. In contrast, an unpublished report by Welly et al. (2016) indicated that the hard coral reef cover in the area was moderate (i.e. hard coral cover of 47%). An explanation for perception of improved reef quality by the fishers may be the coral reef rehabilitation project (the "Biorock Project") which has been implemented in the Pemuteran MPA (Figure 19). One of the tourism operators also suggested that overall ecosystem health had improved remarkably since marine ecosystem protection started in the mid-1990s. While the efficacy of artificial reef rehabilitation work is still uncertain (Romatzki, 2014), the mere appearance of artificial reefs and other human-made underwater structures (e.g. statues) may shape perceptions of the general public and the fishers about marine ecosystem recovery. Nonetheless, over two-thirds of the fishers who took part in the structured interviews perceived there were less fish in their fishing grounds compared to a decade ago. Similarly, the results of semi-structured in-depth interview participants noted a decline in local fish populations as well

as in other important species such as sharks and sea turtles. This perception was consistent with the survey carried out by McClanahan, Marnane, Cinner, and Kiene (2006) and Mustika et al. (2013).

Figure 18. Damaged coral reefs due to bomb fishing

Picture courtesy of Agung Pramana

Figure 19. Biorock coral rehabilitation project with a deity statue. Coral nubbins are attached to the structure, which receives electric current to increase mineral accretion.

Picture courtesy of Agung Pramana

5.2.3. Nusa Penida

The results of the semi-structured in-depth interviews and focus group discussions with participants revealed a widespread view that there had been extensive human-induced damage to coral reef habitats and reductions in catch numbers and/or sizes of targeted fish over the previous two decades. Similarly, fishers who took part in the structured interviews perceived a decline in fishery yield from their surrounding fishing grounds. However, these same fishers also believed that, overall, coral reef health was improving. It was not clear whether the establishment of the MPA in 2010 (GoI, 2010), and the strong marine conservation campaign launched by an environmental NGO from mainland Bali in 2006 had influenced fishers' perceptions about coral reef health in this MPA. An unpublished report by Welly et al. (2016), who worked closely in

the area and monitored the health of the coral reefs using hard coral cover as the main indicator, did suggest that there was significant improvement of hard coral reef coverage in Nusa Penida's MPA.

5.2.4. Comparative discussion

With regards to the perception of declining marine ecosystem health, previous findings have confirmed that coral reef and mangrove habitat degradation has occurred due to coral mining, blast fishing, and illegal harvesting of mangrove tree wood in West Bali National Park from the late 1970s and early 1980s (Polunin et al., 1983). There was little to no evidence, in terms of bioindicator performance (e.g., coral reef coverage and fish population), that established or managed MPAs such as West Bali National Park and Pemuteran were better than non- managed sites (McClanahan et al., 2006). The very limited number of economically-targeted coral reef fishes found around Bali by Mustika et al. (2013) suggested that the nearshore marine ecosystem in Bali has been subjected to negative anthropogenic pressures, mainly through fishery activities, for over 40 years, and this suggests that the degradation of Bali's marine ecosystem, including at the three study sites, has been widespread and substantial. While this thesis was not intended to determine the past, present, or future state of the social-ecological system in each of the study sites, data from research participants and previously published and unpublished literature about Bali's marine ecosystem conditions from early 1980s (e.g. Pollunin et al., 1985) to 2011 (McClanahan et al., 2005; Mustika et al,, 2011) provide compelling evidence that Bali's marine ecosystems have deteriorated to a point where they have permanently changed. That is, their original ecosystem thresholds have been exceeded and they have transitioned to a new state. Thus, it is likely that Bali's marine ecosystems have already moved beyond a state of natural

ecosystem resilience which supported the productivity of fisheries prior to 1970. A range of studies carried out on the productivity status of Indonesian fisheries suggest that most, if not all, fishing grounds in Indonesia have been overfished (Mous et al., 2005) and substantially degraded. This pattern follows the worldwide trend with regard to fisheries activities whereby fishers time and again have been shown the tendency to overfish productive areas and reduce productivity and ecosystem resilience (Pauly et al., 1998).

While the research reported in this thesis shows that many stakeholders, including fishers, understood the dire impact that blast and cyanide fishing had on the marine ecosystem, they, along with many natural resource managers, underestimated the effect of artisanal and subsistence fisheries. The impacts of these types of fisheries in nearshore ecosystems, such as coral reefs, have been shown to severely deplete local fishery resources (e.g., Coblentz, 1997; Dulvy et al., 2004). In addition, many stakeholders considered artisanal fishery activities were inherently more sustainable and would not lead to overfishing.

Overfishing is not just a contemporary phenomenon in human history. For instance, a study carried out by Wing and Wing (2001) suggested that even during the prehistoric period in the Caribbean reefs, overfishing had taken place and had impacted the composition and population of reef fish in the area. Overfishing simply means fishing efforts exerted on a particular fish population is greater and happens faster than the regeneration rate of the targeted fish population. Hence, despite the fishing practices and gear used, overfishing can still occur if, for example, there are a high number of fishers exploiting a fish population of limited size. In all three MPAs examined in this research it was clear that increasing village populations in surrounding areas led to increases in fishing efforts. In addition, further opportunities to expand fishing beyond

catching for local food needs also expanded pressure on the fish stocks and marine ecosystem. For example, the rapid increase in demand for live fish species valued for the ornamental fish trade (Wood, 2001) and live-reef fish food trade added additional demand and fishing pressure on local reef ecosystems (Warren-Rhodes, Sadovy, & Cesar, 2003).

The more recent introduction of marine tourism has also added pressure to marine ecosystems. Examples include; the coral damage caused by pontoon construction as well as the movement of mobile pontoons that were carelessly anchored in Nusa Penida's MPA, the presence of free dive spearfishing as reported by the fishers in West Bali National Park, and the influx of scuba divers in Pemuteran's MPA facilitated by unregistered dive operators. Such findings demonstrate that both fishing activities and tourism contributed to the declining health of the marine ecosystems in the three study sites.

Table 17 summarises the findings of participants' perceptions regarding marine ecosystem health and the responsible sectors based on the results from each of the MPAs

5.3. Unsustainable exploitation of marine resources

5.3.1. West Bali National Park

Most fishers in West Bali National Park who participated in the structured interviews did not seem to understand or be willing to acknowledge the impact of fisheries activities upon the marine ecosystem. This is typical of Balinese fishers as several studies (Johnson & Jackson, 2015; McClanahan, Hicks, & Darling, 2008; Oracion et al., 2005; Suman et al., 1999) which also suggest low understanding among fishers with regards to the impacts of their fishing on marine ecosystems. However, the semi-structured in-depth interviews and the focus group discussion provided more insights into unsustainable and/or illegal fishery activities in the area.

These data revealed that fishers were aware that destructive fishing using home-made dynamite and cyanide started in the 1980s. These findings are consistent with the results of Polunin et al. (1983), who confirmed that the use of destructive fishing methods such as dynamite and cyanide had taken place in West Bali National Park during that period or earlier. The authors also noted that the targeting of ornamental fishes had taken place in and around West Bali National Park. The use of cyanide to catch reef fishes to supply the live fish food trade and highly-prized ornamental fishes for the aquarium trade is typical of the type of illegal activities commonly carried out among fishers in the South East Asia (Burke et al., 2011; Pet-Soede et al., 1999; Pet, Mous, Muljadi, Sadovy, & Squire, 2005). Unlike blast fishing, cyanide was used because it does not kill the fish, instead it was meant to render the fish unconscious, as live reef fish were highly

sought after for supplying Chinese seafood restaurants in Southeast Asia. However, in the case of West Bali National Park the fish were primarily destined for buyers in Hong Kong and commonly targeted fishes were *Epinephelus* and *Plectropomus* species as well as the Napoleon wrasse (*Cheilinus undulatus*) (Pet et al., 2005).

With respect to overfishing, the fishers who took part in the focus group and semi-structured in-depth interviews acknowledged the increasing number of fishers who fished in and around West Bali National Park after 1970s.

The fishers stated that the reasons for these anthropogenic impacts were mainly caused by lack of awareness amongst the fishers themselves. For example, one of the focus group participants admitted being the supplier of illegal materials used for blast fishing. Despite being recognised as one of the best-protected MPAs during its period (White 1982; 1986), the fishers knew they could get away with destructive and illegal activities because there was a lack of enforcement of the fishing grounds inside the MPA. Indeed, lack of enforcement is a recognised as a common challenge in Indonesian MPAs (Pet et al, 2005; Fox, Pet, Dahuri, & Caldwell, 2003; Mangubhai et al., 2011), as well as in other developing nations such as Jamaica (Reid-Grant & Bhat, 2009).

The participants also identified two additional major issues that contributed towards unsustainable exploitation of marine resources in West Bali National Park. These were, first, rapid population growth and second, the lack of an alternative livelihood (Curran & Agardy, 2002; Cassels, Curran, & Kramer, 2005).

Research participants noted that the population of their villages increased during the 1980s. The close proximity of northwest Bali to the eastern part of Java allowed for the easy migration of

people from the larger and densely populated island of Java. There was also an internal migration within Bali consisting of Balinese who escaped Mount Agung's eruption in 1963 and resettled in northwest Bali. The fishers' population also saw an increase with the arrival and settlement of fishers from East Java and South Sulawesi. Finally, the town of Gilimanuk is the land gateway between Java and Bali and the rest of the Lesser Sunda Islands. During the 1980s it became a strategic hub for many traders and seafarers who came from all over Indonesia; some of them decided to remain on this part of the island, and as a result it created a very diverse ethnic population in a relatively small area.

Many of these non-Balinese migrants from other parts of Indonesia could not claim land ownership for two reasons, firstly because most of them lived on land claimed by the central or regional government and, secondly, because most of the village lands were owned by the local Balinese population who had very strict customary practices that governed land ownership. Even if the Balinese were willing to sell the land, the current generation of migrants did not have enough capital to purchase the land.

Thus, overpopulation, lack of land ownership for farming, and limited options for earning a livelihood were the main drivers for villagers to fish the surrounding coastal areas. As the fishes and other targeted species became less abundant, the amount of fishing efforts continued to rise, and some fishers started to use destructive fishing practices. These factors led to marine ecosystem health decline in the MPA and surrounding areas, a pattern also found in other parts of the Coral Triangle (Burke et al., 2002, 2011; Wear, 2016) and the world (Wallner-Hahn et al., 2016; Watson et al., 2016; Wear, 2016).

5.3.2. Pemuteran

Structured interview participants did not consider fishery activities and tourism as threats to the marine ecosystem at this study site. In contrast, fishers and other stakeholders in the semi-structured in-depth interviews cited overcrowding of fishing grounds, coral mining, and the practice of blast fishing (Figure 20) as the main sources of environmental degradation. They identified the 1990s as the period where most of the disturbances occurred. This time was well documented throughout Indonesia as a time of major human-induced deterioration of the marine environment (Cesar et al., 1997). One participant also mentioned the outbreak of crown-of-thorns starfish (*Acantaster planci*) in the 1990s. While a crown-of-thorns starfish outbreak is not always an indicator of anthropogenic stress on a marine ecosystem (Done, 1988), others point out that the removal of species that prey upon A. planci and increased nutrient input into the coral reef ecosystem tend to increase outbreaks (Hughes et al., 2010). Chak, Dumont, Adzis, and Yewdall (2016) did note that fishers and tourism operators in Pemuteran considered that destructive fishing practices had an effect on the crown-of-thorn starfish outbreak in the area.

Figure 20. Blasted fishes from Pemuteran fishing grounds

Picture courtesy of Agung Pramana

Lack of awareness and the inability of Pemuteran fishers to protect the reefs were identified as the major factors that contributed toward unsustainable exploitation of marine resources during the 1990s and prior to that decade. Much of this lack of awareness referred to fishers' ignorance about the effects of the use of destructive fishing practices such as poison and dynamite, and over-exploitation of the reef ecosystem in general.

Poverty was often cited as the main constraint restricting the propensity for fishers to change to more sustainable behaviour, for example by desisting from destructive practices (Wallner-Hahn et al., 2016) or decreasing fishing efforts (Asafu-Adjaye, 2000).

One Pemuteran participant claimed that by the time the fishers started to have some awareness about the importance of protecting the marine ecosystem to sustain their fishery, they were hindered by their lack of capacity to safeguard the reefs because at the time there were no

supporting laws and regulations prohibiting the over exploitation of marine resources by artisanal fishers. In addition, the situation in Pemuteran contrasts with locations where traditional marine tenure systems allow local communities ownership or right of access and thereby the ability to exclude from particular fishing grounds. Such approaches, such as those practiced in Melanesia and surrounding small island communities in the Western Pacific, have been shown to have some success in reducing destructive fishing practices (Asafu-Adjaye, 2000; Cinner, Marnane, McClanahan, Clark, & Ben, 2005; Lam, 1998).

5.3.3. Nusa Penida

Participants from semi-structured in-depth interviews and focus group discussions blamed overfishing and destructive fishing as the primary sources of anthropogenic caused degradation. However, they claimed that the perpetrators of these impacts were fishers from the neighbouring island, Lombok, which is located east of the Nusa Penida islands. Blaming non-resident fishers as the cause of declining fish stocks and over-exploited coral reef ecosystems is quite common in many Indonesian fishing communities (as well other fishing communities around the world) (Aburto, Thiel, & Stotz, 2009; Bielecka & Rózyński, 2014; Brodziak, Mace, Overholtz, & Rago, 2004; Damis, 1998; Johnson, C., 2000; Kraas, 2000).

The practice of seaweed cultivation, first introduced on the islands in the early 1980s (Long & Wall, 1996), is currently practiced by 1,600 seaweed farmers (Welly, personal communication) and one of the participants perceived that such practice generated a substantial amount of plastic waste, as most seaweed farmers used plastic bottles as floatation devices, which led to aesthetic

issues as well as solid waste problems in the area. However, Edwards (2015) insisted the environmental impact of traditional seaweed farming and other mariculture to be limited.

Participants, mostly fishers, also perceived irresponsible tourism to be a source of unsustainable exploitation of marine resources. This was thought to be primarily caused by lacking the knowledge on how to implement best environmental practices, such as proper boat anchoring techniques in the coral reefs and/or the construction of swim platforms (i.e., pontoons) that did not damage coral reefs. One research participant stated that there were more pontoons on the water than there were in the early 2000s, and in 2015 the local authority and conservation group raised concerns regarding the presence of mobile pontoons, which they suspected had destroyed a significant portion of coral reef habitat (Tribun News, 2015). In fact, none of the MPAs in Indonesia limit the number of operators and visitors who can operate and/or enter the MPA at any given time. Problems such as overcrowding can reduce the quality of visitor experience as observed in other MPAs (e.g., Bell, Needham, & Szuster, 2011; Race & Orams, 2014). More specifically, increasing concerns were raised regarding scuba divers' behaviour impacting the coral reef ecosystem and this is supported by research from elsewhere (Barker & Roberts, 2004; Luna, Pérez, & Sánchez-Lizaso, 2009). The growth in the number of scuba divers in a particular MPA, as has occurred in Nusa Penida, has been shown to be correlated with an increase in damage to coral reef ecosystems (Roche et al., 2016), and also to decrease the safety of the activities.

There are two primary economic drivers for the exploitation of marine resources in Nusa Penida; seaweed farming and tourism. Villages of the Nusa Penida district were under-developed until the middle of the 1980s. The government of Indonesia endorsed the introduction of seaweed

culture in the area in the early 1980s to help alleviate poverty and also provide an alternative livelihood for the communities, which at the time, still relied on limited cash crops as well as fisheries. The arrival of tourism in the late 1980s and the beginning of mass tourism in the early 1990s (Long & Wall, 1996) accelerated village development on these islands, primarily on Nusa Lembongan. The district infrastructure was considerably improved by late 2000s and, as a consequence, communication and transportation facilities have also improved. Today most villages have access to cellular networks and are accessible by motorbikes. Other infrastructure and services, such as health clinics and schools, are now also available on Nusa Penida and Nusa Lembongan, including a vocational school for tourism found on Nusa Lembongan. A new hospital will also open in 2017 on Nusa Penida, which reduces the need for patients to cross over the sea to mainland Bali.

5.3.4. Comparative discussion

Despite their perception of declining fish populations, fishers who took part in the structured surveys from the three MPAs did not acknowledge that this problem was caused by fisheries. Whether this was due to lack of knowledge or ignorance on the part of the fishers is difficult to determine. It is possible that most of the fishers interviewed did not understand the effects of overfishing and its cascading impact of fisheries in the coral reefs dominated ecosystems (e.g. Dulvy et al., 2004), this may also meant that fishers have increased their effort (i.e. 'fishing harder') by going further to search for new fishing grounds (Cinner, Folke, Daw, & Hicks, 2011), or it was natural tendency for fishers to play down (their) fishery impact upon the ecosystem (e.g. Edgar, Bustamante, Farina, & Calvopina, 2015), which led them to falsely

believe that the fishing activities they performed had limited impact on fish populations. Perhaps this type of denial was due to fishers' reluctance to admit that their actions were part of the problem (e.g. Johnson, A.E., & Jackson, 2015). However, the local fishers in this study readily blamed non-resident fishers as a contributor to fish population decline. This perception has been reported for other parts Indonesia (e.g. Cassels et al., 2005).

The semi-structured in-depth interviews and focus group discussions provided more insights into these findings. From these data-sets, fishers did acknowledge that they were also contributing to the problems of overfishing and/or destructive fishing.

Table 17. Summary of participants' perceptions of marine ecosystem health and the sectors who are responsible.

MPA	Marine ecosystem	Fishery contributes towards declining marine ecosystem health?	Tourism contributes towards declining marine ecosystem health
West Bali National Park	Coral reef health in decline; fish population in decline (structured interviews) Coral reef health in decline; fish population in decline (semi-structured interviews and focus group discussion)	Yes (semi-structured interviews and focus group discussion) No (structured interviews)	Yes (semi-structured interviews and focus group discussion) No (structured interviews)
Pemuteran	Coral reef health improving; fish population in decline (structured interviews) Coral reef health in decline; fish population in decline (semi-structured interviews and focus group discussion)	Yes (semi-structured interviews and focus group discussion) No (structured interviews)	Yes (semi-structured interviews and focus group discussion) No (structured interviews)
Nusa Penida	Coral reef health improving; fish population in decline (structured interviews) Coral reef health improves; fish population in decline (semi-structured interviews and focus group discussion)	Yes (semi-structured interviews and focus group discussion) No (structured interviews)	No (structured interviews; semi-structured interviews)

5.4. Knowledge and attitudes towards MPA

5.4.1 West Bali National Park

Because West Bali National Park is the oldest MPA on the island, and one of the oldest in the country (Polunin et al., 1983), it is not surprising that the majority of the structured interview participants claimed that they knew of the MPA and supported its objectives. While the question on the interview questionnaire was not specific with regards to how much of the management plan they knew or understood, the data showed that their level of comprehension regarding the MPA was rather rudimentary. The answers revealed that their knowledge was limited to awareness of the existence of the park and where they were allowed to fish (or not to fish) within the MPA's zoning plan.

There are limited peer-reviewed publications on MPA compliance in Indonesia. However, MPA zoning regulation compliance studies from Komodo National Park by Pet et al. (2005), which were also confirmed by Mangubhai et al. (2011), suggested that both a lack of enforcement from the MPA authority and a lack of fisher compliance to MPA zoning regulations have led to the decreasing population of targeted grouper species. Mangubhai et al. (2011) even demonstrated that the majority of fishing violations occurred in the no-take-zones that protect, among others, important spawning aggregation sites of the targeted grouper and other valuable species. When McClanahan et al. (2006) did a comparative study between West Bali National Park and a control area, they assessed how the biomass and average size of target fish species, density of target fish species, and fish species richness, differed between inside and outside the MPA. Their findings showed that there were no significant differences in any of these study parameters, which suggests that MPA management in West Bali National Park has not added any

conservation value that would lead to higher fish productivity. Moreover, case studies from MPAs in the Philippines by Fabinyi (2008) also found that fishers were not interested about conservation inside the MPA and preferred to have their fishing ground open for their group but closed to others. A more recent finding by Mustika et al. (2013) also suggested that the entire marine area surrounding Bali has been severely overfished. Results from the structured interviews of this study showed that fishers claimed to understand and support the MPA, however the evidence from other studies indicate this may be inaccurate. Furthermore, results from the semi-structured in-depth interviews and focus group discussions suggested that the fishers were aware they played a big part in the decline in marine ecosystem health, both in general and in terms of the overfishing problems in West Bali National Park.

5.4.2. Pemuteran

Most of the participants knew about and were supportive of the MPA in Pemuteran. As Pemuteran is a small MPA; most of the fishers who came from the village knew each other, and activities in the sea could be easily observed from the shoreline. The fishers had good compliance levels and respected the no-take-zone imposed by the resorts for conservation purposes (McClanahan et al., 2006). In addition, the amount of destructive fishing occurring in the area had been significantly reduced because the tourism operators promoted conservation awareness for the local communities and engaged local men to patrol the reefs area (Bottema & Bush, 2012).

The tourism sector also facilitated a turtle hatchery program and initiated a coral rehabilitation project, and the Biorock project, which was widely accessible and helped local communities, and

especially fishers, to gain more information about the marine ecosystem and the need to support conservation objectives.

5.4.3. Nusa Penida

Most of the fishers who took part in the structured interviews claimed that they understood the purpose of the MPA and supported its presence. They also believed that the MPA benefited the fishery and their economic conditions in general. Fishers who took part in the semi-structured in-depth interviews appreciated the roles and contributions provided by the conservation NGO in carrying out the marine conservation information dissemination, including facilitating community meetings and other stakeholder meetings as part of the MPA establishment process. There was a community meeting place in Nusa Lembongan facilitated by the conservation NGO, which also served as a marine education and awareness centre for the community. The fishers felt the level of engagement of the conservation NGO was very good and they were satisfied with the way the zoning plan was being developed and implemented. The fishers also appreciated the efforts made by the NGO in facilitating a zoning process that incorporated their fishing grounds area and a sacred, religious area.

As Nusa Penida is the newest MPA among the three MPAs assessed in this thesis, it is too early to tell whether the knowledge and attitudes of the stakeholders, particularly the fishers, reflects the real condition of the MPA, especially in terms of its marine ecosystem health. An unpublished report by a conservation NGO in 2015 revealed that the fish biomass and hard coral cover had improved between 2010 and 2014. This was a good result, considering the intensity of tourism and fishery in the MPA. Furthermore, assuming that this report is scientifically valid,

this result infers that there was a correlation between high support and compliance among the fishers and the MPA's biodiversity performance.

While the unsustainable exploitation of marine resources that resulted in declining marine ecosystem health was caused mainly by fishery-related activities, several participants claimed that tourism also contributed towards marine ecosystem degradation. Activities such as spearfishing and the construction of pontoons, or the movement of mobile pontoons, also caused damage to the marine ecosystem.

5.4.4. Comparative discussion

The roles of agents of change (Dryzek, 2007) in protected area management or natural resource conservation are very crucial. The success of conservation outcomes, that is, in achieving social-ecological-system resilience, will depend on how effectively the agents of change lead and facilitate the trust-building process among the key stakeholders (Lebel et al., 2006). The case studies in the three MPAs showed that there are prominent agents of change, represented by the government agency in the case of West Bali National Park, tourism entrepreneurs in the case of Pemuteran, and the conservation NGO in the case of Nusa Penida. While each of the agents attempted to display collaboration and shared responsibilities among MPA stakeholders in their respective areas, it was clear that the stakeholders' (primarily fishers) perceptions of who the leading institutions are corroborate the characteristics of these institutions or organisations. There are, however, differences in fishers' perceptions of which agents they would like to exercise more leadership in the MPAs. The majority of fishers in West Bali National Park, who were non-Balinese, preferred to rely on the central government to impose more favourable regulations and decisions to support their welfare. In Pemuteran, the majority of fishers, who

were native Balinese, anticipated their customary leaders to be empowered to manage the marine resources. The fishers in Nusa Penida expected both the village officials and fishers' groups to have the capacity to look after the marine resources. Hence, the fishers' expectations in the three MPAs might differ because of their ethnicity (e.g., Balinese vs. non-Balinese), their relationship with the customary leaders, or their reliance on local government authority. West Bali National Park fishers' expectations for a stronger and more just central government agency to manage the MPA may not mean they trust the government, whereas Pemuteran fishers' expectations to have customary leadership with an extended jurisdiction over the marine resources may signal their greater trust and respect of the older institution. Lastly, the Nusa Penida fishers' reliance on village officials may reflect their geographical location; they are detached from the Bali mainland, and thus, it is more practical for them to have empowered officials at the village or island (district) level, rather than having to rely on distant authorities, such as regency or provincial governments based on mainland Bali. Table 18 compares the differences in fishers' expectations regarding their preferred agents.

Table 18. Comparison of MPA governance among three study sites

Governance characteristics and stakeholder perception on leadership	MPAs		
	West Bali NP	Pemuteran	Nusa Penida
Leading agency	West Bali NP authority - Ministry of Environment and Forestry	Fishery and marine service – Buleleng Regency	Fishery and marine service – Klungkung regency
On the ground leader	West Bali NP authority	Tourism entrepreneurs	Conservation NGO
Dominant conservation discourse	Administrative – economic rationalism	Economic rationalism	Sustainable development
Desired leadership	Central government	Customary leaders	Village officials – community

A study by Walpole and Goodwin (2001) in Komodo National Park, a protected area that comprised both terrestrial and marine areas as does West Bali National Park, revealed that local communities' attitudes towards tourism have been very positive, even though they did not perceive that they could only get limited or no financial benefit.

While there was a higher proportion of fishers who claimed to understand the purpose of the MPA in Nusa Penida than there were in Pemuteran and West Bali National Park, the probable explanations to this finding are either that Nusa Penida's fishers may still have fresh memory of the MPA awareness and education they received from the conservation NGO, and/or that the conservation NGO, as expected, did better work than the West Bali National Park Authority and tourism entrepreneurs in Pemuteran because the NGO was more efficient and had more experience in MPA management. However, as other findings from this research revealed, fishers from all three sites did not perceive that they had to make more sacrifices in terms of allocating

more areas as no-take-zones and significantly reduce their fishing efforts in fishing grounds outside these no-take-zones.

Additionally, a higher proportion of the fishers who took part in the structured interviews in Nusa Penida perceived that their MPA provided benefits for the fishery than did the fishers from the other two MPAs. While the fishers did understand that only demersal fishes, not pelagic fishes, may have benefitted from the application of no-take-zones, it is still too soon to see the results of any benefits in this MPA. An unpublished report from the conservation NGO in Nusa Penida did, however, find the fish population biomass had increased in 2014 from the baseline in 2010. However, the fish biomass increase mainly comprised fish species that were not commonly targeted by fishers (Mustika et al., 2013).

Perhaps the fishers' unwillingness to admit that fisheries activities are part of the problem for marine ecosystem health reflects the Indonesian government's inconsistent approach to marine conservation in the first place. Currently, Indonesia manages over 131 MPAs covering 15.7 million hectares of marine area (GoI, 2013). Indonesia has committed to protecting 20 million hectares of MPA by 2020. However, there are several key challenges that face this country in establishing effectively managed MPAs.

Firstly, there are simply not enough skilled and experienced conservation managers and technicians to manage these MPAs. In fact, the first 32 MPAs that were initiated were managed by the Ministry of Environment and Forestry (excluding terrestrial protected areas that also have marine components such as Komodo National Park, Ujung Kulon National Park, and West Bali National Park), while the remaining 99 MPAs were established less than a decade ago by the Ministry of Marine Affairs and Fishery, a much newer Ministry that was established in 1999.

Most of the staff recruited into the Ministry of Marine Affairs and Fishery had little or no experience in MPA management and had little connection of rapport with local communities. In addition, while the Ministry of Environment and Forestry had several decades of experience in managing protected areas, it was perceived as too distant and centralised and with little focus or expertise in marine environmental matters. Judging from its performance so far, the Ministry of Environment and Forestry has not been effective in managing the Indonesian MPAs under its jurisdiction (arguably, the same can be said about its capacity in managing the terrestrial protected areas) (e.g. refer to Green et al., 2008; Alder et al., 2010; and Alder, Sloan, Uktolseya, 1994). For example, one case study in Komodo National Park demonstrated that the park authority, which is under the supervision of the Ministry of Environment and Forestry, did not enforce the management regulations, particularly in protecting the no-take-zones, which led to the decline of several key grouper species due to overfishing and a lack of compliance from the fishery sector (Mangubhai et al., 2011; Pet et al., 2005). This reduction of fish population occurred despite support (technical and financial) provided by a conservation NGO and other aid agencies to commence patrolling, monitoring and capacity-building in MPA management. This support even included creating a financial mechanism to generate tourism revenue for sustaining MPA management and supporting community livelihood (Djohani, 2009). The second Reefs at Risk report, identified Indonesia's performance (and several other countries in the Coral Triangle region) in protecting coral reef ecosystems from destructive fishing and overfishing to be poor (Burke et al., 2011).

Secondly, the challenge for MPA governance in Indonesia is there are two central government agencies that oversee marine conservation matters (Patlis, 2005). These are the Ministry of

Environment and Forestry and the Ministry of Marine Affairs and Fishery. They have somewhat different objectives in marine conservation. The marine conservation approach applied by the Ministry of Environment and Forestry focuses mostly on biodiversity protection based on the country's Biodiversity Act (GoI, 1990), whereas the approach of the Ministry of Marine Affairs and Fishery, which is guided by the Fishery Act (GoI, 2004), tries to emphasise the benefit of marine conservation for enhancing fish productivity.

Thirdly, there is a challenge pertaining to the ambiguity of the Indonesian Fishery Act, including its guiding regulations and ministerial decrees. It has not been used strategically or consistently with regard to the potential of MPAs to enhance fishery productivity. More specifically, the regulations established in the Act allow four types of MPA in Indonesia; national parks, marine reserves, marine recreational parks, and fish reserves but it requires, irrespective of primary purpose, for all MPAs to have fishing zones. Thus, all MPAs in Indonesia are multi-purpose MPAs that must include areas for fishing. This results in very few MPAs having significant no-take-zones, a situation which is consistent with the global pattern (Costello, 2014; Costello & Ballantine, 2015). The presence of a multi-zoning system which allows for extractive activities such as fisheries within MPAs is confusing for users (Ballantine, 2014) and difficult to control (Costello & Ballantine, 2015). Fisheries, even when artisanal in nature, can still severely impact marine ecosystems (Dulvy et al., 2004), and this has occurred for centuries, leading to ecosystem degradation and species extinction (Pinnegar & Engelhard, 2008). As Fischer et al. (2012) argued:

> …global sustainability deficit is not primarily the result of a lack of academic knowledge. Rather, unsustainable behaviours result from a vicious cycle, where traditional market and state institutions reinforce disincentives for more sustainable behaviours while, at the same time, the institutions of civil society lack momentum to effectively promote

> fundamental reforms of those institutions. Achieving more sustainable behaviours requires this cycle to be broken.

It appears that the government of Indonesia wants to approach marine conservation in a moderate way that still allows some level of extraction to occur within the MPAs. A review of the literature, including that focussed on Indonesia, suggests that MPAs will not benefit fisheries if they are implemented in a half-hearted way. This is not just Indonesia's challenge, but also a global one. The results from the research presented in this thesis suggests that the stakeholders, primarily fishers, had differing and somewhat vague ideas about MPA governance and how they could build resilience in their social-ecological system. Conservation NGOs, which also promoted MPA network development in the Coral Triangle region, also could not convince their government counterparts to amend ill-defined laws and regulations pertaining to marine conservation and MPAs. While there are some genuine efforts shown in each of the MPAs examined for this thesis with respect to how the governance system tried to promote public and private participation and inclusion of customary values to safeguard the marine resources, all are compromised by confusion and multiple-use ambitions allowing for fisheries activities to occur within MPA boundaries.

5.5. Benefits of tourism

5.5.1 West Bali National Park

The presence of nature based tourism has the potential to help local communities to increase their awareness and appreciation of the ecosystem (e.g. Diedrich, 2007; Goodwin, 2002) Similarly, in West Bali National Park, the results of the structured interviews indicated that fishers recognised the benefits of MPA tourism for fisheries. The semi-structured in-depth

interviews and focus group discussion revealed that fishers perceived tourism to have increased their conservation awareness, especially with regard for the marine ecosystem and general cleanliness, and particularly in disposing of waste responsibly. The fishers thought the tourists, primarily westerners, had higher interest in and appreciation for marine ecosystem health and were very concerned about waste management. The fishers were intrigued by the tourists' interests in observing underwater life through snorkelling or diving, whereas they themselves considered the marine ecosystem as nothing extraordinary, other than a source of food. Tourists' visits to the MPA brought a sense of pride to the fishers and the local community (also refer to Goodwin, 2002). These visits encouraged fishers, and especially their children, to learn foreign languages, especially English.

5.5.2. Pemuteran

Consistent with findings by Diedrich (2007) which suggested that tourism improved community awareness about coral reefs conservation and benefits families and communities in general, participants in Pemuteran also perceived the same types of benefits that tourism delivered in their community. They believed tourism, particularly the start of marine tourism, had increased environmental awareness and improved the condition of the marine ecosystem, and tourism provided jobs for local villagers who otherwise had to travel to faraway places to make a living. In fact, Bottema and Bush (2012) confirmed that the presence of tourism investment in Pemuteran and Gili Trawangan (Lombok island) provided several common benefits: i) Supported better awareness of marine conservation issues; ii) facilitated local communities to better understand their marine ecosystem; iii) provided options for livelihood; iv) provided financial revenue for marine conservation.

5.5.3. Nusa Penida

Most participants cited job creation as the prominent benefit of tourism. Since the establishment of the Bali Hai cruises and resort (Long & Wall, 1996), the islands of Nusa Penida became an important part of Bali as a tourism destination. The additional livelihood that tourism offers, as discovered by Bottema and Bush (2012), was also noted by the presence of village-owned mangrove guided tours, which was managed by the villagers and demonstrated how they had taken the steps to take part and benefit from tourism on these islands. Furthermore, participants did not perceive that there was conflict between fishers and other resource users (i.e. tourists) as they believed the current MPA zoning system had been well designed and incorporated their needs to access the marine resources accordingly.

5.5.4. Comparative discussion

The possible synergy between tourism for nature conservation has long been proposed by Budowski (1976), who contended that there are three types of relationship that can happen between tourism and nature conservation: Conflict, coexistence, and symbiosis. One of the ways to get maximum benefits from tourism for nature (or marine) conservation, i.e. the symbiosis relationship as proposed by Budowski, is through the allocation of zones in the MPAs, which was suggested by Salm (1985) to Indonesia's early attempt to establish or manage its MPAs in the 1980s. This implies that MPAs would be created as multi-purpose and would cater to various user groups' needs (e.g. fishers and tourists) by dedicating areas or zones that are compatible for them.

Today, all MPAs in Indonesia must be multipurpose as per Ministry of Marine Affairs and Fisheries regulation (Indonesia, 2010). The three MPAs, of which one is managed under the

jurisdiction of Ministry of Environment and Forestry, are also multipurpose MPAs. Attributes of coexistence or even a symbiotic relationship between tourism and nature conservation were strongly demonstrated in Pemuteran where the pioneer of tourism operators in the area directly involved and organised conservation activities including an awareness programme for the local communities (Boettama & Bush, 2012). While at West Bali National Park and Nusa Penida, by their interactions with tourists and tourism operators, the participants perceived that the presence of tourism has led them to understand and appreciate the significance of marine ecosystem conservation in their respective MPAs.

In summary, participants' perceptions with regards to tourism benefits are consistent with the findings from previous studies, that is they are perceived to improve socio-economic conditions such as through job creation (Boettama & Bush, 2012); or improvement of quality life (Diedrich, 2007), as well as improved conservation knowledge (Boettama & Bush, 2012, Diedrich, 2007; Stronza & Gordillo, 2008). Furthermore, participants in Nusa Penida appeared to be most content with the zoning system in their MPA, which accommodated their needs to access the marine resources.

5.6. Threats of tourism

5.6.1. West Bali National Park

The results of this study indicated three key aspects of tourism that caused concerns for the stakeholders, primarily the fishers, of West Bali National Park. These were related to spatial and temporal competition; cultural norms; and inequity of the distribution of tourism benefits.

First, fishers had the perception that tourists carried out recreational fishing, such as spearfishing. What made this controversial was the fishers claimed several tourists did this inside the no-take-zone. Indeed , spatial and temporal competition between fishery and other sectors, such as the tourism sector, are quite common and have also been documented in other MPAs such as in Florida (Suman, Shivlani, & Millon, 1999); Vietnam (Svensson, Rodwell, & Attrill, 2010), and the Philippines (Oracion et al., 2005; Fabinyi, 2008).

Second, tourists' beach attire, which may have been a feature of comfort and/or practicality for the tropical weather, was perceived as inappropriate by some participants. Several participants complained that the beach attire worn by tourists in public places usually showed or exposed skin, and this did not conform to the communities' culture, which is predominantly Muslim. Walpole and Goodwin (2001) also described similar findings regarding cultural conflict faced by the predominantly Muslim communities in and around Komodo National Park, Indonesia, who expressed their discomfort about encountering Western tourists who were wearing swim suits or other related Western beach attire.

Third, participants had the perception that tourism businesses in the area did not employ enough labour from the local communities. This perception of economic inequity as a consequence of tourism was also experienced by certain fishers in Vietnam who felt worse off due to the presence of tourism and were jealous because they perceived that local tourist operators favoured another fisher group instead (Svensson, Rodwell, & Attrill, 2010), or that tourism development only provided benefits for the local elites (Goodwin, 2002).

5.6.2. Pemuteran

Participants identified three aspects that they considered were the potential threats of tourism in Pemuteran. These were: The environment, uncontrolled growth of dive tourism operators coming from outside the village, and inequity of tourism growth.

The first aspect pertains to the environment, where one participant was concerned that rapid tourism growth may cause a water shortage in Pemuteran. There are a number of swimming pools in Pemuteran hotels and homestays, which were not present in late 1990s. One prominent tourism developer and owner of several hotels in Pemuteran did not see water shortage as a problem and believed the water well in the area would provide an infinite amount of water for the locals and tourists alike. While there are no studies into the effects of tourism development upon water supplies in Pemuteran (and the other two study sites in Bali), research carried out by Cole (2012, 2014) identified water shortage problems in Bali, and she blames both the government and the tourism businesses for the rapid and unchecked growth of tourism and predicts that if the present growth and related water consumption continues, it will cause serious implications for the environmental, social and economic stability of Bali in the near future.

The second aspect was about uncontrolled growth of dive tourism operators operating in the village or using the MPA for their clients. Pioneer dive operators in Pemuteran expressed their concerns about the uncontrolled arrivals of dive operators from outside the village who came in and brought their dive tourists. This concern was genuine because marine ecosystems at popular dive sites have suffered from the growth of dive tourism (Epstein, Vermeij, Bakr, & Rinkevich, 2004; Chadwick-Furman, 2002, 1997).

The third aspect pertains to inequity of tourism development. Fishers in the western part of the village perceived that tourism growth favoured only the eastern part of the Pemuteran village. This inequity of tourism benefits distribution was also reported in various case studies in different communities where local communities perceived there was little economic benefit distributed (e.g. Goodwin, 2002; Bookbinder et al., 1998; Young, 1999) that could have led to conflict within the communities (e.g. Stronza & Gordillo, 2007).

5.6.3. Nusa Penida

Participants, mainly fishers, did not have any strong opinions about tourism in their MPA. They exhibited a trait that Goodwin (2002) and Bookbinder et al. (1998) claim that 'supports tourism' presence although they may not understand or experience the direct benefits of tourism for their communities. In other words, they can coexist with other resource users providing that their access to marine resources is not impeded by them.

However, the tour/dive operator and NGO participants interviewed for this research had stronger opinions about the threats of tourism in Nusa Penida, specifically, and to the whole Bali island in general. Their common concern was pertaining to the lack of standards for tourism, mainly diving and other marine related operations. One main issue was overcrowding of divers, which could lead to unsustainable trajectory of popular dive sites (Zakai & Chadwick – Furman, 2002; Davis & Tisdel, 1995). The presence of the MPA did not necessarily reduce the threats from tourism (e.g. diver overcrowding) to popular dive sites in Nusa Penida. The dive operator also perceived the threat came from the careless construction of a pontoon, which is a form of artefactual component that significantly influences the interactions among systems (e.g. natural and tourism) within the SES (Miller, Carter, Walsh, & Peake, 2014). The increasing number of

pontoons around Nusa Penida MPA over the past decade was an indication of the island's increasing tourism popularity, but might also suggest overcrowding has taken place. While a code of conduct for tourism, as suggested by Budowski (1976), was in place for Nusa Penida MPA, the reality was the code of conduct did not provide strong influence to prevent a number of tourism operators from operating recklessly and causing harm for the environment, the people, and their destination.

5.6.4. Comparative discussion

Ecotourism is expected to contribute to nature conservation and local communities' socio - economic development. In the context of MPAs and their local communities, especially in developing countries, the presence or the introduction of tourism is expected to pose challenges, and the three possible outcomes that tourism brings as proposed by Budowski (1976) are still relevant today. Tourism can create conflict (or negative impacts) on the ecosystem and/or the communities (Oracion et al., 2005); it may have an insignificant contribution for the local economiy but conversely it may not necessarily create conflicts (Bookbinder, Dinerstein, Rijal, Cauley, & Rajouria, 1998; Goodwin, 2002; Walpole & Goodwin, 2001); or it can contribute positively to conservation and local livelihoods (Bottema & Bush, 2012; Diedrich, 2007).

Participants interviewed in this research revealed that many of the possible outcomes of tourism in their MPA and communities have already occurred. They all, collectively, perceived the trajectory of tourism in their MPAs from three different scenarios.

On the other hand, tourism actors in all MPAs have a dominant influence in the trajectory of each MPA. This range of influences included changing the zonation in West Bali National Park to favour tourism operations (Soemodinoto, 2009); the implementation of a no-take-area in Pemuteran (Bottema & Bush, 2012); and the initiation of mass tourism development (prior to the establishment of the MPA) in Nusa Penida (Long & Wall, 1996). These influences have created some resentment amongst the communities and the Ministry of Foresty as in the case of West Bali National Park (Soemodinoto, 2009). They have also created doubt regarding the long term sustainability of MPA management in Pemuteran (Botema & Bush, 2012); and concerns for social and environmental sustainability in Nusa Penida (Long & Wall, 1996).

Brown et al. (2013) warned that the presence of dominant actors or stakeholders and their close associations with authority in MPA governance had been used as cover up for collaborative management, when the real interest was to solidify the position of dominant actors as local elites. Participants' perceptions in this research have either corroborated the notion of too much tourism elites' influence in their MPAs and/or that the trajectory of tourism growth has exceed SES thresholds, or in other words, tourism in these MPAs has become dangerously unsustainable.

5.7. Livelihood for the present generation

5.7.1. West Bali National Park

The structured interview results showed that the majority of participants indicated they would prefer to exit fishing and switch to tourism as their primary means of livelihood. However, while the majority of the participants (in structured interviews, semi-structured in-depth interviews, and the focus group discussion) indicated that the marine ecosystem condition in West Bali National Park was no longer ideal or sufficient to support their livelihood needs, the option to switch to tourism was not that simple. At least 40% of the participants who took part in the structured interviews expressed their disagreement regarding switching to tourism. The results of the semi-structured in-depth interviews with fishers also showed their reluctance to embrace tourism as their main source of income. Participants' reluctance to enter tourism is likely influenced by their self-awareness of having limited skills (e.g., the ability to speak English and other foreign languages) and knowledge (e.g., the knowledge to manage tourism-related businesses such as accommodations and restaurants), as well as by a lack of financial capital or access to financial capital to start up tourism business. This is not unusual in artisanal fishing communities (e.g.Goodwin, 2002; Porter, Orams, & Lück, 2015; Walpole & Goodwin, 2001).

5.7.2. Pemuteran

The majority of Pemuteran fishers, surveyed through structured interviews, indicated their disagreement with the idea of abandoning fishing and switching to tourism as their main livelihood. There are two possible explanations for this. First, similar to fishers in West Bali National Park, the fishers in Pemuteran did not feel they were adequately equipped with the required skills and financial capital to work in the tourism industry; this was expressed during

the focus group discussion and during semi-structured in-depth interviews. Second, there is limited land in the village area for the fishers to utilise for tourism-related business. Most of the prime land by the beach and main road, was either too expensive for them to rent or purchase, or had simply already been rented or bought by existing accommodation owners, restaurant owners, and dive operators.

5.7.3. Nusa Penida

The results of structured interviews showed that the majority of fishers in Nusa Penida preferred to switch to tourism, however 42% refused to exit fishing as their main source of livelihood. Similar reasoning can be proposed for this high proportion of fishers refusing to switch their livelihood. First, many of the fishers have access to seaweed farms (Long & Wall, 1996) or manage small estate crops to supplement their livelihood. Second, the fishers may think that they have limited knowledge and skills to work in the tourism industry.

5.7.4. Comparative discussion

The assumption that fishers will exit fishing in the face of fishery decline is based on economic rationality (Dryzek, 2005), an assumption which have been extensively contested (e.g. Daw et al., 2012; Slater, Napigkit, & Stead, 2013a). Alternative livelihood strategies, which include tourism development, have been proposed to alleviate economic hardship and ecosystem degradation in many fishing communities and their fishing grounds, respectively especially in the developing countries such as Indonesia (Cinner, 2014). Despite the presence of livelihood alternatives for fishers, fishing remains relevant as a source of livelihood for many coastal communities (Sievanen, Crawford, Pollnac, & Lowe, 2005; Slater, Napigkit, & Stead, 2013b). Perhaps, this is a lot more relevant for the older or more mature fishers, who perceive fishing as

part of their cultural identity and social norms (Cinner, 2014). Similarly, in this research, while the results of the structured interviews indicated there was a significant difference in fishers' preference to exit fishing and enter the tourism sector according to the location of their MPAs, the collective results of semi - structured in – depth interviews and focus group discussions revealed strong preference amongst the fishers in the three studied MPA sites to maintain their main source of livelihood from fishing. Slater et al. (2013) explain that the availability of alternative livelihoods tends to encourage fishers to remain in non-viable fisheries (e.g. depleted fishing grounds) due to any livelihood back – up system that can subsidise their losses from fishing. This may explain the reasons why fishers in Pemuteran (who have access to farms), and those in Nusa Penida (who also practice seaweed culture and farming), prefer to remain fishing regardless of the limited economic returns from that activity.

5.8. Livelihood for future generations

5.8.1. West Bali National Park

Fishers' perceptions of declining marine ecosystem and fishery productivity are often quite accurate because of their strong association with the marine resources (Benham, 2017) and this is built into their traditional or local ecological knowledge (Mellado, Brochier, Timor, & Vitancurt, 2014). This is consistent with West Bali National Park participants' strong perceptions of marine ecosystem decline inside this MPA and the surrounding fishing grounds. This was based on their local ecological knowledge, which is consistent with earlier survey findings about the degraded marine ecosystem health in Bali (McClanahan et al., 2005; Mustika et al., 2013).

These negative perceptions about the present conditions of marine resources and their future trajectory have likely influenced participants' considerations about their children's livelihood prospects. While participants do not necessarily think tourism was the preferred livelihood option for their children due to cultural reasons, as found in other case studies (e.g. Goodwin & Walpole, 2001; Goodwin, 2002), they strongly preferred their children to not enter the fishery sector.

5.8.2. Pemuteran

The majority of Pemuteran's participants (i.e. fishers) who took part in the structured interviews expressed they would prefer their children to work in the tourism industry rather than become fishers like their parents. This is similar to participants in West Bali National Park, but this preference is also likely influenced by the fishers' perceptions that relying on the depleted marine resources will no longer be an option for their children, who will also have better training and education to enter the tourism industry than their parents.

5.8.3. Nusa Penida

The results of structured interviews showed that, similar to fishers in the other two MPAs, the majority of fishers (89%) in Nusa Penida preferred their children to work in the tourism industry rather than in fisheries. Based on the focus group discussion, the fishers felt as if their children would have better education and/or training to be successful in the tourism industry compared to their parents.

5.8.4. Comparative discussion

Predicting the trajectory of SES is important for decision making processes and setting up possible future scenarios (Folke et al., 2010; Walker et al., 2004). The trajectory of the SES will allow stakeholders and decision makers to determine whether or not the current conditions are tenable, and what are the possible steps that can be taken to either strengthen the resilience of the SES (e.g. building resilience against climate change, increased tourism) or if it is not tenable, how to transform the SES into something that is more functional (or acceptable) (Walker & Salt, 2006).

This research found that in all three MPAs, fishers' perceptions regarding the future of their SES was likely influenced by their perceptions of marine ecosystem health decline. However, their preference to remain in fishing as their livelihood, as supposed to enter tourism, was either due to cultural reasons (Cinner, 2014), a lack of capacity (Goodwin 2002), and/or the presence of other alternative livelihoods that supplement their fishing (Cinner, 2014). However, fishers' livelihood preferences for their children changed completely, as evidenced by their expectations for their children to not enter fishing. This difference of preference may suggest the following:

- Fishers perceive that the degraded marine ecosystem is untenable and it will not support viable livelihood for their children.
- A transformation strategy for them is either to increase their fishing effort (i.e. fish harder) and/or subsidise their fishing from alternative incomes (e.g. farm or seaweed culture).
- A transformation of livelihood for their children into, for example tourism, was more likely to occur due to the degraded marine ecosystem conditions.

These transformation strategies posed challenges in SES resilience. First, the presence of alternative livelihoods (e.g. farming, seaweed culture, and tourism) does not necessarily reduce fishing efforts and pressures in the marine ecosystem. On the contrary, they may create perverse subsidies for fishers and the communities by encouraging higher fishing efforts or even destructive fishing (Cinner, 2014). Second, as the fishers (or their communities) have diverse options of livelihoods, their stewardship of their fishing grounds and marine ecosystems in general will likely decrease. In other words, this creates less attention on fishery management solutions, in which the establishment of an MPA is one of the fishery management tools available to address fishery and marine ecosystem related issues. Third, there are social issues related to the potential loss of the next generation of fishers in the future that signals shifts in cultural norms and/or lifestyle (Cinner, 2014).

5.9. Research contribution to understanding social – ecological system resilience in marine protected area tourism

This section discusses the proposed contribution of this research towards the growing body of knowledge within the field of SES resilience. Based on the results of stakeholders' perceptions, the results of this research suggest there are challenges in implementing the Resilience Assessment Framework (RAF) for the three study sites, and also in many other MPAs (especially in developing countries). As a consequence, an alternative model is offered to enhance and extend the RAF by emphasising the critical role of an independent quality control team who has the mandate to guide MPA stakeholders through an adaptive learning process as a pathway to improved SES resilience in the MPA context.

5.9.1 Challenges in applying the Resilience Assessment Framework

The findings of this research suggest that there was a lack of understanding and/or inconsistencies in understanding SES resilience across all stakeholders in all three studied MPA sites. This hampers adaptive learning efforts, which is central in SES resilience management (Brown, Gray, & Stead, 2013). Without the presence of adaptive learning, and meaningful feedback into the RAF (e.g. on issues such as declining health of marine ecosystems and/or social conflicts) important matters which influence the resilience of SES will tend to be addressed in isolation and will be ineffective in addressing the issues. These challenges to understand and apply adaptive learning are expected, especially from the local stakeholders, because, as stated by Gibbs (2009), many coastal communities: i) do not have the capacities to explicitly manage for resilience; ii) could not afford to make the economic sacrifices of their

sector (e.g. by reducing fishing efforts or imposing a fishing moratorium); and iii) experience difficulties in preventing cumulative ecological impacts that affects resilience. In addition, in developing countries such as Indonesia, these challenges in adaptive learning also apply to the government agencies that are connected to the SES whose human resources are either not properly trained or had the experience, and have to operate under insufficient funding.

However, the challenges do not lie with the MPA stakeholders alone. Gibbs (2009) also reminded that there is no consensus that measures the level of resilience or adaptive capacity of SES, nor is there specific management intervention that can be applied to ensure resilience outcomes.

Presently in Indonesia, the government has already issued an MPA management effectiveness standard (Indonesia, 2014). However, the standard focusses primarily on the administrative and governance aspects of MPA management, which means a highly assessed MPA with a gold standard (i.e. the highest category for an effective MPA), does not necessarily mean a resilient MPA. Another model that considers aligning human interactions and the natural environment is the United Nations' Man and Biosphere (MAB) programme. This is based on voluntary participation from each nation which nominates a particular area in their country that demonstrates high levels of sustainable use of resources by the community and provides evidence of protection measures to safeguard the ecosystem (Brown, 2002). Sites that get to be selected as MAB will bring pride to the host nations and enhance tourism for the area. However, as this programme is based entirely on voluntary participation, there is no legally binding agreement between the host country and the United Nations that will prevent the host country to opt out from the MAB programme should it decide to pursue economic development activities

incompatible with MAB sustainability goals. Nonetheless, the lack of standards should not prevent any attempt to build resilient SES, rather it is more important to focus on developing and taking part in experimentation and a learning process to build resilience (Holling, 2001). However, to conduct a legitimate resilience assessment still requires a well-designed process that can consider the complexity of the systems, their dynamics and cross scale interactions, assess compatible governance, and synthesise findings to deliver plans of actions for management revision and possibly reviewing or challenging current value systems (e.g. anthropocentric development goals) to allow for transformation (e.g. resilient based development goals).

To overcome these challenges, I am proposing a facilitation approach to establish quality control in resilience assessment, which is explained in the next section.

5.9.2. RAF implementation: Independent RAF quality control for adaptive learning

As resilience assessment is not an exact science with standardised tools that can predict a certain resilience outcome for a particular SES (Gibbs, 2009), I am proposing the involvement of an independent facilitation team as a way to guide and inform MPA stakeholders in carrying out this assessment process as well as to ensure there is high quality output derived from a rigorous resilience assessment process implemented by the appointed MPA authority and its partners (e.g. community groups, NGOs, fishing groups, and tourism operators). The aim of the team is not to perform the resilience assessment for the MPA (or any SES unit), which is expected to be carried out separately by either a government appointed agency, communities, private sectors, or a collaborative team comprising diverse stakeholder groups. Rather, the team is positioned to be an independent quality control team that will facilitate and guide local MPA stakeholders to

conduct their resilience assessment (Figure 21). The proposed objectives of the independent resilience assessment quality control team are to:

1) Validate adaptive learning process that take place at each stage.
2) Facilitate constructive debate and a decision-making process among MPA stakeholders without sacrificing the scientific evidence that informs the process.
3) Ensure that values or belief systems are considered, but that they do not take precedence over the key SES resilience priority.

The team should comprise the following attributes:

- A group of individuals with diverse disciplines and/or experience who is committed to work under the transdisciplinary framework (Jahn, Bergmann, & Keil, 2012; Rosenfield, 1992) to address SES related issues.
- Possess a wealth of knowledge, understanding, and experience of various systems (i.e. social and natural) and their interactions across scales.

5.9.3. Independent quality control team interaction with MPA stakeholders to implement RAF

The independent quality control team will interact closely with MPA stakeholders at each phase of the RAF (Figure 22). The difference between the MPA stakeholder team and the quality control team is illustrated in Table 19. Depending on the knowledge and experience of the MPA stakeholders who are conducting the RAF, the interaction can range from facilitating the whole process and guiding MPA stakeholders to make decisions, an approach which is suited for

scenarios where stakeholders have limited knowledge and experience; or merely performing quality control at the end of each phase and providing recommendations.

Table 19. Difference of roles between MPA team and Resilience Assessment Quality Control Team.

	MPA team	Resilience assessment Quality control team
Objective	Carry out a RAF to establish a plan that will increase MPA resilience	Perform quality control and assist with RAF facilitation
Reporting line	Appointed agency in charge (e.g. in Indonesia it is Ministry of Marine Affairs and Fishery or Ministry of Forestry for national MPAs or head of province/provincial government for provincial MPAs)	No direct reporting line to Government agency however may report its findings to Office of the President; regional and International agencies (e.g. Coral triangle; UNEP, etc)
Team members	Head of MPA, and key stakeholders from the community (e.g. local government agencies, fishing groups, NGOs, tourism sectors, donor agencies etc.)	Experts, transdisciplinary team, NGOs/community representative / religious leaders.
Product output	Transformation plan, revised management plan, action plan (with revisions incorporated based on the output provided by the quality control team)	Recommendation and /or endorsement. Additional output such as reports/recommendation on awareness and capacity building, coordination

During the first stage, (i.e. system description), the quality control team can assess the capacity of the MPA stakeholders team to describe their SES, its social (e.g. tourism) and ecological (e.g. conservation) features; and what are the prevalent issues affecting those systems. How did they come up with such information? Did this information come from sound monitoring regimes following legitimate protocols, or were they mostly based on anecdotal or unstructured information? The team will provide assistance to organise extra help for MPA stakeholders if they require it to develop their capacity to help them describe their system, its associated issues and (potential) impacts on the SES. Furthermore, the team will also be able to assist in capacity building assessment needs to ensure skills or information are matched to specific groups within the MPA (Wu & Tsai, 2016).

At the second stage, (i.e. system dynamics), the quality control team will facilitate the gathering of information regarding MPA stakeholders' understanding about thresholds and transitions (e.g. declining catch rates of targeted fishes; and/or increasing number of diving operators in the village).

At the third stage, (i.e. interactions), the quality control team is expected to provide information about cross – scale interactions between the focal SES (i.e. the MPA) with the higher scale SES (Figure 21). This is because many local stakeholders do not have access to information regarding systems outside their focal SES (Berkes, 2009). For example, the government decision to incentivise visitor arrivals by waiving or easing up tourist visa requirements (e.g. visa on arrival) for countries with high tourism potentials such as China and India; or the increasing climate induced event that caused higher surface water temperature leading to coral mortality in the many coral reef communities on the northern coastline. Such information or events that took place elsewhere (i.e. in higher level SES) may not be disseminated to the focal SES and their repercussions may not be anticipated or understood by local stakeholders.

At the fourth stage, (i.e. system governance), the quality control team will verify whether the present governance system for the MPA is best suited to address focal SES needs and it may suggest alternative governance systems if required.

At the final stage, (i.e. acting on the assessment), the quality control team will be able to guide the MPA stakeholders' team to develop an action plan to increase the resilience of the focal SES or, if the focal SES (or MPA) is considered to have been severely degraded due to anthropogenic pressures and/or natural disturbances, then develop a programme that will help transform the focal SES to a more resilient state.

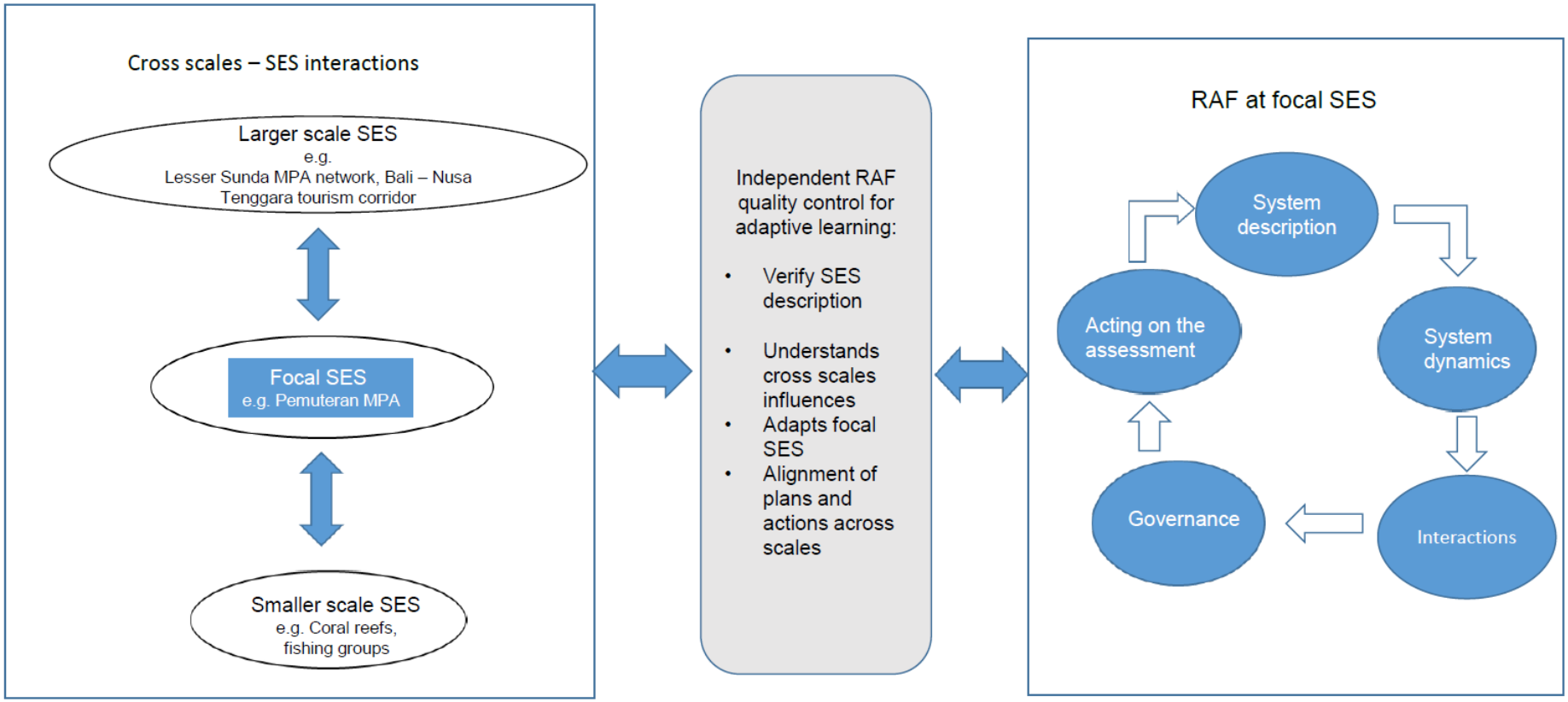

Figure 21. Independent RAF quality control for adaptive learning

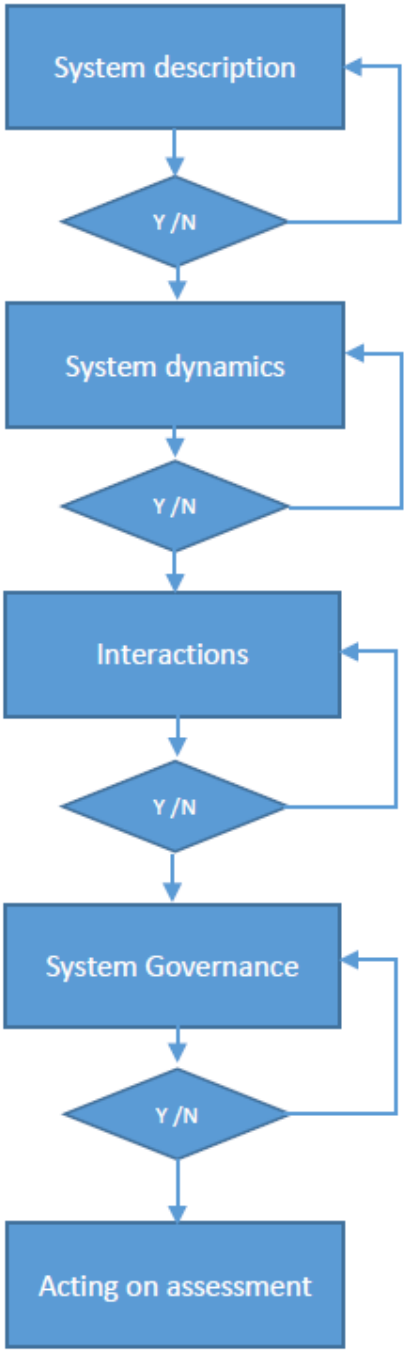

Figure 22. Quality controlled RAF process at focal SES

5.9.4. Resilience assessment quality control team: Putting it into practice

The RAF quality control team is a team comprising experts from multiple disciplines and with diverse experience. Ideally, this team shall not be accountable to any Ministry or agency, rather they must have the highest mandate possible to be independent to carry out their tasks and be able to coordinate with virtually all ministries and related agencies, central and regional/provincial government, and the private sector.

Within the Indonesian context, an example of an independent entity that has produced respectable work is the Commission for the Eradication of Corruption (or commonly known by its local abbreviation KPK). This is an example of an independent entity that was created through a parliamentary Act to address rampant corruption that has plagued the country for decades. To say that the creation of such entity does not create controversies is an understatement because over the years those who felt threatened by the KPK have launched many attempts to weaken or disband this agency/commission completely. However, strong public support for KPK's existence has demonstrated how social pressure for change has forced the Indonesian government to take serious actions and maintain its commitments to corruption abatement.

Similarly, the creation of a powerful independent entity is needed to oversee the quality and consistency for SES resilience planning and implementation across the country. This is to ensure that there is synergy in cross scales SES planning, among government agencies, resource users and their sectors (e.g. fisheries and tourism sectors) and the local communities. MPA stakeholders will anticipate the fact that one of the realities in developing resilience means certain sectors of the communities (or the economies) may lose out (e.g. recommendation to implement no-take MPAs to close fishing grounds will impact fisheries and certain types of

extractive underwater tourism such as free diving - spear fishing), and certain types of economic development, including tourism development, may have to be reconsidered or discarded completely (e.g. investment in mass tourism infrastructure).

5.10. Summary

This research has shown that strong similarities in stakeholder's perceptions of their marine ecosystem, social system including fisheries, tourism, and MPAs across the three case studies. Declining qualities of marine ecosystem health and its subsequent effect on fishery productivity dominated the findings of this research and were consistent with the information from other research on Bali and other similar areas in Indonesia and the wider coral triangle region. The use of mixed methods enabled the research to verify the participants diverse, and sometimes contradicting responses, to the research questions. The research findings revealed there were gaps in terms of participants' capacity in acknowledging key issues that affect the resilience of SES such as anthropogenic roles (e.g. fishery and tourism) and their impacts on the SES. Similarly, participants' perceptions of fisheries, MPA, and tourism in the context of SES resilience were also mixed and/or inconsistent with resilience principles. To ensure adaptive learning to take place this research proposed the creation of a quality control team that is empowered to assist and endorse the resilience assessment process at the MPA level.

Chapter 6: Conclusion

6.1 Introduction

This research assessed stakeholders' perceptions of the impact of MPA tourism on SES resilience. Fishers, whose presence strongly influence SES present and future conditions, are considered one of the most affecting and affected stakeholders in MPAs. The influx of tourism in many coastal communities have added another component and challenges to the already degraded marine ecosystems in many areas in Indonesia and other countries in the coral triangle region. Understanding fishers' and other key stakeholders' perceptions about their SES and its trajectory inform adaptive learning processes. The Resilience Assessment Framework (RAF) is a model which, to be effective, needs to be informed by an adaptive learning process. The establishment and management of MPAs and/or MPA networks to sustain livelihoods and other ecosystem services (e.g. fisheries and tourism) through biodiversity protection is an example of management approach which seeks to address SES resilience. However, despite over four decades of modern MPA management, the effectiveness of these MPAs to reverse the decline of marine ecosystem health is very low in countries such as Indonesia. This suggests that there is still a significant challenge in ensuring that MPAs actually work as a strategy to benefit marine ecosystems and the people who depend on them. In addition, this research has shown there is a gap between stakeholders' perceptions of SES resilience and the reality of their world today and in the future.

The research reported in this thesis applied a pragmatic approach using a comparative case study of three MPAs in Bali, Indonesia. Mixed methods, comprising various forms of interviews (i.e. structured, semi -structured in-depth; and focus group discussion), was implemented to assess the perception of fishers, government officials, tourism operators, and conservation NGO officers at all three MPAs. The interviews were structured and adapted from the RAF to assess research participants' perceptions of the marine ecosystem, social systems such as fisheries, tourism, and MPAs; and aspirations for SES. From the perspective of the RAF, the stakeholders' perceptions inform the issues, approaches, preferences, which may explain the status and trajectory of the SES.

The findings of this research revealed problems encountered in many MPAs, which is consistent with the findings of key literature on the same subject and related areas such as fisheries management, and marine ecosystem health. The results of this research is consistent with previous findings that pointed out the failures of many MPAs to address SES resilience was due to a lack of effective protection of marine ecosystems from extractive or degradative activities. The introduction of tourism in MPAs might have increased awareness and provided alternative livelihood options, but did not prove to have improved marine ecosystem condition in general, rather findings suggest tourism may have added more challenges to the SES. While findings of this research may not be new in a general sense it does provide the first empirical data on MPAs and SES in Bali, Indonesia. In addition, it offers a revised framework which can approve the effectiveness of the RAF in its aims to improve SES. The suggestion that a of group of experts, who work with a transdisciplinary approach, and who are empowered to validate and facilitate RAF implementation at the local MPA scale is important. Given that an adaptive learning

process and meaningful involvement of key stakeholders and decision makers is considered critical to an effective implementation of the RAF it is important to ensure that such adaptive learning is able to occur through credible and valid information. This can be achieved with the inclusion into the process of a independent quality control team. Without this the RAF process is flawed and will struggle to overcome barriers due to lack of knowledge and/or conflicting and incompatible worldviews.

This chapter will summarise the findings of this research within the context of the research questions. It discusses the limitations of the findings based on the constraints encountered, further discusses the contributions of this research, and suggest the implications and applicability of this research for various sectors and locations.

6.2 Revisiting the research questions.

6.2.1 How do the stakeholders perceive the conditions of marine ecosystem health?

- Fishers, across the three MPAs reported significant decline in reef fishes, especially edible and economically targeted fishes, in their fishing ground. Similarly, tourism operators also witnessed marine ecosystem degradation over the past 20 years.
- While the data collected in this research showed there were inconsistent perceptions with regards to the condition of coral reefs over the past 10 years, results from other research suggested that there was no significance difference between the quality of corals inside and outside of the MPAs (i.e., in Pemuteran and West Bali NP).
- Both fishers and tourism operators acknowledged that the practice of dynamite and/or cyanide fishing has negatively impacted both the fishery and coral reefs ecosystem in

general. However, most fishers did not understand that overfishing had also contributed towards the decline of the marine ecosystem including fishery.

6.2.2 How do the stakeholders perceive the impact of the MPA on their social – ecological system?

- Although most of the stakeholders supported the presence of the MPA in their respective villages and/or fishing grounds; their level of understanding was low with respect to the roles of MPAs and/or MPA networks and how conservation is a necessity for sustainable livelihoods.
- Stakeholders, especially fishers in West Bali National Park and Pemuteran still held reservations with regard to effectiveness and benefits of their MPAs. These reservations were caused mainly by their perceptions of MPA management authorities lack of enforcement and stakeholder engagement, and inconsistencies in implementing MPA regulations.

6.2.3 How do the stakeholders perceive the impact of tourism on their social – ecological system?

- The stakeholders widely acknowledged the roles of marine tourism operators, especially in the Pemuteran MPA, as a catalyst for conservation or MPA development.
- However, stakeholders were also critical about the role of tourism and its effects on local marine ecological and social systems.

- While MPA tourism was considered to have enhanced the livelihood for local communities and surrounding areas, stakeholders also raised their concerns and doubts regarding the types of tourism being developed or currently being promoted.

6.2.4 How do the stakeholders envision the future of their social – ecological system?

- Fishers in general expressed their desire to remain being fishers. However, they perceived that there is no more future in fishing for their children nor do they want their children work as fishers.
- The presence of MPAs and tourism do not provide a guarantee or hope for the fishers that their fishing ground will be healthier in the future.
- Likewise, fishers, did not necessarily perceive tourism as an alternative livelihood for themselves. However, they did believe that there will be better opportunities for their children to pursue a more stable and/or safer livelihood in tourism in the future.

6.3 Limitations of results

Discussion about the pragmatic limitations and challenges of this research design as well as the strategies to address them was presented in Chapter Three. This covered issues with regards to the research paradigm, instruments used, and cultural and language influences. In general, the research design applied for this thesis was appropriate, and it enabled the collection and critical analysis of a diverse range of information. Nonetheless, there were some research limitations, specifically based on its case study approach.

With respect to the case study approach, common limitations that beset such research, as summarised by Flyvbjerg (2006, p. 221), include the following:

i) Generalisation cannot be made based on single case study and thus a case study cannot contribute to scientific development;

ii) Case study has a bias towards verifications because it is used to confirm researchers' preconceived notions;

iii) Challenges in generating general propositions and theories.

This research faced the above mentioned three issues that challenge the value of its case study approach.

First, regarding the generalisations, the challenge of a case study is to consider how representative or relevant the case study is to the rest of the world. If a case study has limited relevance to other sites or scenarios then it has limited application or value for other places. However, Flyvbjerg (2006) argued that generalisations tend to be overvalued while the contribution of a single example is often overlooked. Furthermore, to address this challenge, for this research, a multiple case study format (that is three case studies comprising three MPAs) was implemented. The rationale for this was discussed in the research design chapter. This research probed common challenges that faced MPAs, which at the global level, share the same issues with respect to their design flaws that allow extractive activities such as fishing to occur (Costello & Ballantine, 2015; Mora et al., 2006) which is detrimental to their objectives for biodiversity protection and sustaining livelihoods (Costello, Wilson, & Houlding, 2013). These problems were mainly caused by lack of scientific input, which was often influenced by low social and /or political support (Costello, 2014; Sale, P.F., 2008; Sale, P.F. et al., 2005).

Likewise, in developing countries such as those found in the coral triangle region (i.e. in part of South East Asia and Melanesian countries), the conditions of marine ecosystem health have been found to be generally in decline (Burke et al., 2002; 2011). This suggests many of the MPAs found in this region are not effective in protecting marine biodiversity or in sustaining fisheries or other livelihoods (e.g. tourism).

The second main limitation is about researcher's bias in verification. This research is about stakeholders' perceptions within the context of MPA tourism and its impact on SES resilience. Issues covered in this research such as marine ecosystem health, unsustainable exploitation of fisheries, marine conservation efforts including the challenges faced by MPAs, were consistent with findings in the literature by several leading authors in this area. In addition, findings about fishers or stakeholders' perceptions regarding exiting from fishing or reducing fishing pressures to other alternative livelihoods were also varied, if not complicated, as mentioned by several authors (e.g. Cinner, 2014; Bookbinder, 1998; Goodwin, 2002). Furthermore, the application of mixed methods allowed verification of research participants' responses to interviews to screen cultural biases (e.g. the tendency to provide responses that are deemed socially acceptable), and inconsistencies.

Regarding the third main limitation, which pertains to the difficulty to summarise case studies into new theories and/or prepositions, Flyvbjerg (2006) pointed out that the difficulty is in the properties of the reality studied and not the research methods. This research proposed a model to enhance the application of RAF by emphasising the establishment of transdisciplinary team, which is empowered to validate and/or facilitate RAF implementation by local stakeholders. This is to address the above- mentioned challenges with respect to lack of scientific input for MPAs

design around the world, especially in developing countries such as Indonesia, where many small coastal communities would have limited capacity to manage resilience in their area (e.g. MPA scale) to other or higher scales (i.e. cross-scales) (Gibbs, 2009).

6.4 Implications of this research

The impacts of tourism in MPAs, especially in developing countries, continue to be an important SES resilience research area. The complexities of issues pertaining to the outcome of social and natural systems interactions are expected to involve at least two major sectors; specifically fisheries (which is often small scale or artisanal), and tourism, which is developing rapidly and becoming diverse in their services with the advance of technology. While several case studies (e.g. Bottema & Bush, 2012; Svenson et al., 2010) have demonstrated a potential symbiotic relationship between tourism and marine conservation that has long been proposed (e.g. Budowski, 1976; Salm, 1980), performance of MPAs where there is tourism presence in the area does not guarantee positive contributions towards conservation (e.g. McClanahan et al., 2005) nor does it reduce fishing pressures (e.g. Cinner, 2014).

The performance of MPAs around the world, and especially in developing countries, remains unsatisfactory due to poor integration of scientific information that often had to be sacrificed due to socio-economic pressures (Costello & Ballantine, 2015; Sale, P.F., 2008; Sale, P.F. et al. 2005, McClanahan et al., 2008). As this research covered SES comprising many different sectors and stakeholders such as MPAs, tourism, fisheries, as well as the formal (e.g. government) and informal actors (e.g. NGO and community groups), the following sections discuss implications of these findings beyond academia and to other relevant sectors such as: Governments, tourism, and NGOs.

6.4.1. Implications for academia

Essential characteristics of SES and its interactions include the complexities and unpredictability of the systems and their components as an outcome of continuous adaptive processes.

Multidisciplinary researchers are increasingly being challenged to collaborate to address the complexities in SES and propose new knowledge and/or innovation that will increase our understanding and build better pathways to SES resilience. The call for a transdisciplinary approach in SES research is stronger, and especially with the complexity of problems faced by natural and social systems interactions such as fisheries, tourism, and marine conservation, production of new knowledge and/or innovation in academic research is needed, as well as a better understanding of the transdisciplinary research framework that needs to be developed further (Jan, Berkman, & Kiel, 2012).

6.4.2. Implications for government

The establishment of coral triangle initiatives (CTI) in 2009, which is supported by six countries (i.e. East Timor, Indonesia, Malaysia, Papua New Guinea, The Philippines, and Solomon Islands) signalled important progress in regional marine conservation commitment for food security. The establishment of MPAs and MPA networks are part of the CTI initiatives action plan to utilise area conservation management approaches to develop SES resilience in many coastal communities in this region.

The findings of this research suggest that there was a lack of understanding among MPA stakeholders in terms of basic marine conservation concepts; and especially the impact of fisheries and tourism. Furthermore, stakeholders were not completely aware with regards to the objectives of MPAs and MPA networks, and especially the significant roles of marine reserves

or no-take-zones within MPA networks to sustain fisheries and other livelihoods such as tourism. This lack of understanding occurred amongst many groups of stakeholders, not exclusively among fishers. Leading marine conservation authors (e.g., Costello, 2015; Sale, P.F., 2003) blamed this lack of understanding on the confusing mixed messages disseminated by conservation organisations, tourism operators and/or government agencies that suggest multi-purpose MPAs will address both the demands of human exploitation of marine resources and biodiversity conservation. Many MPAs in Bali, as elsewhere in the world, utilise a multi-use zoning system and do not allocate enough area for complete protection from extractive activities (Costello, 2014; Costello & Ballantine, 2015; Roberts & Hawkins, 2000). However, with only a small number and limited size of no-take-zones or marine reserves, the benefits of MPAs for fishery productivity will be very small, if at all. Conversely, MPAs which do not deliver on their "promise" of enhancing fishery productivity will not impress fishers and tourists alike.

Central to the strategy of developing a resilient marine social-ecological system in Bali, and a significant component of the adaptive measures, will be the improvement of the existing design of the MPA network in Bali into a network of no-take marine reserves and ensuring that this reserves network is functional and operationally enforced. It is expected that ill-informed stakeholders and fishers will react negatively to the idea of fishing ground closures needed to establish a network of no-take marine reserves (Costello & Ballantine, 2015). Hence, a strong leadership and awareness program must be designed to build stakeholder support for such an approach. The capacity building has to be tailor made to specific stakeholder group within the SES (Wu & Tsai, 2016), and this also includes various government agencies.

6.4.3. Implications for the tourism sector

The growth of marine tourism has been very strong in many developing countries. Hence, Bali, like many other tourism destination islands in the coral triangle region, and other tropical destinations, is competing to attract tourists and generate high revenue from this sector. While Indonesia has recognised the need to develop its tourism sustainably (GOI, 2009, 2011) the country, like many other countries in the coral triangle region and elsewhere in the world, has found it difficult to make sustainable tourism work, and this applies to the marine tourism sector too. The heavy emphasis from governments to set ambitious tourism growth targets is still centred on the increasing the number of tourist arrivals and the revenue that they generate (GOI, 2011). Such a singular focus and heavy reliance on using only financial indicators as a measure of success will ignore other important indicators that are needed to measure the success of the ecological - social system that supports local peoples. Failure to recognise and incorporate the importance of these indicators, which are not always financial or economic value, will decrease social and ecological system resilience, which in turn will negatively impact tourism competitiveness in the long term. The establishment of MPAs for tourism offers opportunities for innovation, which is often required for managing SES resilience, that can potentially bring added value for sustainable tourism sector in Bali and other marine tourism destinations.

6.4.4. Implications for NGOs

The role of NGOs for nature conservation and community development is of paramount importance for developing countries in the coral triangle region including Indonesia. This research, for example, featured the outcome of conservation NGOs contributions in Bali and across the coral triangle region to advance the science, partnership, and political commitments

for marine conservation, and development of resilience SES. Specifically, for MPAs, the key messages were confusing if not contrary to the latest scientific literature (Costello & Ballantine, 2015). While the presence of international conservation NGOs have been instrumental in the design and development of MPA networks in the coral triangle region, and as shown in this research, including Bali and the Lesser Sunda ecoregion (e.g. Green et al., 2008; McLeod et al., 2009; Wilson et al., 2011), findings of this research suggest a more direct or assertive approach is required to engage government partners to accept the establishment of more no-take-areas and/or the assertive removal of extractive activities from within MPAs. This needs to be supported by stricter management regimes in relevant key sectors such as in fisheries and tourism as a way to fulfil CTI commitment and create pathways for improved SES resilience. In addition, the NGOs will continue to play a pivotal role to facilitate capacity building efforts for both the government and communities, especially in integrating science into decision making processes that enable policy makers and the public to understand and accept scientific principles as a basis of building functional MPAs and MPA networks.

6.5 Research contribution

Findings of this research demonstrated a gap of knowledge and understanding amongst the stakeholders with respect to marine ecosystem issues and the roles of MPA to safeguard biodiversity and sustain livelihoods. While considerable progress has been made regarding MPA and MPA network development in Indonesia and other countries, the majority, if not all, of these MPAs still allow extractive activities, mainly fisheries, to occur within the MPA boundaries. Hence, a model, that includes an independent RAF quality control team to facilitate adaptive learning, is proposed to facilitate MPA stakeholders to have an informed engagement in the RAF

based planning and decision making process. The objectives of the independent RAF quality control team are to:

- Facilitate adaptive learning processes at each stage in the RAF process.
- Facilitate constructive debate and a decision-making process among MPA stakeholders without sacrificing the scientific evidence that informs the process.
- Ensure that values or belief systems are considered, but that they do not take precedence over the key SES resilience priority.

6.6 Moving forward

The establishment of more MPAs and MPA networks have taken place and are likely to continue to take place in Indonesia, in other coral triangle nations in the region, and across the world for years to come. However, common problems are still encountered in many MPAs around the world today, and this pertains to the failures to exclude extractive activities, mainly fisheries, to make these MPAs functional in their objectives to protect biodiversity and sustain livelihoods. In developing countries, MPA management faces more challenges because of the demand from many coastal communities that rely on fishing for food as well as for livelihoods. The introduction of tourism in MPAs, while it has been proposed as part of the solution to the conservation and economic issues facing many MPAs especially in developing countries, has not proved to significantly contribute towards improvement of marine ecosystem health. One of the key findings in the three studied MPAs in this research suggests, based on fishers' perceptions that the condition of the marine ecosystem is continuing to deteriorate. As a consequence, this would not make fishing a viable source of livelihood for their children or future generations. In

addition, despite the strong growth of marine tourism in Bali, many fishers had limited capacity and little desire to switch their livelihood to tourism.

Suggested future research includes the development and testing of a transdisciplinary mechanism to allow scientific input to form the basis of an adaptive learning process (Jahn et al., 2012) that has been absent in many MPA management regimes globally (Sale, P.F., 2008; Costello & Ballantine, 2015). Within the tourism sector, developing better understanding about the typologies of marine tourists according to specific niche groups (e.g. Orams & Towner, 2013) may give some insight into the compatibility of marine tourism, and marine tourists with other resource user groups such artisanal fishers. With regard to capacity building efforts, the findings of this research is in agreement with Wu and Tsai (2016) and their recommendation to build tailor made tourism capacity development activities that acknowledge the difference subsystems within the SES (or MPAs) to address issues pertaining to conflicts and alignment of different management objectives that occur across various sectors.

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Appendix 1. IUCN's protected area categories

Category	Designation	Primary objective
Ia	Strict nature reserve	To conserve regionally, nationally or globally outstanding ecosystems, species (occurrences or aggregations) and/or geodiversity features: these attributes will have been formed mostly or entirely by non-human forces and will be degraded or destroyed when subjected to all but very light human impact
Ib	Wilderness area	To protect the long-term ecological integrity of natural areas that are undisturbed by significant human activity, free of modern infrastructure and where natural forces and processes predominate, so that current and future generations have the opportunity to experience such areas
II	National park	To protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation
III	Natural monument or feature	To protect specific outstanding natural features and their associated biodiversity and habitats.
IV	Habitat/Species management area	To maintain, conserve and restore species and habitats.
V	Protected landscape/seascape	To protect and sustain important landscapes/seascapes and the associated nature conservation and other values created by interactions with humans through traditional management practices
VI	Protected area with sustainable use of natural resources	To protect natural ecosystems and use natural resources sustainably, when conservation and sustainable use can be mutually beneficial.

Adapted from Dudley (2008).

Appendix 2. Research assistant confidentiality agreement

Confidentiality Agreement

Project title: **Stakeholders' perceptions of the impacts of tourism on the social and ecological resilience of marine protected areas in Bali, Indonesia.**

Project Supervisor: ***Mark B. Orams***

Researcher: ***Fahri Mirza Kurniawan Pedju***

- ○ I understand that all the material I will be asked to record is confidential.
- ○ I understand that the contents of the Consent Forms, tapes, or interview notes can only be discussed with the researchers.
- ○ I will not keep any copies of the information nor allow third parties access to them.

Intermediary's signature:

Intermediary's name:

Intermediary's Contact Details (if appropriate):

Date:

Project Supervisor's Contact Details (if appropriate):

Approved by the Auckland University of Technology Ethics Committee on 14 November 2011
AUTEC Reference number 11/303

Note: The Intermediary R.A should retain a copy of this form.

Appendix 3. Transcriber's confidentiality agreement

Confidentiality Agreement

Project title: **Stakeholders' perceptions of the impacts of tourism on the social and ecological resilience of marine protected areas in Bali, Indonesia.**

Project Supervisor: ***Mark B. Orams***

Researcher: ***Fahri Mirza Kurniawan Pedju***

- ○ I understand that all the material I will be asked to transcribe is confidential.
- ○ I understand that the contents of the tapes or recordings can only be discussed with the researchers.
- ○ I will not keep any copies of the transcripts nor allow third parties access to them.

Transcriber's signature:

….....……

Transcriber's name:

….....……

Transcriber's Contact Details (if appropriate):

……..

Date:

Project Supervisor's Contact Details (if appropriate):

Approved by the Auckland University of Technology Ethics Committee on 14 November 2011 AUTEC Reference number 11/303

Note: The Transcriber should retain a copy of this form.

Appendix 4. Research participant consent form

Project title: **Stakeholders' perceptions of the impacts of tourism on the social and ecological resilience of marine protected areas in Bali, Indonesia.**

Consent Form

Project Supervisor: ***Mark B. Orams***

Researcher: ***Fahri Mirza Kurniawan Pedju***

- ○ I have read and understood the information provided about this research project in the Information Sheet dated:29 Oct 2011 .
- ○ I have had an opportunity to ask questions and to have them answered.
- ○ I understand that notes will be taken during the interviews and that they will also be audiotaped and transcribed.
- ○ I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.
- ○ If I withdraw, I understand that all relevant information including tapes and transcripts, or parts thereof, will be destroyed.
- ○ I agree to take part in this research.
- ○ I wish to receive a copy of the report from the research (please tick one):

  Yes○ **No**○

Participant's signature:

Participant's name:

Participant's contact details (if appropriate):

Date:

Approved by the Auckland University of Technology Ethics Committee on 14-Noveber-2011 AUTEC Reference number 11/303

Note: The Participant should retain a copy of this form.

Appendix 5. Participation information sheet

Participant Information Sheet

Date Information Sheet Produced:

29-October-2011

Project Title

Stakeholders' perceptions of the impacts of tourism on the social and ecological resilience of marine protected areas in Bali, Indonesia**.**

I invite you

My name is Mirza Pedju and I am a student at Auckland University of Technology. I am conducting a PhD research project that will assess the perceptions of tourism stakeholders on the social and ecological resilience of marine protected areas in Bali. Your participation is valued and will contribute towards better understanding of the perception of stakeholders towards the impact of tourism on marine protected areas. Your participation is voluntary and you may withdraw from the project at any time during the data collection. It is your choice to participate in this research; prior relationships or standings with partner organizations will not be affected by your choice.

What is the purpose of this research?

The purpose of this research is to investigate stakeholders' perceptions on the impact of tourism with respect to marine protected area resilience in Bali - Indonesia. Understanding stakeholders' perceptions is essential because it influences the governance and management of the marine protected areas and, as a consequence, has wider influence on the local community and the marine resources they often depend on. This is particularly important for Indonesia because the nation underwent a major decentralisation and legal reform processes in 1999 and 2004, which promoted greater local participation in decision making of social, economic and political matters (Schmit, 2008)(Schmit, 2008)(Schmit, 2008)(Schmit, 2008)(Schmit, 2008)(Schmit, 2008)(Schmit, 2008)(Schmit, 2008)(Schmit, 2008)(Schmit, 2008). Thus, local stakeholder perceptions have become a vital aspect in shaping policies and regulations pertaining to marine conservation and tourism development, including in Bali.

The overarching question for this research is: How do stakeholders perceive the impacts of tourism on the resilience of marine protected areas in Bali?

How was I identified and why am I being invited to participate in this research?

You were chosen to participate based on your role in the relevant government agencies, non-governmental organisations, marine tourism related business and/or association, marine resource utilisation, and local communities. I used the relevant government agencies, local village offices, district tourism services, conservation non-governmental organisations, local fishing group, or a referral from another member of the community to obtain your contact information.

Semi-structured interviews

If you were identified as a participant for the semi-structured interview, this choice was based on your role in your organisation, business, association, marine resource use, or community.

Structured interview

If you were randomly identified as a participant for the key informant structured interview, this choice was based on your role as a fisher and/or seaweed farmer.

Focus groups

If you were identified as a participant for the key informant semi-structured interview, this choice was based on your role as a fisher and/or seaweed farmer

What will happen in this research?

Semi-structured interviews

This research is assessing the perceptions of MPA tourism stakeholders. If you are participating in the semi-structured interviews, you will be asked questions about your knowledge on marine ecosystem health, marine protected area, and marine tourism.

Structured interviews

Randomly selected participants comprising members of fishing communities will be requested to answer a structured questionnaire pertaining to marine ecosystem health, marine protected areas, and marine tourism

Focus groups

The focus group discussion will take place in fishing communities to assess participants in depth knowledge pertaining to marine ecosystem health, marine protected areas, and marine tourism. During the discussion, participants will be requested to provide written and/or visualisation images to describe various issues.

What are the discomforts and risks?

Some of the discussion may touch upon issues pertaining to: marine conservation and marine tourism policies; illegal marine resource utilisation activities; conflicts between and/or within individuals/organisations/agencies; and conflict among marine resource users, these types of questions will not ask for names, locations, times or specific incidents, but rather ask about the

general occurrences. However, you may feel uncomfortable telling us about issues that have faced in your agencies, organisation, business unit, and/or community. You may be concerned that you or the group you are involved with may be able to be identified as a result of the research.

How will these discomforts and risks be alleviated?

All questions are optional, and you may choose not to answer some questions. All answers are confidential and your answers cannot be linked to you personally or your community. Your responses are confidential and will be stored anonymously in a database.

What are the benefits?

The results from this research will be used towards the write up of a thesis for my PhD. Your responses will help me to articulate your perception as MPA tourism stakeholder and it is anticipated that the findings will be useful for relevant agencies or organisation that are interested in increasing the contribution of marine tourism toward resilient social-ecological systems.

How will my privacy be protected?

Only I and my research assistants will know your identity when we meet in person. Unless you wish to be identified, I will use only pseudonyms or arbitrary capitals in my notes and records. Data will be presented in aggregated form for the final write up.

What are the costs of participating in this research?

There are no monetary costs associated with participation. If you wish to participate, the time requirements will be 20 minutes to answer structured questionnaire; 45 minutes for key informant interviews; and 2.5 hours for focus group discussion. Meetings will be conveniently scheduled.

What opportunity do I have to consider this invitation?

You have until 31January 2012 to consider this invitation. Formal data collection will begin after the holidays in 1February 2012.

How do I agree to participate in this research?

To participate in this research, you will be asked to give verbal or written consent. Before data collection begins, I will provide you with the necessary forms and/or information.

Will I receive feedback on the results of this research?

The result of this research will be compiled into an extended executive summary and will be distributed to relevant government agencies, non-governmental-organisations, marine tourism businesses, and relevant groups in your community.

Summary of expectations:

This project WILL:

Ask marine protected area tourism stakeholders to describe their perception on the impacts of marine tourism on increasing the resilience of social-ecological systems.

Protect the confidentiality and anonymity of the participants.

This project will NOT:

Favour any particular stakeholder's view over the other.

Create a tourism business.

Provide equipment or monetary benefits (e.g. new boats, gear) to anyone.

This project MAY provide:

Feedback for adaptive marine protected area tourism management to relevant government agencies, conservation organisations, aid agencies, and other concerned parties.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Professor Mark Orams, mark.orams@aut.ac.nz, *country code (64) area code (9) 921 9999 ext. 6410*

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTEC, Dr Rosemary Godbold, *rosemary.godbold@aut.ac.nz*, country code (64) *area code (9)* 921 9999 ext. 6902.

Whom do I contact for further information about this research?

Researcher Contact Details**:**

Mirza Pedju, mpedju@aut.ac.nz, 081310354984

Project Supervisor Contact Details**:**

Mark Orams, mark.orams@aut.ac.nz, *country code (64) area code (9) 921 9999 ext. 6410*.

Approved by the Auckland University of Technology Ethics Committee on 14 November 2011, AUTEC Reference number 11/303.

Appendix 6. AUT ethics committee approval

M E M O R A N D U M
Auckland University of Technology Ethics Committee (AUTEC)

To: Mark Orams
From: **Dr Rosemary Godbold** Executive Secretary, AUTEC
Date: 18 November 2011
Subject: Ethics Application Number 11/303 **Stakeholders' perceptions of the impacts of tourism on the social and ecological resilience of marine protected areas in Bali, Indonesia.**

Dear Mark

I am pleased to advise that the Auckland University of Technology Ethics Committee (AUTEC) approved your ethics application at their meeting on 14 November 2011, subject to the following conditions:

1. Clarification of whether the fisherfolk will be participating in a focus group or answering a questionnaire. AUTEC recommends that the former would be more appropriate given the information provided in the application about the low literacy levels among the fisherfolk;
2. Clarification of the following matters relating to recruitment:
    a. Reconsideration of the level to which the key informants are involved in the recruitment process. AUTEC suggests that their role be limited to providing the researcher with a pool of potential participants from which the researcher selects some to invite;
    b. Clarification of exactly how the fisherfolk and seaweed farmers will be recruited and will give consent;
3. Clarification of how the research findings will be made available to the fisherfolk and identification of this in the Information Sheet;
4. Revision of the Information Sheet as follows:
    a. Use of less academic language and more everyday language that the participants will be more likely to understand;
    b. Inclusion of an invitation statement starting with 'I invite you...' in the section titled 'An Invitation';
    c. Provision of an Information sheet specifically targeted towards the fisherfolk;
    d. Clarification of why a photographic consent form has been included given that the use of photographs is not mentioned in the application.

I request that you provide me with a written response to the points raised in these conditions at your earliest convenience, indicating either how you have satisfied these points or proposing an alternative approach. AUTEC also requires written evidence of any altered documents, such as Information Sheets, surveys etc. Once this response and its supporting written

evidence has been received and confirmed as satisfying the Committee's points, you will be notified of the full approval of your ethics application.

When approval has been given subject to conditions, full approval is not effective until *all* the concerns expressed in the conditions have been met to the satisfaction of the Committee. Data collection may not commence until full approval has been confirmed. Should these conditions not be satisfactorily met within six months, your application may be closed and you will need to submit a new application should you wish to continue with this research project.

To enable us to provide you with efficient service, we ask that you use the application number and study title in all written and verbal correspondence with us. Should you have any further enquiries regarding this matter, you are welcome to contact me by email at ethics@aut.ac.nz or by telephone on 921 9999 at extension 6902. Alternatively, you may contact your AUTEC Faculty Representative (a list with contact details may be found at http://www.aut.ac.nz/research/research-ethics/ethics).

Yours sincerely

Dr Rosemary Godbold
Executive Secretary
Auckland University of Technology Ethics Committee

Cc: Fahri Mirza Kurniawan Pedju mpedju@aut.ac.nz

Appendix 7. Structured interview questionnaire

Section 1: These statements below are about your perception of the local marine environment.

Please indicate your best answer in the box provided.

S.D= Strongly disagree; D.A=Disagree; N=Neutral; A=Agree; S.A=Strongly Agree; D.K/N.A=Don't know/Not applicable

1. There are more fish to catch now than 10 years ago in my village fishing ground:

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

2. The conditions of coral reefs in my village fishing ground are much better now than 10 years ago:

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

3. Fishery is a threat for the marine environment:

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

4. Marine tourism is a threat for the marine environment

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

5. Marine resources surrounding my village must be protected.

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

Section 2: These statement below are about your perception of Marine Protected Area (MPA) in your local area.

S.D= Strongly disagree; D.A=Disagree; N=Neutral; A=Agree; S.A=Strongly Agree; D.K/N.A=Don't know/Not applicable

1. I am aware that there is an MPA near my village:

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

2. I support the purpose of MPA in my village :

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

3. The presence of MPA has improved fishery

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

4. The presence of MPA benefits my village .

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

5. The presence of MPA has improved my livelihood

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

6. MPA authority regularly seek public feedback to improve its service(s)

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

Section 3: These statements below are about your perception of marine tourism in the local Marine Protected Area (MPA).

1. The presence of tourism in the MPA has benefitted fishery:

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

2. The presence of tourism in the MPA has improved the coral reefs

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

3. The presence of tourism within the MPA has provided job opportunities for the villagers

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

4. The presence of tourism in the MPA has improved my livelihood.

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

5. The presence of tourism in the MPA has increased the harmony within my community

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

6. If there is an opportunity, I prefer to work in the tourism sector than in fishery.

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

7. If there is an opportunity, I prefer my children to work in the tourism sector than in fishery

S.D ☐ D ☐ N ☐ A ☐ S.A ☐ D.K/N.A ☐

Section 4: The questions below are about you

1. My gender ☐ Female ☐ Male

2. My age group

☐ 20 – 29 yrs. ☐ 30 – 39 yrs. ☐ 40 – 49 yrs. ☐ 50 -59 yrs. ☐ 60 years and over

3. My marital status: ☐ Single ☐ Married

4. With my partner(s) I have

☐ No child ☐ 1 child ☐ 2 children ☐ 3 children ☐ 4 or more children

5. My main occupation is

☐ Not working ☐ fisher ☐ seaweed farmer ☐ tourism sector ☐ other

6. In addition to my occupation above, my other income generating activity is

☐ No other work ☐ Fisher/seaweed ☐ agriculture ☐ tourism sector ☐ other

7. I have been fishing in the fishing ground near and around my village for

☐ I never fished in this area ☐ less than a year ☐ a year but less than 5 years ☐ 5 years but less than 10 years ☐ 10 years or more

8. My average income per month (in Rupiah)

☐ < 1,000,000 ☐ 1,000,000 – 2,999,999 ☐ 3,000,000 - 4,999,999 ☐ 5,000, 000 – 6,999,999 ☐ 7,000,000 or more

9. My religion :

☐ Islam ☐ Christianity ☐ Hindu ☐ Other ☐ do not belong to any particular religion

10. My ethnic group:

☐ Balinese ☐ Madurese ☐ Javanese ☐ Indonesian – Other ☐ Non – Indonesian

11. My highest level of education

☐ No formal education ☐ Primary Sc ☐ Intermediate ☐ High School ☐ Post high School or higher

12. I have lived in this village

☐ Since I was born	☐ less than 5 yrs	☐ more than 5 yrs but less than 10 yrs	☐ more than 10 yrs but less than 20 yrs	☐ 20 years or more

14. I have fished/tended seaweed farm in this village

☐ Less than a year	☐ For a year or more but less than 5 years	☐ for 5 years or more but less than 10 years	☐ for 10 years or more but less than 20 years	☐ 20 years or more

Appendix 8. Semi-structured in-depth interview

No:

Date:

Perception on marine ecosystem health

- List up to five important species in your marine environment
    1. .....
    2. .....
    3. .....
    4. .....
    5. .....
- List up to five factors that cause changes to the important species and/or habitat in your marine environment?
    1. .....
    2. .....
    3. .....
    4. .....
    5. .....
- If possible, can you describe the changes that have occurred in the past 30 years or more in a chronological order
    1. 1980s: (e.g. reef sharks were commonly sighted; village population is 1,000/or low).....
    2. 1990s: (e.g. reef sharks were rarely seen; village population increased; tourism resort opened...).....
    3. 2000s: (e.g. reef sharks have never been seen; village population 10.000; there are 20 dive resorts).....

- Do you think management intervention is needed to address these changes?
- Who is in charge with respect to marine ecosystem protection in this area?
- List three enabling factors that you think can help (or has helped) marine ecosystem protection in this area?
    1. .....
    2. .....
    3. .....
- List three barriers that will limit (or have limited) the success of marine ecosystem protection in this area?
    1. .....
    2. .....
    3. .....

Perception on marine protected area

- Who initiated the establishment of marine protected area in your area?
- List five key stakeholders of your marine protected area?
    1. ...
    2. ....
    3. ....
    4. ....
    5. ....
- What is the community level of support towards marine protected area?
- List up to five activities that you do (or have done) to gain the stakeholders support for the marine protected area
    1. ...
    2. ....
    3. ....
    4. ...
    5. ....
- List up to five important issues that face your marine protected area
    1. ......
    2. ......
    3. ......
    4. .....
    5. .....
- What strategy do you want to implement (or have implemented) to overcome these issues?
    1. ....
    2. ....
    3. ....
    4. ....
    5. ....

- List up to five the benefits that this marine protected area brings for the local community?
    1. ......
    2. ......
    3. ......
    4. ......
    5. ....
- List up to five detrimental factors that this marine protected area has towards local community
    1. ....
    2. ....
    3. ....
    4. ....
    5. ....

Perception on marine protected area tourism

- What are the main tourism attractions of your marine protected area? please list up to five activities:
    1. .....
    2. .....
    3. .....
    4. .....
    5. .....
- List up to five factors the (beneficial/detrimental) ecological impact of tourism in the marine protected area?
    1. .....
    2. .....
    3. .....
    4. .....
    5. .....
- List up to five factors the (beneficial/detrimental) social and economic impact of tourism in the marine protected area?
    1. .....
    2. .....
    3. .....
    4. .....
    5. .....

- What is the community level of support towards tourism in the marine protected area?

Do you have any questions or is there anything else you want to tell me?

Appendix 9. Structured interviews – Frequencies raw data

Frequencies

Notes

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	Cases Used	Statistics are based on all cases with valid data.
Syntax		FREQUENCIES VARIABLES=more fish than 10yrs ago better coral health on fishing ground than 10yrs ago marine tourism is a threat to marine environment marine tourism is a threat to marine environment marine resources near village must be protected mpa1 mpa2 mpa3 mpa4 mpa5 mpa6 tour1 tour2 tour3 tour4 tour5 tour6 tour7 /ORDER=ANALYSIS.
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	Elapsed Time	00 00:00:00.019

Statistics

		more fish than 10yrs ago	better coral health on fishing ground than 10yrs ago	Fishery is a threat to marine environment	marine tourism is a threat to marine environment	marine resources near village must be protected	aware about the presence of mpa
N	Valid	230	230	230	230	230	230
	Missing	0	0	0	0	0	0

Statistics

		understand the purpose of mpa	mpa benefits fishery	mpa benefits tourism	mpa provides higher fishery income	mpa mgt regularly seeks input from community
N	Valid	230	230	230	230	230
	Missing	0	0	0	0	0

Statistics

		tourism in mpa benefits fishery	tourism in mpa improves health of marine environment	tourism in mpa provides job opportunities	tourism in mpa increases my income	tourism in mpa increases social harmony in my village
N	Valid	230	230	230	230	230
	Missing	0	0	0	0	0

Statistics

		wants to exit fishery and switch to tourism	prefers children to work in tourism rather than fishery
N	Valid	230	230
	Missing	0	0

more fish than 10 years ago

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	63	27.4	27.4	27.4
	disagree	124	53.9	53.9	81.3
	neutral	10	4.3	4.3	85.7
	agree	24	10.4	10.4	96.1
	strongly agree	8	3.5	3.5	99.6
	don't know or not relevant	1	.4	.4	100.0
	Total	230	100.0	100.0	

better coral health on fishing ground than 10 years ago

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	55	23.9	23.9	23.9
	disagree	87	37.8	37.8	61.7
	neutral	4	1.7	1.7	63.5
	agree	61	26.5	26.5	90.0
	strongly agree	23	10.0	10.0	100.0
	Total	230	100.0	100.0	

fishery is a threat to marine environment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	27	11.7	11.7	11.7
	disagree	178	77.4	77.4	89.1
	neutral	3	1.3	1.3	90.4
	agree	18	7.8	7.8	98.3
	strongly agree	2	.9	.9	99.1
	don't know or not relevant	2	.9	.9	100.0
	Total	230	100.0	100.0	

marine tourism is a threat to marine environment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	12	5.2	5.2	5.2
	disagree	181	78.7	78.7	83.9
	neutral	4	1.7	1.7	85.7
	agree	27	11.7	11.7	97.4
	strongly agree	5	2.2	2.2	99.6
	don't know or not relevant	1	.4	.4	100.0
	Total	230	100.0	100.0	

marine resources near village must be protected

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	disagree	1	.4	.4	.4
	neutral	1	.4	.4	.9

	agree	32	13.9	13.9	14.8
	strongly agree	196	85.2	85.2	100.0
	Total	230	100.0	100.0	

aware about the presence of mpa

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	disagree	1	.4	.4	.4
	neutral	4	1.7	1.7	2.2
	agree	154	67.0	67.0	69.1
	strongly agree	52	22.6	22.6	91.7
	don't know or not relevant	19	8.3	8.3	100.0
	Total	230	100.0	100.0	

understand the purpose of mpa

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	1	.4	.4	.4
	disagree	4	1.7	1.7	2.2
	neutral	2	.9	.9	3.0
	agree	136	59.1	59.1	62.2
	strongly agree	33	14.3	14.3	76.5
	don't know or not relevant	54	23.5	23.5	100.0
	Total	230	100.0	100.0	

mpa benefits fishery

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	1	.4	.4	.4
	disagree	5	2.2	2.2	2.6
	neutral	6	2.6	2.6	5.2
	agree	120	52.2	52.2	57.4
	strongly agree	91	39.6	39.6	97.0
	don't know or not relevant	7	3.0	3.0	100.0
	Total	230	100.0	100.0	

mpa benefits tourism

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	disagree	27	11.7	11.7	11.7
	neutral	9	3.9	3.9	15.7
	agree	133	57.8	57.8	73.5
	strongly agree	58	25.2	25.2	98.7
	don't know or not relevant	3	1.3	1.3	100.0
	Total	230	100.0	100.0	

mpa provides higher fishery income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	2	.9	.9	.9
	disagree	49	21.3	21.3	22.2

	neutral	33	14.3	14.3	36.5
	agree	95	41.3	41.3	77.8
	strongly agree	48	20.9	20.9	98.7
	don't know or not relevant	3	1.3	1.3	100.0
	Total	230	100.0	100.0	

mpa management regularly seeks input from community

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	7	3.0	3.0	3.0
	disagree	49	21.3	21.3	24.3
	neutral	4	1.7	1.7	26.1
	agree	121	52.6	52.6	78.7
	strongly agree	22	9.6	9.6	88.3
	don't know or not relevant	27	11.7	11.7	100.0
	Total	230	100.0	100.0	

tourism in mpa benefits fishery

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	4	1.7	1.7	1.7
	disagree	53	23.0	23.0	24.8
	neutral	12	5.2	5.2	30.0
	agree	117	50.9	50.9	80.9
	strongly agree	39	17.0	17.0	97.8
	don't know or not relevant	5	2.2	2.2	100.0
	Total	230	100.0	100.0	

tourism in mpa improves health of marine environment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	disagree	48	20.9	20.9	20.9
	neutral	20	8.7	8.7	29.6
	agree	122	53.0	53.0	82.6
	strongly agree	33	14.3	14.3	97.0
	don't know or not relevant	7	3.0	3.0	100.0
	Total	230	100.0	100.0	

tourism in mpa provides job opportunities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	disagree	29	12.6	12.6	12.6
	neutral	13	5.7	5.7	18.3
	agree	135	58.7	58.7	77.0
	strongly agree	46	20.0	20.0	97.0
	don't know or not relevant	7	3.0	3.0	100.0
	Total	230	100.0	100.0	

tourism in mpa increases my income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	6	2.6	2.6	2.6
	disagree	62	27.0	27.0	29.6
	neutral	39	17.0	17.0	46.5
	agree	95	41.3	41.3	87.8
	strongly agree	25	10.9	10.9	98.7
	don't know or not relevant	3	1.3	1.3	100.0
	Total	230	100.0	100.0	

tourism in mpa increases social harmony in my village

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	1	.4	.4	.4
	disagree	33	14.3	14.3	14.8
	neutral	34	14.8	14.8	29.6
	agree	120	52.2	52.2	81.7
	strongly agree	38	16.5	16.5	98.3
	don't know or not relevant	4	1.7	1.7	100.0
	Total	230	100.0	100.0	

wants to exit fishery and switch to tourism

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	18	7.8	7.8	7.8
	disagree	85	37.0	37.0	44.8
	neutral	17	7.4	7.4	52.2
	agree	58	25.2	25.2	77.4
	strongly agree	50	21.7	21.7	99.1
	don't know or not relevant	2	.9	.9	100.0
	Total	230	100.0	100.0	

prefers children to work in tourism rather than fishery

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	2	.9	.9	.9
	disagree	12	5.2	5.2	6.1
	neutral	5	2.2	2.2	8.3
	agree	75	32.6	32.6	40.9
	strongly agree	133	57.8	57.8	98.7
	don't know or not relevant	3	1.3	1.3	100.0
	Total	230	100.0	100.0	

Appendix 10. Structured interviews' cross tabulation data with respect to fishers' education

Notes

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	Cases Used	Statistics for each table are based on all the cases with valid data in the specified range(s) for all variables in each table.
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	Dimensions Requested	2
	Cells Available	174762

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Educ * more fish than 10yrs ago	230	100.0%	0	.0%	230	100.0%
Educ * better coral health on fishing ground than 10yrs ago	230	100.0%	0	.0%	230	100.0%
Educ * fishery is a threat to marine environment	230	100.0%	0	.0%	230	100.0%
Educ * marine tourism is a threat to marine environment	230	100.0%	0	.0%	230	100.0%
Educ * marine resources near village must be protected	230	100.0%	0	.0%	230	100.0%
Educ * aware about the presence of mpa	230	100.0%	0	.0%	230	100.0%
Educ * understand the purpose of mpa	230	100.0%	0	.0%	230	100.0%
Educ * mpa benefits fishery	230	100.0%	0	.0%	230	100.0%
Educ * mpa benefits tourism	230	100.0%	0	.0%	230	100.0%
Educ * mpa provides higher fishery income	230	100.0%	0	.0%	230	100.0%
Educ * mpa mgt regularly seeks input from community	230	100.0%	0	.0%	230	100.0%
Educ * tourism in mpa benefits fishery	230	100.0%	0	.0%	230	100.0%
Educ * tourism in mpa improves health of marine environment	230	100.0%	0	.0%	230	100.0%
Educ * tourism in mpa provides job opportunities	230	100.0%	0	.0%	230	100.0%
Educ * tourism in mpa increases my income	230	100.0%	0	.0%	230	100.0%
Educ * tourism in mpa increases social harmony in my village	230	100.0%	0	.0%	230	100.0%
Educ * wants to exit fishery and switch to tourism	230	100.0%	0	.0%	230	100.0%
Educ * prefers children to work in tourism rather than fishery	230	100.0%	0	.0%	230	100.0%

		more fish than 10yrs ago				
		strongly disagree	disagree	neutral	agree	strongly agree
Educ	1	7	18	0	1	1
	2	33	64	7	16	7
	3	11	17	0	4	0
	4	12	22	3	3	0
	5	0	3	0	0	0
Total		63	124	10	24	8

Count

		more fish than 10yrs ago	
		don't know or not relevant	Total
Educ	1	0	27
	2	1	128
	3	0	32
	4	0	40
	5	0	3
Total		1	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.322[a]	20	.758
Likelihood Ratio	21.781	20	.353
Linear-by-Linear Association	1.165	1	.280
N of Valid Cases	230		

a. 20 cells (66.7%) have expected count less than 5. The minimum expected count is .01.

Educ * better coral health on fishing ground than 10yrs

Count

		better coral health on fishing ground than 10yrs					
		strongly disagree	disagree	neutral	agree	strongly agree	Total
Educ	1	7	9	0	10	1	27
	2	26	47	3	38	14	128
	3	11	12	1	6	2	32
	4	11	17	0	7	5	40
	5	0	2	0	0	1	3
Total		55	87	4	61	23	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.931[a]	16	.604
Likelihood Ratio	16.167	16	.441
Linear-by-Linear Association	1.062	1	.303
N of Valid Cases	230		

a. 12 cells (48.0%) have expected count less than 5. The minimum expected count is .05.

Educ * fishery is a threat to marine environment

Count

		fishery is a threat to marine environment				
		strongly disagree	disagree	neutral	agree	strongly agree
Educ	1	2	22	0	3	0
	2	14	99	1	11	2
	3	4	27	1	0	0
	4	7	27	1	4	0
	5	0	3	0	0	0
Total		27	178	3	18	2

Crosstab

Count

		fishery is a threat to marine environment	
		don't know or not relevant	Total
Educ	1	0	27
	2	1	128
	3	0	32
	4	1	40
	5	0	3
Total		2	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.692[a]	20	.926
Likelihood Ratio	15.621	20	.740
Linear-by-Linear Association	.234	1	.628
N of Valid Cases	230		

a. 24 cells (80.0%) have expected count less than 5. The minimum expected count is .03.

Educ * marine tourism is a threat to marine environment

		marine tourism is a threat to marine environment				
		strongly disagree	disagree	neutral	agree	strongly agree
Educ	1	0	20	0	4	2
	2	4	106	1	15	2
	3	3	24	2	3	0
	4	5	29	0	5	1
	5	0	2	1	0	0
Total		12	181	4	27	5

		marine tourism is a threat to marine environment	
		don't know or not relevant	Total
Educ	1	1	27
	2	0	128
	3	0	32
	4	0	40
	5	0	3
Total		1	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	43.886[a]	20	.002
Likelihood Ratio	27.472	20	.123
Linear-by-Linear Association	2.800	1	.094
N of Valid Cases	230		

a. 24 cells (80.0%) have expected count less than 5. The minimum expected count is .01.

Educ * marine resources near village must be protected

		marine resources near village must be protected				
		disagree	neutral	agree	strongly agree	Total
Educ	1	0	0	10	17	27
	2	1	0	15	112	128
	3	0	1	4	27	32
	4	0	0	3	37	40
	5	0	0	0	3	3
Total		1	1	32	196	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.426[a]	12	.044
Likelihood Ratio	17.107	12	.146
Linear-by-Linear Association	4.864	1	.027
N of Valid Cases	230		

a. 14 cells (70.0%) have expected count less than 5. The minimum expected count is .01.

*** aware about the presence of mpa**

		aware about the presence of mpa					
		disagree	neutral	agree	strongly agree	don't know or not relevant	Total
Educ	1	0	0	19	2	6	27
	2	0	1	89	26	12	128
	3	0	1	20	11	0	32
	4	1	2	24	13	0	40
	5	0	0	2	0	1	3
Total		1	4	154	52	19	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	31.525[a]	16	.012
Likelihood Ratio	34.185	16	.005
Linear-by-Linear Association	2.151	1	.142
N of Valid Cases	230		

a. 16 cells (64.0%) have expected count less than 5. The minimum expected count is .01.

Educ * understand the purpose of mpa

Crosstab

Count

		understand the purpose of mpa				
		strongly disagree	disagree	neutral	agree	strongly agree
Educ	1	0	0	0	13	3
	2	1	3	0	77	13
	3	0	1	1	18	7
	4	0	0	0	26	10
	5	0	0	1	2	0
Total		1	4	2	136	33

Crosstab

Count

		understand the purpose of mpa	
		don't know or not relevant	Total
Educ	1	11	27
	2	34	128
	3	5	32
	4	4	40
	5	0	3
Total		54	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	58.652[a]	20	.000

Likelihood Ratio	31.007	20	.055
Linear-by-Linear Association	4.950	1	.026
N of Valid Cases	230		

a. 20 cells (66.7%) have expected count less than 5. The minimum expected count is .01.

Educ * mpa benefits fishery

Crosstab

Count

		mpa benefits fishery				
		strongly disagree	disagree	neutral	agree	strongly agree
Educ	1	0	0	0	19	7
	2	1	3	3	68	48
	3	0	1	1	15	14
	4	0	1	2	15	22
	5	0	0	0	3	0
Total		1	5	6	120	91

Crosstab

Count

		mpa benefits fishery	
		don't know or not relevant	Total
Educ	1	1	27
	2	5	128
	3	1	32
	4	0	40
	5	0	3
Total		7	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.025[a]	20	.775
Likelihood Ratio	18.744	20	.539
Linear-by-Linear Association	.213	1	.644
N of Valid Cases	230		

a. 22 cells (73.3%) have expected count less than 5. The minimum expected count is .01.

Educ * mpa benefits tourism

		mpa benefits tourism					
		disagree	neutral	agree	strongly agree	don't know or not relevant	Total
Educ	1	1	0	20	4	2	27
	2	18	7	74	28	1	128
	3	6	2	16	8	0	32
	4	2	0	20	18	0	40
	5	0	0	3	0	0	3
Total		27	9	133	58	3	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	29.856[a]	16	.019
Likelihood Ratio	30.059	16	.018
Linear-by-Linear Association	1.434	1	.231
N of Valid Cases	230		

a. 15 cells (60.0%) have expected count less than 5. The minimum expected count is .04.

Educ * mpa provides higher fishery income

Crosstab

Count

		mpa provides higher fishery income				
		strongly disagree	disagree	neutral	agree	strongly agree
Educ	1	0	2	5	14	4
	2	1	33	17	49	27
	3	1	8	4	12	7
	4	0	6	6	19	9
	5	0	0	1	1	1
Total		2	49	33	95	48

Crosstab

Count

		mpa provides higher fishery income	
		don't know or not relevant	Total
Educ	1	2	27
	2	1	128
	3	0	32
	4	0	40
	5	0	3
Total		3	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.270[a]	20	.441
Likelihood Ratio	18.287	20	.569
Linear-by-Linear Association	.003	1	.954
N of Valid Cases	230		

a. 16 cells (53.3%) have expected count less than 5. The minimum expected count is .03.

Educ * mpa mgt regularly seeks input from community

Crosstab

Count

		mpa mgt regularly seeks input from community				
		strongly disagree	disagree	neutral	agree	strongly agree
Educ	1	0	7	0	12	4
	2	4	27	1	67	13
	3	1	7	1	15	3
	4	2	8	2	24	2
	5	0	0	0	3	0
Total		7	49	4	121	22

Crosstab

Count

		mpa mgt regularly seeks input from community	
		don't know or not relevant	Total
Educ	1	4	27
	2	16	128
	3	5	32
	4	2	40
	5	0	3
Total		27	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.181[a]	20	.869
Likelihood Ratio	15.256	20	.762
Linear-by-Linear Association	1.127	1	.288
N of Valid Cases	230		

a. 20 cells (66.7%) have expected count less than 5. The minimum expected count is .05.

Educ * tourism in mpa benefits fishery

Crosstab

Count

		tourism in mpa benefits fishery				
		strongly disagree	disagree	neutral	agree	strongly agree
Educ	1	1	5	2	14	4
	2	2	33	5	59	25
	3	1	7	0	19	5
	4	0	8	4	23	5
	5	0	0	1	2	0
Total		4	53	12	117	39

Crosstab

Count

		tourism in mpa benefits fishery	
		don't know or not relevant	Total
Educ	1	1	27
	2	4	128
	3	0	32
	4	0	40
	5	0	3
Total		5	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.454[a]	20	.623
Likelihood Ratio	19.490	20	.490
Linear-by-Linear Association	.032	1	.858
N of Valid Cases	230		

a. 18 cells (60.0%) have expected count less than 5. The minimum expected count is .05.

Educ * tourism in mpa improves health of marine environment

Crosstab

Count

	tourism in mpa improves health of marine environment					
	disagree	neutral	agree	strongly agree	don't know or not relevant	Total

Educ	1	4	2	14	4	3	27
	2	30	8	70	16	4	128
	3	7	7	14	4	0	32
	4	7	2	23	8	0	40
	5	0	1	1	1	0	3
Total		48	20	122	33	7	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.836[a]	16	.118
Likelihood Ratio	20.627	16	.193
Linear-by-Linear Association	.101	1	.751
N of Valid Cases	230		

a. 14 cells (56.0%) have expected count less than 5. The minimum expected count is .09.

Educ * tourism in mpa provides job opportunities

Crosstab

Count

		tourism in mpa provides job opportunities					
		disagree	neutral	agree	strongly agree	don't know or not relevant	Total
Educ	1	1	2	17	5	2	27
	2	17	9	77	21	4	128
	3	6	1	17	7	1	32
	4	5	1	21	13	0	40
	5	0	0	3	0	0	3
Total		29	13	135	46	7	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.964[a]	16	.601
Likelihood Ratio	16.091	16	.447
Linear-by-Linear Association	.001	1	.970
N of Valid Cases	230		

a. 14 cells (56.0%) have expected count less than 5. The minimum expected count is .09.

Educ * tourism in mpa increases my income

Crosstab

Count

		tourism in mpa increases my income				
		strongly disagree	disagree	neutral	agree	strongly agree
Educ	1	0	7	4	12	2
	2	4	37	24	49	13
	3	2	9	2	14	5
	4	0	9	6	20	5
	5	0	0	3	0	0
Total		6	62	39	95	25

Crosstab

Count

		tourism in mpa increases my income	
		don't know or not relevant	Total
Educ	1	2	27
	2	1	128
	3	0	32
	4	0	40
	5	0	3
Total		3	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	32.434[a]	20	.039
Likelihood Ratio	27.214	20	.129
Linear-by-Linear Association	.111	1	.739
N of Valid Cases	230		

a. 18 cells (60.0%) have expected count less than 5. The minimum expected count is .04.

Educ * tourism in mpa increases social harmony in my village

Crosstab

Count

		tourism in mpa increases social harmony in my village				
		strongly disagree	disagree	neutral	agree	strongly agree
Educ	1	0	2	4	17	2
	2	0	22	16	65	24
	3	1	5	8	11	6
	4	0	4	6	24	6
	5	0	0	0	3	0
Total		1	33	34	120	38

Crosstab

Count

		tourism in mpa increases social harmony in my village	
		don't know or not relevant	Total
Educ	1	2	27
	2	1	128
	3	1	32
	4	0	40
	5	0	3
Total		4	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.495[a]	20	.183
Likelihood Ratio	23.340	20	.272
Linear-by-Linear Association	.070	1	.791
N of Valid Cases	230		

a. 19 cells (63.3%) have expected count less than 5. The minimum expected count is .01.

Educ * wants to exit fishery and switch to tourism

Crosstab

Count

		wants to exit fishery and switch to tourism				
		strongly disagree	disagree	neutral	agree	strongly agree
Educ	1	5	12	1	3	5
	2	10	54	6	35	22
	3	3	10	1	7	11
	4	0	8	8	12	12
	5	0	1	1	1	0
Total		18	85	17	58	50

Crosstab

Count

		wants to exit fishery and switch to tourism	
		don't know or not relevant	Total
Educ	1	1	27
	2	1	128
	3	0	32
	4	0	40
	5	0	3
Total		2	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	37.763[a]	20	.009
Likelihood Ratio	37.412	20	.010
Linear-by-Linear Association	8.561	1	.003
N of Valid Cases	230		

a. 16 cells (53.3%) have expected count less than 5. The minimum expected count is .03.

Educ * prefers children to work in tourism rather than fishery

Crosstab

Count

		prefers children to work in tourism rather than fishery				
		strongly disagree	disagree	neutral	agree	strongly agree
Educ	1	1	1	1	10	13
	2	0	9	2	44	72
	3	1	1	0	8	21
	4	0	0	2	13	25
	5	0	1	0	0	2
Total		2	12	5	75	133

Crosstab

Count

		prefers children to work in tourism rather than fishery	
		don't know or not relevant	Total
Educ	1	1	27
	2	1	128
	3	1	32
	4	0	40
	5	0	3
Total		3	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.107[a]	20	.335
Likelihood Ratio	22.590	20	.309
Linear-by-Linear Association	1.019	1	.313
N of Valid Cases	230		

a. 21 cells (70.0%) have expected count less than 5. The minimum expected count is .03.

Appendix 11. Structured interviews' cross tabulation data with respect to fishers' length of stay in the village

Output Created		16-Mar-2015 07:17:25
Comments		
Input	Data	D:\09 KLIEN DATA\44 MIRZA\DATA FINAL.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	230
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each table are based on all the cases with valid data in the specified range(s) for all variables in each table.
Syntax		CROSSTABS /TABLES=pers14 BY more fish than 10yrs ago better coral health on fishing ground than 10yrs ago marine tourism is a threat to marine environment marine resources near village must be protected marine resources near village must be protected mpa1 mpa2 mpa3 mpa4 mpa5 mpa6 tour1 tour2 tour3 tour4 tour5 tour6 tour7 /FORMAT=AVALUE TABLES /STATISTICS=CHISQ /CELLS=COUNT /COUNT ROUND CELL.
Resources	Processor Time	00 00:00:00.000
	Elapsed Time	00 00:00:00.051

Dimensions Requested	2
Cells Available	174762

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Liv * more fish than 10yrs ago	230	100.0%	0	.0%	230	100.0%
Liv * better coral health on fishing ground than 10yrs ago	230	100.0%	0	.0%	230	100.0%
Liv * Fishery is a threat to marine environment	230	100.0%	0	.0%	230	100.0%
Liv * marine tourism is a threat to marine environment	230	100.0%	0	.0%	230	100.0%
Liv * marine resources near village must be protected	230	100.0%	0	.0%	230	100.0%
Liv * aware about the presence of mpa	230	100.0%	0	.0%	230	100.0%
Liv * understand the purpose of mpa	230	100.0%	0	.0%	230	100.0%
Liv * mpa benefits fishery	230	100.0%	0	.0%	230	100.0%
Liv * mpa benefits tourism	230	100.0%	0	.0%	230	100.0%
Liv * mpa provides higher fishery income	230	100.0%	0	.0%	230	100.0%
Liv * mpa mgt regularly seeks input from community	230	100.0%	0	.0%	230	100.0%
Liv * tourism in mpa benefits fishery	230	100.0%	0	.0%	230	100.0%
Liv * tourism in mpa improves health of marine environment	230	100.0%	0	.0%	230	100.0%
Liv * tourism in mpa provides job opportunities	230	100.0%	0	.0%	230	100.0%

Liv * tourism in mpa increases my income	230	100.0%	0	.0%	230	100.0%
Liv * tourism in mpa increases social harmony in my village	230	100.0%	0	.0%	230	100.0%
Liv * wants to exit fishery and switch to tourism	230	100.0%	0	.0%	230	100.0%
Liv * prefers children to work in tourism rather than fishery	230	100.0%	0	.0%	230	100.0%

Liv * more fish than 10yrs ago

Count

		more fish than 10yrs ago				
		strongly disagree	disagree	neutral	agree	strongly agree
Liv	1	34	83	5	22	8
	2	3	6	2	0	0
	3	7	5	1	0	0
	4	8	18	1	2	0
	5	11	12	1	0	0
Total		63	124	10	24	8

Count

		more fish than 10yrs ago	Total
		don't know or not relevant	
Liv	1	0	152
	2	0	11
	3	0	13
	4	1	30
	5	0	24
Total		1	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	32.778[a]	20	.036
Likelihood Ratio	34.244	20	.025
Linear-by-Linear Association	9.385	1	.002
N of Valid Cases	230		

a. 19 cells (63.3%) have expected count less than 5. The minimum expected count is .05.

Liv * better coral health on fishing ground than 10yrs ago

		better coral health on fishing ground than 10yrs ago					
		strongly disagree	disagree	neutral	agree	strongly agree	Total
Liv	1	27	52	2	52	19	152
	2	2	5	2	1	1	11
	3	6	5	0	1	1	13
	4	10	14	0	5	1	30
	5	10	11	0	2	1	24
Total		55	87	4	61	23	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	43.322[a]	16	.000
Likelihood Ratio	34.820	16	.004
Linear-by-Linear Association	19.835	1	.000
N of Valid Cases	230		

a. 15 cells (60.0%) have expected count less than 5. The minimum expected count is .19.

Liv * marine tourism is a threat to marine environment

		Fishery is a threat to marine environment				
		strongly disagree	disagree	neutral	agree	strongly agree
Liv	1	18	120	2	9	2
	2	0	9	0	2	0
	3	0	11	0	2	0
	4	5	22	0	3	0
	5	4	16	1	2	0
Total		27	178	3	18	2

		fishery is a threat to marine environment	
		don't know or not relevant	Total
Liv	1	1	152
	2	0	11
	3	0	13
	4	0	30
	5	1	24
Total		2	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.656[a]	20	.796
Likelihood Ratio	16.589	20	.679
Linear-by-Linear Association	.294	1	.588
N of Valid Cases	230		

a. 23 cells (76.7%) have expected count less than 5. The minimum expected count is .10.

Liv * marine resources near village must be protected

		Marine tourism is a threat to marine environment				
		strongly disagree	disagree	neutral	agree	strongly agree
Liv	1	8	124	4	12	4
	2	0	7	0	3	1
	3	1	10	0	1	0
	4	2	24	0	4	0
	5	1	16	0	7	0
Total		12	181	4	27	5

		marine tourism is a threat to marine environment	
		don't know or not relevant	Total
Liv	1	0	152
	2	0	11
	3	1	13
	4	0	30
	5	0	24
Total		1	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.228[a]	20	.019
Likelihood Ratio	24.323	20	.229
Linear-by-Linear Association	1.852	1	.174
N of Valid Cases	230		

a. 23 cells (76.7%) have expected count less than 5. The minimum expected count is .05.

Liv * marine resources near village must be protected

		marine resources near village must be protected				
		disagree	neutral	agree	strongly agree	Total
Liv	1	1	1	22	128	152
	2	0	0	4	7	11
	3	0	0	1	12	13
	4	0	0	3	27	30
	5	0	0	2	22	24
Total		1	1	32	196	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.168[a]	12	.846
Likelihood Ratio	6.810	12	.870
Linear-by-Linear Association	1.941	1	.164
N of Valid Cases	230		

a. 14 cells (70.0%) have expected count less than 5. The minimum expected count is .05.

Liv * aware about the presence of mpa

		aware about the presence of mpa					
		disagree	neutral	agree	strongly agree	don't know or not relevant	Total
Liv	1	1	3	101	32	15	152
	2	0	0	6	4	1	11
	3	0	0	11	1	1	13
	4	0	1	22	7	0	30
	5	0	0	14	8	2	24
Total		1	4	154	52	19	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.706[a]	16	.882
Likelihood Ratio	13.332	16	.648
Linear-by-Linear Association	.051	1	.821
N of Valid Cases	230		

a. 16 cells (64.0%) have expected count less than 5. The minimum expected count is .05.

Liv * understand the purpose of mpa

		understand the purpose of mpa				
		strongly disagree	disagree	neutral	agree	strongly agree
Liv	1	0	2	1	99	15
	2	0	2	0	6	1
	3	0	0	0	5	0
	4	1	0	0	12	11
	5	0	0	1	14	6
Total		1	4	2	136	33

		understand the purpose of mpa	Total
		don't know or not relevant	
Liv	1	35	152
	2	2	11
	3	8	13
	4	6	30
	5	3	24
Total		54	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	58.469[a]	20	.000
Likelihood Ratio	41.524	20	.003
Linear-by-Linear Association	.371	1	.542
N of Valid Cases	230		

a. 21 cells (70.0%) have expected count less than 5. The minimum expected count is .05.

Liv * mpa benefits fishery

		mpa benefits fishery				
		strongly disagree	disagree	neutral	agree	strongly agree
Liv	1	0	4	5	72	66
	2	0	1	0	7	3
	3	0	0	0	10	2
	4	1	0	1	16	12
	5	0	0	0	15	8
Total		1	5	6	120	91

		mpa benefits fishery	
		don't know or not relevant	Total
Liv	1	5	152
	2	0	11
	3	1	13
	4	0	30
	5	1	24
Total		7	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.697[a]	20	.415
Likelihood Ratio	21.069	20	.393
Linear-by-Linear Association	.405	1	.525
N of Valid Cases	230		

a. 21 cells (70.0%) have expected count less than 5. The minimum expected count is .05.

Liv * mpa benefits tourism

		mpa benefits tourism					
		disagree	neutral	agree	strongly agree	don't know or not relevant	Total
Liv	1	15	8	91	37	1	152
	2	2	1	6	2	0	11
	3	1	0	10	1	1	13
	4	5	0	16	9	0	30
	5	4	0	10	9	1	24
Total		27	9	133	58	3	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.512[a]	16	.295
Likelihood Ratio	19.089	16	.264
Linear-by-Linear Association	.121	1	.728
N of Valid Cases	230		

a. 15 cells (60.0%) have expected count less than 5. The minimum expected count is .14.

Liv * mpa provides higher fishery income

		mpa provides higher fishery income				
		strongly disagree	disagree	neutral	agree	strongly agree
Liv	1	1	32	22	62	34
	2	0	2	2	6	1
	3	0	1	5	4	2
	4	0	7	3	14	6
	5	1	7	1	9	5
Total		2	49	33	95	48

		mpa provides higher fishery income	Total
		don't know or not relevant	
Liv	1	1	152
	2	0	11
	3	1	13
	4	0	30
	5	1	24
Total		3	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.808[a]	20	.351
Likelihood Ratio	18.282	20	.569
Linear-by-Linear Association	.093	1	.760
N of Valid Cases	230		

a. 19 cells (63.3%) have expected count less than 5. The minimum expected count is .10.

Liv * mpa mgt regularly seeks input from community

		mpa mgt regularly seeks input from community				
		strongly disagree	disagree	neutral	agree	strongly agree
Liv	1	3	28	4	86	14
	2	0	2	0	8	0
	3	0	3	0	4	2
	4	3	11	0	10	3
	5	1	5	0	13	3
Total		7	49	4	121	22

		mpa mgt regularly seeks input from community	
		don't know or not relevant	Total
Liv	1	17	152
	2	1	11
	3	4	13
	4	3	30
	5	2	24
Total		27	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.008[a]	20	.288
Likelihood Ratio	22.875	20	.295
Linear-by-Linear Association	1.762	1	.184
N of Valid Cases	230		

a. 20 cells (66.7%) have expected count less than 5. The minimum expected count is .19.

Liv * tourism in mpa benefits fishery

		tourism in mpa benefits fishery				
		strongly disagree	disagree	neutral	agree	strongly agree
Liv	1	1	38	9	80	21
	2	0	3	0	5	2
	3	1	5	0	5	2
	4	2	5	1	15	7
	5	0	2	2	12	7
Total		4	53	12	117	39

		tourism in mpa benefits fishery	Total
		don't know or not relevant	
Liv	1	3	152
	2	1	11
	3	0	13
	4	0	30
	5	1	24
Total		5	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.100[a]	20	.284
Likelihood Ratio	22.205	20	.329
Linear-by-Linear Association	2.101	1	.147
N of Valid Cases	230		

a. 19 cells (63.3%) have expected count less than 5. The minimum expected count is .19.

Liv * tourism in mpa improves health of marine environment

		tourism in mpa improves health of marine environment					
		disagree	neutral	agree	strongly agree	don't know or not relevant	Total
Liv	1	34	18	79	18	3	152
	2	2	0	8	1	0	11
	3	3	0	5	3	2	13
	4	6	1	14	8	1	30
	5	3	1	16	3	1	24
Total		48	20	122	33	7	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.168[a]	16	.172
Likelihood Ratio	20.068	16	.217
Linear-by-Linear Association	4.334	1	.037
N of Valid Cases	230		

a. 15 cells (60.0%) have expected count less than 5. The minimum expected count is .33.

Liv * tourism in mpa provides job opportunities

		tourism in mpa provides job opportunities					
		disagree	neutral	agree	strongly agree	don't know or not relevant	Total
Liv	1	20	10	85	32	5	152
	2	2	0	7	2	0	11
	3	3	0	8	1	1	13
	4	4	0	22	4	0	30
	5	0	3	13	7	1	24
Total		29	13	135	46	7	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.255[a]	16	.435
Likelihood Ratio	22.696	16	.122
Linear-by-Linear Association	.486	1	.486
N of Valid Cases	230		

a. 16 cells (64.0%) have expected count less than 5. The minimum expected count is .33.

Liv * tourism in mpa increases my income

		tourism in mpa increases my income				
		strongly disagree	disagree	neutral	agree	strongly agree
Liv	1	2	40	26	66	17
	2	0	4	1	4	2
	3	0	2	3	5	2
	4	3	10	5	11	1
	5	1	6	4	9	3
Total		6	62	39	95	25

		tourism in mpa increases my income	Total
		don't know or not relevant	
Liv	1	1	152
	2	0	11
	3	1	13
	4	0	30
	5	1	24
Total		3	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.833[a]	20	.468
Likelihood Ratio	16.477	20	.687
Linear-by-Linear Association	.831	1	.362
N of Valid Cases	230		

a. 20 cells (66.7%) have expected count less than 5. The minimum expected count is .14.

Liv * tourism in mpa increases social harmony in my village

		tourism in mpa increases social harmony in my village				
		strongly disagree	disagree	neutral	agree	strongly agree
Liv	1	1	23	27	78	21
	2	0	2	1	6	2
	3	0	3	0	7	2
	4	0	4	2	17	7
	5	0	1	4	12	6
Total		1	33	34	120	38

		tourism in mpa increases social harmony in my village	
		don't know or not relevant	Total
Liv	1	2	152
	2	0	11
	3	1	13
	4	0	30
	5	1	24
Total		4	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.706[a]	20	.793
Likelihood Ratio	16.904	20	.659
Linear-by-Linear Association	4.754	1	.029
N of Valid Cases	230		

a. 22 cells (73.3%) have expected count less than 5. The minimum expected count is .05.

Liv * wants to exit fishery and switch to tourism

		wants to exit fishery and switch to tourism				
		strongly disagree	disagree	neutral	agree	strongly agree
Liv	1	11	50	17	39	35
	2	1	3	0	3	3
	3	2	7	0	3	0
	4	4	13	0	7	6
	5	0	12	0	6	6
Total		18	85	17	58	50

		wants to exit fishery and switch to tourism	Total
		don't know or not relevant	
Liv	1	0	152
	2	1	11
	3	1	13
	4	0	30
	5	0	24
Total		2	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	36.853[a]	20	.012
Likelihood Ratio	38.039	20	.009
Linear-by-Linear Association	.767	1	.381
N of Valid Cases	230		

a. 19 cells (63.3%) have expected count less than 5. The minimum expected count is .10.

Liv * prefers children to work in tourism rather than fishery

		preferes children to work in tourism rather than fishery				
		strongly disagree	disagree	neutral	agree	strongly agree
Liv	1	2	1	5	45	98
	2	0	0	0	6	4
	3	0	0	0	7	5
	4	0	6	0	8	16
	5	0	5	0	9	10
Total		2	12	5	75	133

		preferes children to work in tourism rather than fishery	Total
		don't know or not relevant	
Liv	1	1	152
	2	1	11
	3	1	13
	4	0	30
	5	0	24
Total		3	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	53.467[a]	20	.000
Likelihood Ratio	45.883	20	.001
Linear-by-Linear Association	12.823	1	.000
N of Valid Cases	230		

a. 21 cells (70.0%) have expected count less than 5. The minimum expected count is .10.

Appendix 12. Structured interviews cross - tabulation data based on fishers 'MPA

Notes

Output Created		16-Mar-2015 07:22:40
Comments		
Input	Data	D:\09 KLIEN DATA\44 MIRZA\DATA FINAL.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	230
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each table are based on all the cases with valid data in the specified range(s) for all variables in each table.
Syntax		CROSSTABS /TABLES=siteid BY marenv1 marenv2 marenv3 marenv4 marenv5 mpa1 mpa2 mpa3 mpa4 mpa5 mpa6 tour1 tour2 tour3 tour4 tour5 tour6 tour7 /FORMAT=AVALUE TABLES /STATISTICS=CHISQ /CELLS=COUNT /COUNT ROUND CELL.
Resources	Processor Time	00 00:00:00.031
	Elapsed Time	00 00:00:00.035
	Dimensions Requested	2
	Cells Available	174762

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Site Identification * marenv1	229	99.6%	1	.4%	230	100.0%
Site Identification * marenv2	229	99.6%	1	.4%	230	100.0%
Site Identification * marenv3	229	99.6%	1	.4%	230	100.0%
Site Identification * marenv4	229	99.6%	1	.4%	230	100.0%
Site Identification * marenv5	229	99.6%	1	.4%	230	100.0%
Site Identification * aware about the presence of mpa	229	99.6%	1	.4%	230	100.0%
Site Identification * understand the purpose of mpa	229	99.6%	1	.4%	230	100.0%
Site Identification * mpa benefits fishery	229	99.6%	1	.4%	230	100.0%
Site Identification * mpa benefits tourism	229	99.6%	1	.4%	230	100.0%
Site Identification * mpa provides higher fishery income	229	99.6%	1	.4%	230	100.0%
Site Identification * mpa mgt regularly seeks input from community	229	99.6%	1	.4%	230	100.0%
Site Identification * tourism in mpa benefits fishery	229	99.6%	1	.4%	230	100.0%
Site Identification * tourism in mpa improves health of marine environment	229	99.6%	1	.4%	230	100.0%
Site Identification * tourism in mpa provides job opportunities	229	99.6%	1	.4%	230	100.0%

Site Identification * tourism in mpa increases my income	229	99.6%	1	.4%	230	100.0%
Site Identification * tourism in mpa increases social harmony in my village	229	99.6%	1	.4%	230	100.0%
Site Identification * wants to exit fishery and switch to tourism	229	99.6%	1	.4%	230	100.0%
Site Identification * prefers children to work in tourism rather than fishery	229	99.6%	1	.4%	230	100.0%

There are more fish in my fishing grounds compared to ten years ago

		responses			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat NP	39	77	4	8
	Pemuteran	13	15	3	5
	Nusa Penida	11	31	3	11
Total		63	123	10	24

		responses		
		strongly agree	don't know or not relevant	Total
Site Identification	Bali Barat NP	3	0	131
	Pemuteran	4	1	41
	Nusa Penida	1	0	57
Total		8	1	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.172[a]	10	.010
Likelihood Ratio	20.590	10	.024
Linear-by-Linear Association	6.468	1	.011
N of Valid Cases	229		

a. 9 cells (50.0%) have expected count less than 5. The minimum expected count is .18.

Site Identification * marenv2

		marenv2			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat NP	44	62	3	17
	Pemuteran	4	5	0	21
	Nusa Penida	7	20	1	24
Total		55	87	4	61

		marenv2	
		strongly agree	Total
Site Identification	Bali Barat NP	5	131
	Pemuteran	12	41
	Nusa Penida	5	57
Total		22	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	65.943[a]	8	.000
Likelihood Ratio	65.578	8	.000
Linear-by-Linear Association	28.847	1	.000
N of Valid Cases	229		

a. 4 cells (26.7%) have expected count less than 5. The minimum expected count is .72.

Site Identification * marenv3

		marenv3			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat NP	19	93	2	16
	Pemuteran	6	31	1	1
	Nusa Penida	2	54	0	1
Total		27	177	3	18

		marenv3		
		strongly agree	don't know or not relevant	Total
Site Identification	Bali Barat NP	0	1	131
	Pemuteran	2	1	41
	Nusa Penida	0	0	57
Total		2	2	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.847[a]	10	.003
Likelihood Ratio	27.776	10	.002
Linear-by-Linear Association	1.047	1	.306
N of Valid Cases	229		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .36.

Site Identification * marenv4

		marenv4			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat NP	8	100	1	17
	Pemuteran	3	32	1	6
	Nusa Penida	1	49	2	4
Total		12	180	4	27

		marenv4		
		strongly agree	don't know or not relevant	Total
Site Identification	Bali Barat NP	4	1	131
	Pemuteran	0	0	41
	Nusa Penida	1	0	57
Total		5	1	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.908[a]	10	.638
Likelihood Ratio	9.646	10	.472
Linear-by-Linear Association	.834	1	.361
N of Valid Cases	229		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .18.

Site Identification * marenv5

		marenv5				
		disagree	neutral	agree	strongly agree	Total
Site Identification	Bali Barat NP	1	1	19	110	131
	Pemuteran	0	0	6	36	42
	Nusa Penida	0	0	7	50	57
Total		1	1	32	195	230

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.718[a]	6	.944
Likelihood Ratio	2.460	6	.873
Linear-by-Linear Association	.906	1	.341
N of Valid Cases	229		

a. 6 cells (50.0%) have expected count less than 5. The minimum expected count is .18.

Site Identification * aware about the presence of mpa

		aware about the presence of mpa			
		disagree	neutral	agree	strongly agree
Site Identification	Bali Barat NP	1	4	83	37
	Pemuteran	0	0	27	8
	Nusa Penida	0	0	43	7
Total		1	4	153	52

		aware about the presence of mpa	
		don't know or not relevant	Total
Site Identification	Bali Barat NP	6	131
	Pemuteran	6	41
	Nusa Penida	7	57
Total		19	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.553[a]	8	.068
Likelihood Ratio	16.723	8	.033
Linear-by-Linear Association	.350	1	.554
N of Valid Cases	229		

a. 8 cells (53.3%) have expected count less than 5. The minimum expected count is .18.

Site Identification * understand the purpose of mpa

		understand the purpose of mpa			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat NP	0	4	2	66
	Pemuteran	1	0	0	23
	Nusa Penida	0	0	0	46
Total		1	4	2	135

		understand the purpose of mpa		
		strongly agree	don't know or not relevant	Total
Site Identification	Bali Barat NP	25	34	131
	Pemuteran	4	13	41
	Nusa Penida	4	7	57
Total		33	54	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.648[a]	10	.006
Likelihood Ratio	26.269	10	.003
Linear-by-Linear Association	3.797	1	.051
N of Valid Cases	229		

a. 9 cells (50.0%) have expected count less than 5. The minimum expected count is .18.

Site Identification * mpa benefits fishery

		mpa benefits fishery			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat NP	0	3	5	72
	Pemuteran	1	0	1	21
	Nusa Penida	0	2	0	27
Total		1	5	6	120

		mpa benefits fishery		
		strongly agree	don't know or not relevant	Total
Site Identification	Bali Barat NP	46	5	131
	Pemuteran	16	2	41
	Nusa Penida	28	0	57
Total		90	7	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.030[a]	10	.222
Likelihood Ratio	15.692	10	.109
Linear-by-Linear Association	.479	1	.489
N of Valid Cases	229		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .18.

Site Identification * mpa benefits tourism

		mpa benefits tourism			
		disagree	neutral	agree	strongly agree
Site Identification	Bali Barat NP	22	3	69	35
	Pemuteran	4	2	25	9
	Nusa Penida	1	4	38	14
Total		27	9	132	58

		mpa benefits tourism	
		don't know or not relevant	Total
Site Identification	Bali Barat NP	2	131
	Pemuteran	1	41
	Nusa Penida	0	57
Total		3	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.104[a]	8	.108
Likelihood Ratio	16.083	8	.041
Linear-by-Linear Association	1.980	1	.159
N of Valid Cases	229		

a. 6 cells (40.0%) have expected count less than 5. The minimum expected count is .54.

Site Identification * mpa provides higher fishery income

		mpa provides higher fishery income			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat NP	2	41	15	43
	Pemuteran	0	5	9	19
	Nusa Penida	0	3	9	32
Total		2	49	33	94

		mpa provides higher fishery income		
		strongly agree	don't know or not relevant	Total
Site Identification	Bali Barat NP	28	2	131
	Pemuteran	7	1	41
	Nusa Penida	13	0	57
Total		48	3	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.736[a]	10	.004
Likelihood Ratio	29.395	10	.001
Linear-by-Linear Association	8.927	1	.003
N of Valid Cases	229		

a. 6 cells (33.3%) have expected count less than 5. The minimum expected count is .36.

Site Identification * mpa mgt regularly seeks input from community

		mpa mgt regularly seeks input from community			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat NP	5	35	0	65
	Pemuteran	2	11	0	12
	Nusa Penida	0	3	3	44
Total		7	49	3	121

		mpa mgt regularly seeks input from community		
		strongly agree	don't know or not relevant	Total
Site Identification	Bali Barat NP	12	14	131
	Pemuteran	5	11	41
	Nusa Penida	5	2	57
Total		22	27	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	43.357[a]	10	.000
Likelihood Ratio	46.369	10	.000
Linear-by-Linear Association	3.297	1	.069
N of Valid Cases	229		

a. 8 cells (44.4%) have expected count less than 5. The minimum expected count is .54.

Site Identification * tourism in mpa benefits fishery

		tourism in mpa benefits fishery			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat Np	3	33	4	63
	Pemuteran	1	11	4	18
	Nusa Penida	0	9	4	35
Total		4	53	12	116

		tourism in mpa benefits fishery		
		strongly agree	don't know or not relevant	Total
Site Identification	Bali Barat NP	24	4	131
	Pemuteran	6	1	41
	Nusa Penida	9	0	57
Total		39	5	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.142[a]	10	.428
Likelihood Ratio	12.245	10	.269
Linear-by-Linear Association	.293	1	.588
N of Valid Cases	229		

a. 8 cells (44.4%) have expected count less than 5. The minimum expected count is .72.

Site Identification * tourism in mpa improves health of marine environment

		tourism in mpa improves health of marine environment			
		disagree	neutral	agree	strongly agree
Site Identification	Bali Barat NP	26	5	73	21
	Pemuteran	10	1	20	9
	Nusa Penida	12	13	29	3
Total		48	19	122	33

		tourism in mpa improves health of marine environment	
		don't know or not relevant	Total
Site Identification	Bali Barat NP	6	131
	Pemuteran	1	41
	Nusa Penida	0	57
Total		7	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	27.956[a]	8	.000
Likelihood Ratio	27.151	8	.001
Linear-by-Linear Association	5.641	1	.018
N of Valid Cases	229		

a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is 1.25.

Site Identification * tourism in mpa provides job opportunities

		tourism in mpa provides job opportunities			
		disagree	neutral	agree	strongly agree
Site Identification	Bali Barat NP	26	6	69	23
	Pemuteran	1	4	26	10
	Nusa Penida	2	3	40	12
Total		29	13	135	45

		tourism in mpa provides job opportunities	
		don't know or not relevant	Total
Site Identification	Bali Barat NP	7	131
	Pemuteran	0	41
	Nusa Penida	0	57
Total		7	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.279[a]	8	.004
Likelihood Ratio	27.044	8	.001
Linear-by-Linear Association	3.377	1	.066
N of Valid Cases	229		

a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is 1.25.

Site Identification * tourism in mpa increases my income

		tourism in mpa increases my income			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat NP	4	49	10	51
	Pemuteran	2	8	16	13
	Nusa Penida	0	5	13	31
Total		6	62	39	95

		tourism in mpa increases my income		
		strongly agree	don't know or not relevant	Total
Site Identification	BALI BARAT NP	14	3	131
	Pemuteran	2	0	41
	Nusa Penida	8	0	57
Total		24	3	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	42.624[a]	10	.000
Likelihood Ratio	45.785	10	.000
Linear-by-Linear Association	6.565	1	.010
N of Valid Cases	229		

a. 7 cells (38.9%) have expected count less than 5. The minimum expected count is .54.

Site Identification * tourism in mpa increases social harmony in my village

		tourism in mpa increases social harmony in my village			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat NP	1	26	7	66
	Pemuteran	0	3	14	18
	Nusa Penida	0	4	12	36
Total		1	33	33	120

		tourism in mpa increases social harmony in my village		
		strongly agree	don't know or not relevant	Total
Site Identification	Bali Barat NP	27	4	131
	Pemuteran	6	0	41
	Nusa Penida	5	0	57
Total		38	4	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.717[a]	10	.000
Likelihood Ratio	37.478	10	.000
Linear-by-Linear Association	.241	1	.624
N of Valid Cases	229		

a. 6 cells (33.3%) have expected count less than 5. The minimum expected count is .18.

Site Identification * wants to exit fishery and switch to tourism

		wants to exit fishery and switch to tourism			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat NP	10	44	3	36
	Pemuteran	2	23	1	8
	Nusa Penida	6	18	13	13
Total		18	85	17	57

		wants to exit fishery and switch to tourism		
		strongly agree	don't know or not relevant	Total
Site Identification	Bali Barat NP	36	2	131
	Pemuteran	7	0	41
	Nusa Penida	7	0	57
Total		50	2	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	37.218[a]	10	.000
Likelihood Ratio	33.551	10	.000
Linear-by-Linear Association	5.091	1	.024
N of Valid Cases	229		

a. 7 cells (38.9%) have expected count less than 5. The minimum expected count is .36.

Site Identification * prefers children to work in tourism rather than fishery

		prefers children to work in tourism rather than fishery			
		strongly disagree	disagree	neutral	agree
Site Identification	Bali Barat NP	1	12	0	54
	Pemuteran	0	0	0	13
	Nusa Penida	1	0	5	7
Total		2	12	5	74

		prefers children to work in tourism rather than fishery		
		strongly agree	don't know or not relevant	Total
Site Identification	Bali Barat NP	61	3	131
	Pemuteran	28	0	41
	Nusa Penida	44	0	57
Total		133	3	229

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	44.805[a]	10	.000
Likelihood Ratio	51.196	10	.000
Linear-by-Linear Association	7.217	1	.007
N of Valid Cases	229		

a. 11 cells (61.1%) have expected count less than 5. The minimum expected count is .36.

Appendix 13. Themes

Theme 1 : Declining marine ecosystem health

West Bali National Park	Pemuteran	Nusa Penida
TNBB 1003:	**P1007**: In the past, the old people used to say that if you want to fish you did not have to go very far.	NP0005: Between 1991–2000 it was good to be fishers. In a month we can [could] get up to 10 tons of fish.
In the old days there were more fish than now. There were more fish	You can fish by the shoreline and you could catch many fish.	
In the past, it was easy to catch crabs and sea cucumber. Their numbers have declined steadily since the beginning of 2000s.	13 years ago, it was really easy to find snapper. There were many tuna fishers.	In 2009, [a] fisher's income used to be 400,000 rupiah per month, now we have nothing. And now fishers gamble [if they want] to fish, luckily, they also own piece[s] of land to farm; they can't rely completely to be fishers.
TNBB1004: Back [in the 1980s] we could have deployed our net and could catch fish rapidly, only within hours, now, we had to wait for days		

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West Bali National Park **Pemuteran** **Nusa Penida**

Between 76 to 80, fishes were easy to find [as if they were] lining up

2) : Now it is difficult to find ornamental fish. In those days, it was really easy to find butterfly fish, and there were many sharks in the sea. Now there was [no shark] left in this area

Prior 1990s there were no one who want to purchase sharks, and then suddenly the price of sharks went up significantly. At the same time the population of sharks started to decrease.

And yes, I also sold sharks.

Theme 2: Anthropogenic pressures

West Bali National Park	Pemuteran	Nusa Penida
TNB 1003: The number of residents in this village has increased exponentially.	P1007: Now there are many fishers using engine powered boats, so I had to take my boat for three hours into the deeper areas to catch tunas	Bali1002 "sea weed farming caused erosion and created a lot of [plastic]wastes.
TNBB 1003: In the past many local fishers practiced destructive fishery by using homemade explosives and cyanides. The enforcement was not tight and most of these fishers did not know that it was illegal. . .	P 1001: Previously when I first came here, we had cyanide fishing? Dynamite fishing, bad anchoring, coral collecting/coral mining those had negative effects. Positive effect : dive business and tourism, protection of the stopping/fought for the negative things. If not dive tourism came here and stop the destructive, this place would never be existed, pondok sari would never grow. P1001: In mid 90s , between 95-98 there was a big explosion over here and we collected 70.000 of COT. Since then, after 98, we collected probably around 6000 so the number decreased. If the reef is healthy means more fisher around so it benefits them as well. What I figured that a lot of these damages caused by man, so kind of up to us to help bring back the balance.	

West Bali National Park	Pemuteran	Nusa Penida
TNBB1004: irresponsible [fishers] fished with dynamites and cyanides. Now they are not that many because most of the reefs have been damaged.		

Theme 3: Knowledge and attitude of MPA

West Bali National Park	Pemuteran	Nusa Penida
TNBB1002: the local government agencies do not care about marine conservation		
TNBB1003: The NGO WWF wanted to be a hero by trying to order us what to do unlike other NGOs that attempted to give us direction and knowledge about sustainable fishery. .		

Theme 4: Benefits of tourism

West Bali National Park	Pemuteran	Nusa Penida
TNBB1002: The presence of tourism has encouraged our appreciation for the sea.	P1001: Now a lot more staying here, so it's good, they're getting better education so it's kind of, I'm not really sure of what's going to happen one way the land prices is going up, so don't know they can afford to stay here or not, but they are getting better education better nutrition because people working here having more money to buy food, and all that. But it's like the process is getting up , faster then what they can catch up. So, I don't know in long term is good or bad.	
Tourism has no negative impact on the environment. From the cleanliness perspectives, we even learned [from the tourists] about maintaining good hygiene.	Bali002: From tourism perspectives, especially in Indonesia, healthy coral reefs benefits people, not just for them to enjoy (the reefs) but it also provides opportunity for education, where through raising people awareness at a time when people are willing and ready for information and learn about new change	

West Bali National Park	Pemuteran	Nusa Penida
I don’t mind if my children want to work in the tourism sector. I don’t see any issue with my religion		

Theme 5 Threats of tourism

West Bali National Park	Pemuteran	Nusa Penida
TNBB1002: we also fear for foreign influence on our tradition and corrupt our morality. In Sumber Kima, most of us are Muslim and we are not comfortable to see tourists who are walking around with minimal clothing. We should be consulted first	P1001: In first decade of tourism in pemuteran 2000ish, they had a lot less but people seem much happier. It was more simple life for them, even though they had nothing and that they all seems to be had a lot of smile, seemed to be friendly atmosphere around here. Security wise pretty much the same.	
	later on, we start having other companies come in, which are they don't understand that idealism that we start of, we got pushed a lot more a lot more promotion and all that. Dive tourism, hotels, building industries and warung they flow on. They started to selling lands, offering high price of it, it is great having high price for the land but unfortunately, many people here don't know how to handle of that kind of money. So, in short, it was gone for gambling or partying, not many of them put in bank or bought new property to change it, they don't know how to look after the money.	
TNBB 1003: If tourism sector was willing to involve the fishers, the		

result will be substantial. However, the reality dictate otherwise.

TNBB1003: There is not much of positive impacts, tourists just sightseeing around mangrove areas and rent our boats.

I wish we can be given the mandate to manage tourism in our own village and share our revenue with the national park.

TNBB 1003: Tourists complained a lot. If they see our net stuck in the coral branches, they would have complained straight away.

Theme 6: Livelihood for present generation

West Bali National Park	Pemuteran	Nusa Penida
	I just want to be a fisher	. NP 005: Balinese fishers' efforts are limited to our adat obligations, unlike other Indonesian fishers who can go on fishing journey[s] for extended period[s], Balinese fishers have to fulfil their religious and adat commitment[s], so we can't go very far from this island.

Theme 7: Livelihood for future generation

West Bali National Park	Pemuteran	Nusa Penida
TNBB1002: I personally do not want my kids to be fishers. They must know the sea but not becoming fishers.		Given the option to be fishers or [work] in [the] tourism sector, obviously we [prefer] to work in the tourism sector. Whatever [happens], my kids cannot be fishers and I will do whatever I can within my power so they can be farmers or office workers, but not fishers. My motto is I don't want to [allow] my kids to be fishers. Because to be [a fisher] here [is] difficult.
I don't agree if my children work in the tourism sector, I prefer they work as civil servant, as long as they don't go to the seas.		
TNBB 1003: I want my children grow to be entrepreneur and create jobs including for the tourism sector.		
TNBB1004: As long they don't have to work with net.		