Perceptions of compliance in co-managed marine protected areas from three stakeholder groups in two marine protected areas in Maluku, Indonesia

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Abstract

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Increasing voluntary compliance to marine protected area (MPA) regulations will increase the probability of MPA success. This research utilizes qualitative interview research to determine perceptions of the MPA, discover the drivers of compliance and noncompliance with MPA regulations, and recommend ways to improve compliance in two remote MPAs in Maluku, Indonesia: Ay MPA and Koon MPA. Additionally, this research uses two social behavioral theories to understand interview responses and behavior in these sites: Lindenberg's (2001) Goal Framing Theory and Ajzen (1991) Theory of Planned Behavior. This research was conducted with the support of the 5-year Sustainable Ecosystems Advanced (SEA Project), led by the United States Agency for International Development, and is supporting the development of MPAs throughout three Indonesian provinces. Interviews demonstrated that perceptions of the MPA can impact drivers of compliance and noncompliance. Compliance is often driven by expected and realized benefits from the MPA and the social responsibility to behave in a manner that will bring benefits to the community. Noncompliance is often driven by perceived limitations or inability to follow the rules, the undesired perceived loss of freedom as well as the desire to increase one's resources. This research provides site-specific information and recommendations for SEA Project as efforts continue to build management plans and secure government authorization of these two MPAs.

1. Introduction

The Indonesian government has accepted technical assistance from the United States Agency for International Development (USAID) to maintain or increase Indonesia's fish production, increase food security and boost the economy, all without damaging the marine ecosystem. USAID and various non-governmental organizations (NGOs) are working with the Indonesian government on the 5-year Sustainable Ecosystems Advanced (SEA) Project to accomplish these objectives. The SEA Project is prioritizing the promotion of successfully managed marine protected areas (MPAs) throughout the country to enhance biodiversity conservation, augment fisheries production and promote sustainable livelihoods.

MPAs are clearly delineated portions of the marine environment that have been designated for the protection of natural resources and may prohibit certain activities within the area, or within portions of the area (Agardy, 1994; Green et al., 2013; White and Green, 2014). The SEA Project is working to improve, or create, management plans for existing MPAs in three Indonesian provinces: North Maluku, Maluku and West Papua. Two small MPAs in Maluku Province are receiving support from the SEA Project and are the focus of this research: Ay MPA and Koon MPA. Ay MPA is in the Banda Sea around Ay Island, among the Banda Islands. It was created in 2012 and is also supported by the Coral Triangle Center (CTC). Koon MPA is located east of Seram Island in the Koon-Neiden Island region. It was created in 2011 with the support of the World Wide Fund for Nature- Indonesia (WWF). These MPAs have been authorized by local government and have active rules or regulations, but neither of them have official management plans.

This research addresses the need for site-specific social and contextual information in these two MPAs, which are undergoing management plan development (Christie et al., 2003). Specifically, this research examines compliance to the rules of each MPA where compliance is defined as voluntarily acquiescence to rules and regulations (Read et al., 2011). The following three questions are addressed

based on interviews with stakeholders: How is the MPA perceived? What are the perceptions of compliance to MPA regulations in Koon and Ay? And what can be done to increase compliance to MPA regulations? This research utilizes interviews as the primary source of information. Interviews were conducted with local community members, district and provincial government employees, SEA Project staff and staff from CTC and WWF.

1.2 Theoretical Background

MPAs are generally considered an important tool for marine resource conservation and natural resource management because they have been shown to increase biodiversity, organism density, biomass, body size, and reproductive potential within the MPA boundaries (Chaigneau and Brown, 2016; Green et al., 2013; Kritzer, 2004; Marshall et al., 2010; Roberts, 2012). The best practices recommend that effective and successful MPAs be designed based on the entire ecosystem, including humans, and that the MPA is imbedded within a larger natural resources management framework (Christie et al., 2005; Green et al., 2013). MPAs with strong management plans and effective implementation are expected to provide benefits to local communities by increasing target fish catches, providing diversified livelihoods through employment in the tourism, aquaculture or law enforcement sectors, and reducing conflict between resource users through the use of multiple-use zoning systems (Campbell et al., 2013; Chaigneau and Brown, 2016; Green et al., 2014; Kusumawati and Huang, 2015; Mangubhai et al., 2015; Russ et al., 2008; Weeks et al., 2014; White et al., 2005). However, the effectiveness of an MPA, even if well-designed, largely depends on user compliance to and enforcement of the regulations (Arias et al., 2015; Crawford et al., 2004; Dalton et al., 2015; Kritzer, 2004; Little et al., 2005; Marshall et al., 2010; Read et al., 2011, 2015; Warner and Pomeroy, 2012).

MPA managers largely rely on the following assumptions to create or improve compliance to MPA regulations: use of participatory decision-making process, creating a multiple- use MPA, an increase in fish abundance, an increase economic benefits to stakeholders, or the perception of increased

fish catches and economic gains, provision of alternative livelihoods, provision of marine education and outreach activities, clearly marking MPA boundaries, clearly communicating MPA rules, having a strong and consistent enforcement system, perception of a real threat that there are consequences for non-compliance, and respecting traditional management and marine tenure systems where applicable (Agostini et al., 2012; Flower et al., 2013; Huffard et al., 2012; Ostrom, 2008; Varney et al., 2010). Based on the documented benefits of MPAs and the management assumptions regarding compliance, this research aims to understand the perceptions of the MPA and compliance to MPA regulations within two SEA Project sites in Maluku Province: Ay Marine Tourism Park in the Banda Islands and Koon Island Marine Protected Area east of Seram Island.

In addition to current assumptions about compliance, this research uses two social psychological theories regarding human behavior to understand the decision to engage in compliant behavior or not: Lindenberg's goal framing theory (2001) and Ajzen's theory of planned behavior (1991). These two theories present a framework to understand the motivations of human behavior and the decision to comply, or not, with rules such as those presented in an MPA management plan. Social psychological theories can be used to understand compliance as the theories attempt to explain why humans behave as they do. The "why" is extremely important for natural resource managers to understand because knowing why people are compliant or noncompliant can aid in the development of programs and strategies to increase compliance (Arias et al., 2015).

In 2001 the goal framing theory was developed by Lindenberg to describe how an individual's goals influence situational perceptions and behaviors (Lindenberg and Steg, 2007). This theory recognizes that a person likely has various goals they are working towards simultaneously; it also recognizes that these goals may change over time and the goals may conflict with each other (Etienne, 2011; Lindenberg and Steg, 2007). The goal framing theory identifies three primary goals in an individual's life: gain goal, hedonic goal, and normative goal. The gain goal refers to the desire to increase or maintain resources, the hedonic goal aims to improve one's mood or generate pleasure from the behavior, and the normative goal

refers to the desire to behave appropriately according to personal and social norms (Lindenberg and Steg, 2007). This theory posits that in a given situation one must decide how to behave, to engage in an activity or not, and one of the goals will have a greater influence on the behavioral decision making it the goal "in frame," and the other two goals the background goals. However the goal in frame is not static and can be replaced by another goal depending on the situation and context (Lindenberg and Steg, 2007). A survey of Swedish homeowner compliance to on-site sewage system upgrades tested the goal-framing theory and found that the gain goal was the strongest driver of compliance in that situation (Wallin et al., 2013). The Swedish case study suggests that by identifying the active goal frame, resource managers can highlight the positive outcomes received from compliant behavior as it relates to the active goal.

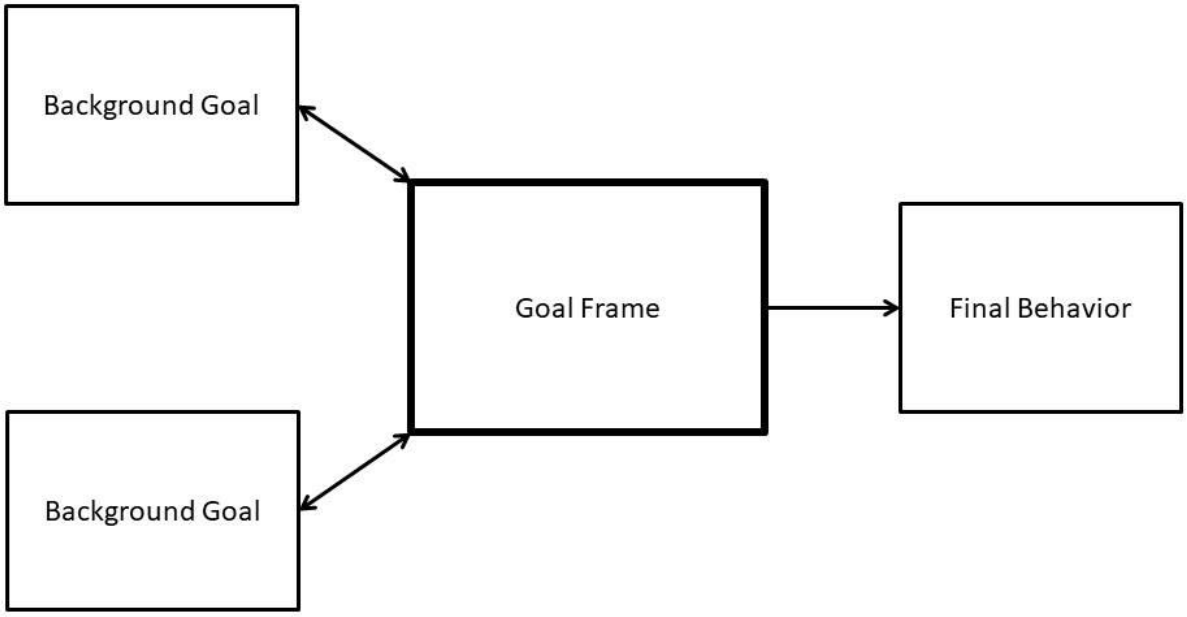

Figure 1: Diagram depicting Lindenberg's Goal Framing Theory. The background goals and goal in frame interact with each other, but the goal in frame has the most influence over the final behavior.

The theory of planned behavior (Ajzen, 1991) was developed as model to predict and explain human behavior by examining an individual's behavioral intentions. The theory posits that three beliefs influence an individual's behavior: behavioral, normative and control beliefs (Ajzen, 1991; Madden et al., 1992). Behavioral beliefs refer to one's perception of the outcome of engaging in a behavior, whether

positive or negative. Normative beliefs, similar to the normative goal above, refer to the perceived social acceptability of engaging in the behavior. Control beliefs refer to the perceived ability to engage in a behavior based on personal skill, knowledge and resources (Ajzen, 1991; Madden et al., 1992). According to the theory of planned behavior, the combination of these beliefs results in one's intention to engage in a behavior (Figure 1). Behavioral intention leads to a behavior, provided that the control beliefs also support that behavior. A study of United Kingdom commercial truck drivers identified control beliefs as the largest predictor of compliance to truck driving regulations, specifically that the surveyed drivers thought it was easy or possible to comply with truck driving regulations, so they complied (Poulter et al., 2008). Identifying the belief or beliefs that strongly influence compliant or noncompliant behavior can help natural resource managers target their interventions to increase compliance.

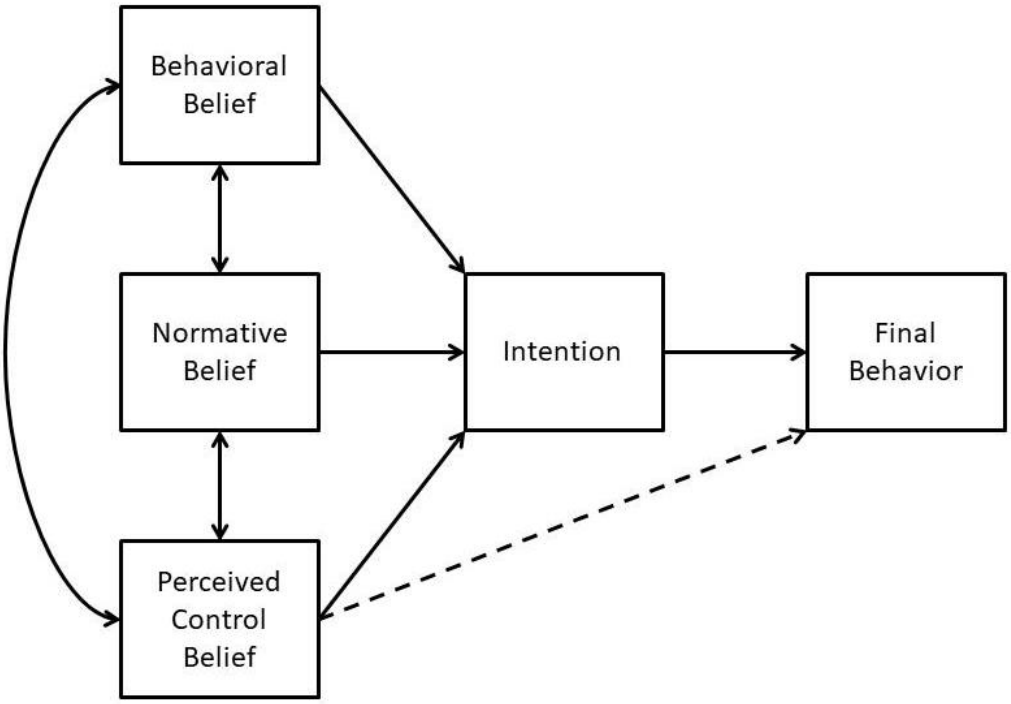

Figure 2: Diagram depicting Ajzen's Theory of Planned Behavior. All three behavioral beliefs influence each other and the behavioral intention, which influences the final behavior. The perceived control belief can also directly influence the final behavior. Figure adapted from Ajzen 1991.

In addition to using these theories to understand compliance, they can also be used to design and evaluate interventions aimed at increasing compliance (Arias, 2015; Read et al., 2011, 2015). There has been an important distinction made between coerced and voluntary compliance (Arias et al., 2015; Read et al., 2011) and this has implications for managers. Coerced compliance refers to increasing compliance through enforcement efforts and voluntary compliance is when an individual complies with regulations because they want to, they believe it is the right thing to do, or because they genuinely support and agree with the regulations and the authority (Arias, 2015). Enforcement operations tend to be expensive because patrolling large areas of ocean often requires multiple boats and significant amounts of fuel, as well as a significant amount of time as people fish during the day and night, so many managers are looking to increase voluntary compliance to reduce the cost of enforcement. Enforcement is still necessary, especially in order to manage external resource users, but increasing voluntary compliance by the residents in the MPA could increase the success of the MPA (Ainsworth et al., 2012). This research utilizes the theories to understand compliance and make recommendations for MPA managers.

1.3 Study context

Indonesia is a Southeast Asia island nation, comprised of over 15,000 islands. Indonesia is one of the six Coral Triangle countries that have made a multi-national agreement to responsibly manage the region's marine resources. The other countries include Malaysia, Philippines, Papua New Guinea, Solomon Islands, and Timor-Leste. This portion of the world is called the Coral Triangle because of the expansive coral reefs and extreme marine biodiversity found in the region (Green et al., 2011). The Coral Triangle is approximately 1.6% of the world ocean but is estimated to contain 76% of known coral species, 37% of known reef fish species, over 30% of the world's coral reefs, and the most expansive mangrove forests in the world (Green et al., 2011; White and Green, 2014), and these are the resources receiving the attention of marine conservationists and natural resource managers as these countries continue to develop.

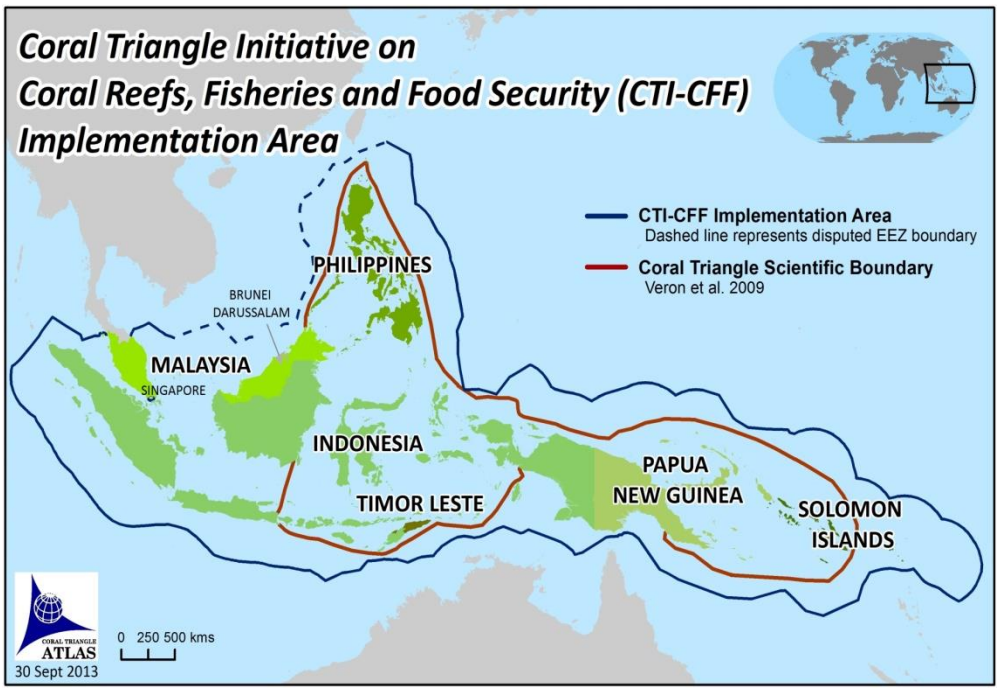

Figure 3: Map of the six countries in the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security.

Maluku Province is in eastern Indonesia, close to Papua New Guinea and is comprised of 1,340 islands, the majority of which are uninhabited. The islands are surrounded by the Banda Sea to the south, the Molucca Sea to the northwest and the Seram Sea to the northeast. Maluku Province is comprised of about 10% land and 90% sea and as such the province has become the highest supplier of marine resources to Indonesia by supplying about 25% of the country's capture fisheries (Keputusan Bupati Seram Bagian Timur, 2016). Marine resource management in Maluku is expected to improve the condition of the local economy by improving the ecosystem in order to maintain or increase fish abundance, by increasing the attractiveness of the locations to boost the tourism industry, and by diversifying livelihoods (Keputusan Bupati Seram Bagian Timur, 2016). Additionally, management strategies are intended to build local capacity to monitor and adaptively manage natural resources to support sustainable development and improve social and economic welfare(USAID, 2016).

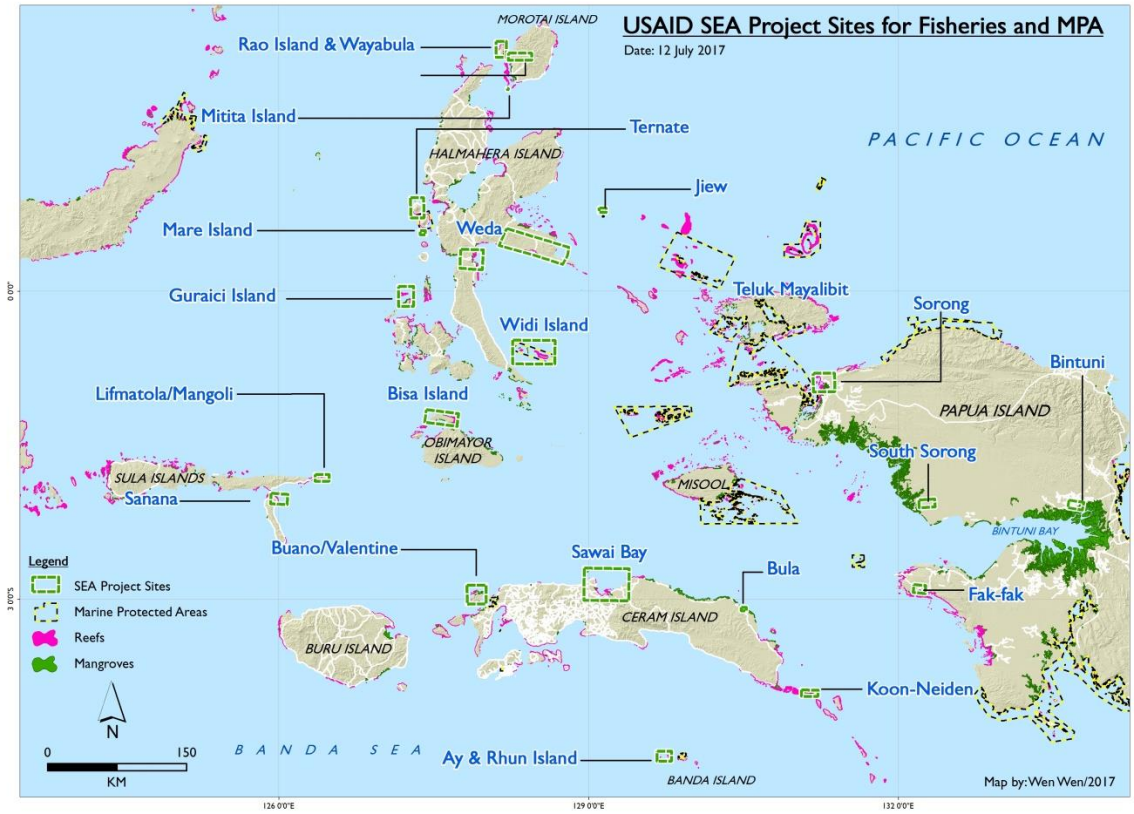

Figure 4: Map of USAID SEA Project sites.

In addition to the formal Indonesian laws and regulations, many communities within Maluku Province still rely on customary governance systems called *adat* and the traditional resource management system called *sasi* (Evans et al., 1997; Harkes and Novaczek, 2002). Within Southeast Asia collaborative management (co-management) between local villages, the formal government and a supporting organization, like an NGO, is a popular management strategy (Campbell et al., 2013; Cohen and Steenbergen, 2015; Warner and Pomeroy, 2012; White et al., 2014). In areas that still utilize the customary legal systems, such as *adat*, NGOs and the formal government often work with the traditional system to respect customary law and increase the support for conservation interventions, such as MPAs. Both MPAs in this study have active *adat* systems as the traditional Kataloka Kingdom still holds power in Koon and the community in Ay is using *sasi* to manage harvesting of four species. In order to protect specific terrestrial and marine resources, local village leaders can declare a certain resource under the

protection of *sasi*, which prohibits the extraction of that resource in a particular area for a predetermined amount of time (Evans et al., 1997; Harkes and Novaczek, 2002).

2. Methodology

Site Selection

Indonesia was selected because of SEA Project and the drive to improve co-managed MPAs throughout the country. Ay and Koon MPAs were chosen because they have valuable marine resources, the residents are aware of the MPA, and because they are receiving support from SEA Project to develop management plans. Information about the perceptions of compliance to MPA regulations can inform the management strategies and programs which are incorporated into the management plans.

Data Collection

Interviews were conducted between July and October 2017. During the semi-structured, elite-style interviews, respondents were asked a series of open-ended questions and they were encouraged to give their opinions and answer with the information they thought was important (Berry, 2002; Brady, 1977; Dexter, 2006). Interview respondents were SEA Project staff, CTC staff, WWF staff, provincial and district government employees, and residents of each MPA. Respondents were grouped into three stakeholder categories: government, practitioner, or resident. Government and practitioner respondents were chosen based on their knowledge of MPA management or involvement with Ay and Koon MPAs. Resident respondents were sampled to include diverse perspectives by interviewing fishers and farmers. The interviews lasted between 30-60 minutes and were conducted in Indonesian with a translator, unless the respondent felt comfortable enough to speak in English. In all, 45 interviews were conducted with both male and female respondents. Respondent identities are kept confidential to minimize risk and comply with the University of Washington's Human Subjects Division Internal Review Board's approval of this project.

Analysis

The interviews were transcribed, and the text was analyzed using ATLAS.ti software (ATLAS.ti, 2017). Interviews conducted in Indonesian were transcribed by the translator and interviews conducted in English were transcribed by the author. The author analyzed the interviews. Interview transcripts were first coded using an inductive approach to identify the major themes of the perceptions of the MPA and compliance in each site (Patton, 2015; Saldaña, 2016). Codes were initially developed using a strengths, weaknesses, opportunities and threats (SWOT) approach in order to understand the positive and negative perceptions of the MPA(Dyson, 2004; Saaty, 1987). After the SWOT analysis was complete, the interviews were re-analyzed to expand the initial code categories and identify trends and drivers of compliance. Tertiary analysis utilized the research questions as a framework for organizing the patterns identified inductively during primary data analysis to answer the research questions. This cross-case synthesis (Yin, 2014) answers research questions in the following manner:

Table 1: Research questions and strategy for determining the answers.

Research question	Answer
1. How is the MPA perceived?	Positive and negative perceptions of the MPA Perceived purpose of MPA
2. What are the perceptions of compliance to the MPA regulations?	Perceived amount of compliance Respondent suggested drivers of compliance and drivers of noncompliance
3. What can be done to increase compliance?	Respondent suggestions Researcher suggestions based on interview and observations

3. The Case of Ay Island Marine Tourism Park

Site Context

The Banda Islands includes 11 islands and a sand bar, six of which are inhabited: Hatta, Big Banda, Neira, Volcano, Ay and Rhun Island. The Banda Islands are part of the Central Maluku District, located in the southern portion of Maluku Province, in the Banda Sea. The Ay Marine Tourism Park (hereafter: Ay MPA) is co-managed between the community on Ay, CTC and the Maluku provincial government. The initial survey to create an MPA in this area was conducted by CTC in 2012 and the MPA was formalized in 2014 with the provincial government. At the time of this research, the formal status of the MPA is that the boundaries have been declared by the governor (Figure 4), and the creation of the official management plan and zoning system is planned for next year (2018). However, the village on Ay has already formalized MPA regulations and zoning within their village regulations.

Ay is the first of the Banda Islands to create customized, formal, written village regulations and these regulations were developed by the community itself. The village regulations identify two small core zones and two small tourism zones, and the remainder of the MPA is dedicated to traditional, nondestructive fishing methods. Additionally, Ay MPA has the following marine animals under the protection of *sasi*: all lobster and sea cucumber species, *Trochus niloticus*, and *Turbo marmoratus*. In addition to the periodic closures of *sasi*, there are size restrictions for harvesting these animals during the open season. They have also implemented a ban on all shark, turtle, turtle egg and Napoleon wrasse fishing or harvesting. Other relevant village regulations include: no stealing, no disposing of rubbish in the ocean, on the beach or the ground, and no harvesting sand from Ay Island unless it will be used to build one's own home. The regulations also stipulate fines for various offenses, such as paying 50,000 IDR (3.68 USD) per stolen nutmeg fruit. There is also a voluntary Conservation Team comprised of 15 men and women from the community that work to implement the village regulations. Residents of Ay make their living from farming, fishing, and tourism operations.

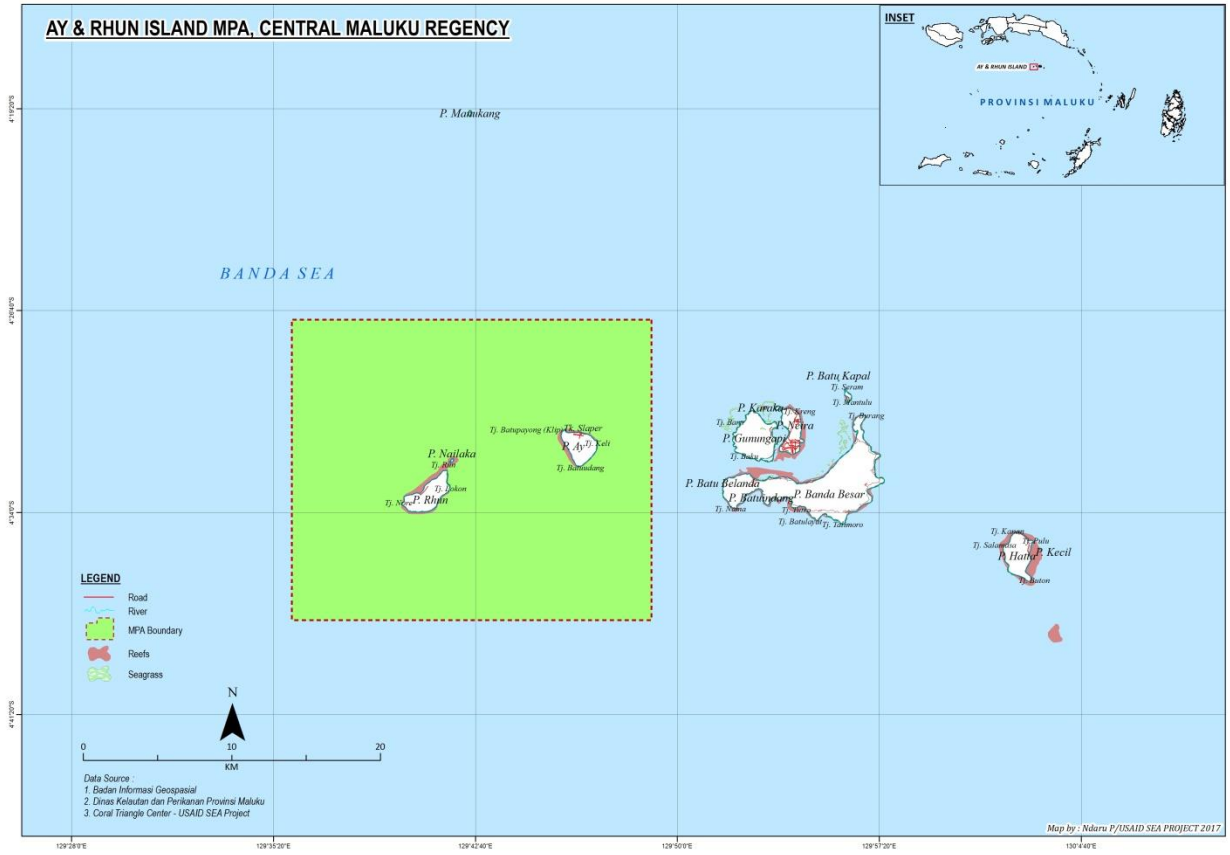

Figure 5: Map of Ay and Rhun MPA. The community on Rhun Island had not begun implementation of MPA or village regulations at the time of this research and thus Rhun residents were not included in this compliance research.

Results

The interviews demonstrated an overall positive perception of Ay MPA and the set of village regulations. Since the rules, management strategy, and zones of the MPA are contained within the set of village regulations and both were developed simultaneously, residents do not view the two separately. Residents maintain that the regulations were developed to increase village safety and protect resources for current and future generations. These village regulations have improved the safety and condition of the village because "the village has become clean and residents feel safe about their resources on land, like farms. No one dares to steal because they will get fines. Residents feel secure about the sea, too, because there is no destructive or blast fishing, or something illegal in the fisheries" (Farmer 4, 9/13/17). Each resident respondent claims that the community of Ay already recognizes the benefits of having an MPA

since “it is easy to catch fish right now and fishers do not need to go farther for fishing” (Fisher 1, 9/12/17) and respondents are able to see future opportunities because “if everything is well protected then it would attract more people to come that also could increase the income for the local community” (Government 1, 8/15/17). The community in Ay has also decided to revitalize the *sasi* system for four commonly harvested animals and as the abundance of those species increases the community is excited for the harvest season to be opened. Overall there is a positive perception of the MPA as people have noticed positive changes in their lives, such as having a clean village, an increase in fish catch, reduced conflicts within the community and many are able to see an increase in opportunities for the tourism industry.

An overall positive perception of the MPA does not preclude the community from experiencing some drawbacks or negative feelings toward this new way of life. Many of the village regulations, especially those related to the MPA, prohibit behaviors that were normal to the community prior to CTC introducing conservation. For example, residents were accustomed to eating turtles and turtle eggs, disposing of trash on the beach, fishing whatever and wherever they wanted, or harvesting and selling sand from the beaches of Ay Island. This loss of freedom was the main negative perception of the MPA and the village regulations. Though people negatively perceive these restrictions, people generally support conservation efforts and one respondent explained this concept by saying “I believe that conservation is good, even though it prohibits us, it does not mean that we can’t take anything. We can but we have to protect it so our next generation will benefit” (Fisher 3, 9/12/17).

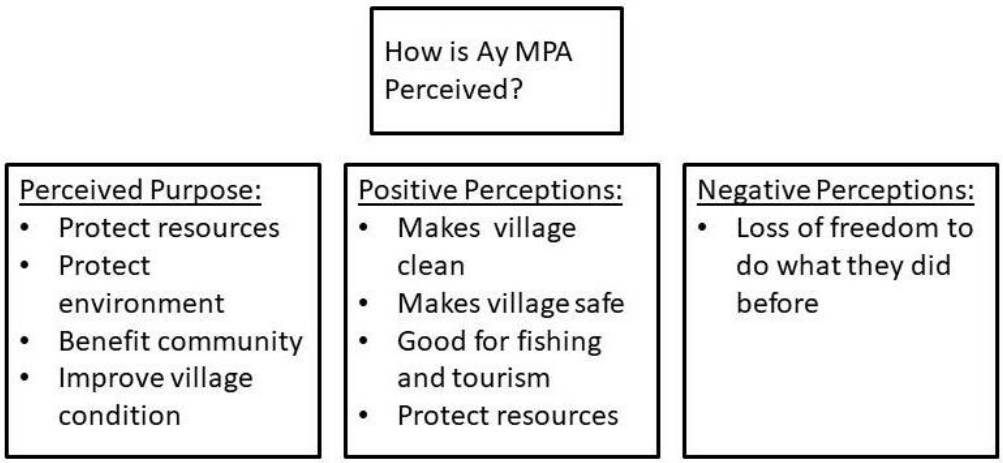

Figure 6: Answers to RQ1: How is Ay MPA Perceived?

Supporting conservation and the existence of an MPA does not necessarily lead to compliance with the regulations as there are many factors that influence an individual's life and behavior, as discussed in Lindenberg's goal-framing theory (GFT). Respondents were asked about the amount of compliance to MPA regulations and the answers varied widely; however, most people suggested that there are more compliant individuals than noncompliant individuals. The drivers of compliance for this community also vary but are closely linked to the positive perceptions of the MPA. People obey the rules because "following the rules and regulations the condition of the village becomes better" (Farmer 3, 9/6/17) and "because it makes their income from fishing increase and other people follow so the fish are not scarce" (Housewife 4, 9/11/17). In addition to receiving benefits people are also motivated to comply to avoid a fine or punishment. In the case of Ay Island the concept of the MPA was introduced by CTC, but the community members designed and agreed upon the regulations, which appears to motivate people to comply. One respondent explained that "since I was on the committee when we declared these regulations, I try to follow the best I can to the regulations. I am very happy and proud that I can follow all of the village regulations" (Farmer 2, 9/12/17). The final driver of compliance that was identified was that people expect their neighbors to follow the rules and hold each other accountable. This was apparent when one respondent said "when the community sees other people breaking the rules, they should tell them not to. For example, if there is someone to put a net in the core zone, they should tell him not to do

that" (Fisher 3, 9/12/17). Using the GFT as a framework is an effective way of understanding these drivers of compliance. Those that follow the rules because it will increase fish catch are likely motivated by the gain goal, and those that enjoy seeing the village clean and safe, are proud of the regulations, or are afraid of the punishment for disobedience are likely motivated by the hedonic goal, while those motivated by peer pressure to follow the rules are influenced by the normative goal.

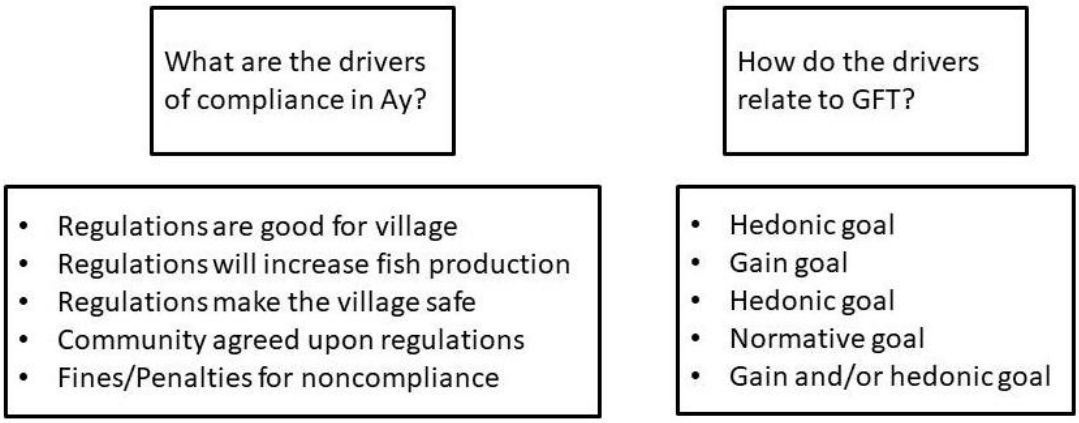

Figure 7: Drivers of compliance to regulations in Ay and how the driver relates to the goal framing theory.

There were two main drivers of noncompliance that were identified from the interviews with Ay residents. The first driver stems from the negative perception that the MPA regulations limit an individual's freedom. "People don't want to follow because they feel like they are not free anymore to do anything they want. They want it to be like it was in the past when they could go spearfishing anywhere, or catching and putting net anywhere. They want it to be a free area still" (Fisher 1, 9/12/17). The second driver of noncompliance is "money, money, money, money! Easy! Allie, it is money, money, money. Because in Indonesia, everything is about money, even in Bali" (Tourism Operator 2, 9/14/17). Certain village regulations take away some opportunities for individuals to make an income such as harvesting sand and rocks from the coastal area and selling them on other islands to construction projects. On Ay economic pressures can entice an individual to break the rules "because they need to earn money for their family, to send their kids to school, so they disobey the rules, even if they want to obey but because of this they cannot. For example, they go fishing by using bomb to get more fish and get more income"

(Government 1, 8/15/17). These two drivers of noncompliance may explain the wide range of perceived amount of regulation compliance since some people may only follow the regulations when it is convenient. Alternatively, people may only follow the regulations when they feel comfortable with their income but break the rules when money is low. According to the GFT noncompliant individuals are either motivated by the hedonic goal when they disobey to regain feelings of freedom or the gain goal when they disobey to increase their resources.

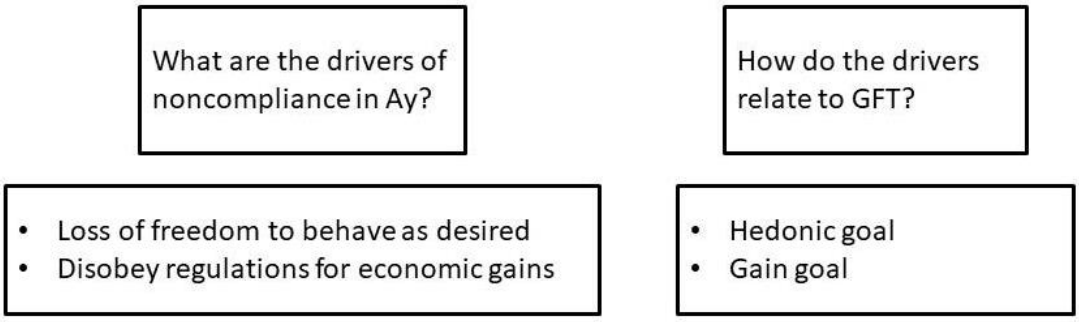

Figure 8: Drivers of noncompliance to regulations in Ay and how the drivers relate to the goal framing theory.

4. The Case of Koon Island Marine Protected Area

Site Context

Koon Island is a small, uninhabited island located in East Seram District. Koon Island is part of the Kataloka Kingdom, which also includes Grogos Island and many communities on Gorom Island. There are various other islands nearby, such as Nukus, Kisui, and Panjang that are affected by this MPA. The no-take conservation area around Koon Island was created to protect the spawning aggregations of commercially important fish. Prior to the MPA, the area was rented to a foreign fishing company for extractive use and destructive fishing was common during this time. In 2011, WWF approached the King of Kataloka to enter into a marine conservation agreement (MCA) which would take over the lease and close the area off to fishers and ensure that destructive fishing methods were no longer used in Kataloka

Kingdom. However, in 2015 King of Kataloka agreed to end the rental agreement with WWF to implement an MPA with the help of WWF and the East Seram district government. The Kingdom of Kataloka is a traditional *adat* system of governance where the King rules by decree. Since there is no official management plan for the MPA and the Maluku provincial government is still authorizing the MPA, the king declared the area as no-take. Figure 8 shows the government zoning plan for the entire Koon-Neiden MPA which was established by the East Seram district government.

The geography of the region is important since the king lives on Gorom Island, which is about 35-40 minutes from Koon by speedboat on a calm day and Grogos is only about 5-10 minutes from Koon by speedboat on a calm day. Residents of Gorom make their living mainly through farming and fishing while residents of Grogos predominately rely on fishing. Currently, visiting live-aboard and yachts are the only form of tourism in the region, and they generally do not interact with the communities of Gorom or Grogos. WWF as worked with the Kataloka community to create a community monitoring group called Lembaga Adat Wanu Atalo'a (LEWANA) (Kataloka Customary Institution), though this group is recently formed and has not engaged in many activities at the time of this research.

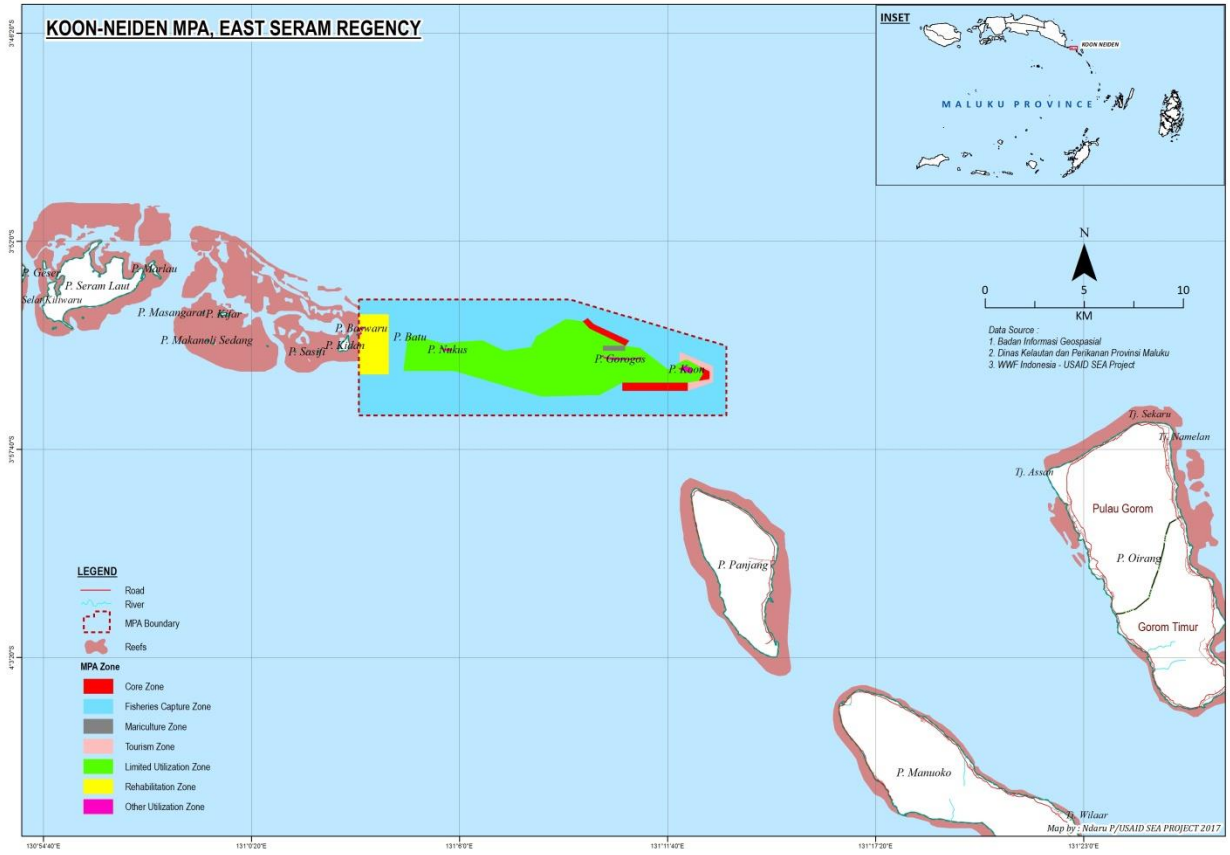

Figure 9: Map of Koon MPA and zoning for the entire region of Koon-Neiden.

Results

The waters around Koon Island are likely a spawning and aggregation site for commercially important fish, like grouper, that the entire Moluccas region depends on which is partially why WWF approached the king of Kataloka to protect the area. Many of the Kataloka residents are aware that fish lay their eggs around this island and by protecting "the fish and the coral is not only for their own benefit but for the benefit of the whole community" (Village Leader 1, 8/18/19). Prior to the marine conservation agreement between Kataloka and WWF, the foreign fishing company that rented the area was known to use destructive fishing methods, particularly cyanide fishing (Barber and Pratt, 1998; Halim, 2002). So WWF also initiated conservation because "if we do not protect it, the area will be destroyed with cyanide or other destructive fishing or unsustainable fishing tools" (Practitioner 5, 8/19/17). Prohibiting fishing in

this MPA is expected to benefit the regions fishers “because most of the people here are fishers, so out of the protected area their income will increase” (Fisher 9, 8/19/17). The positive perceptions of the MPA are generally related to the belief that the MPA will provide benefits to the Kataloka Kingdom and the surrounding islands both now and for future generations.

The negative perceptions of the MPA are related to the impact that the fishers feel by losing access to these fishing grounds. One respondent explained that “the community will feel some weaknesses because when they go fishing the nearest area is the protected area but since it is protected they need to go farther for fishing which requires a bigger, better boat like a Ketinting or Johnson, but the bigger boat is very expensive” (Teacher 1, 8/18/17). Additionally, despite destructive fishing practices the waters around Koon are still very productive so by prohibiting fishing in this region “people will feel loss because for example today if a man goes fishing in Koon he could catch 10 fish but if he fishes in other places then he will only catch 5 fish, so it means that their catch will decrease” (Fisher 5, 8/21/17). The loss of income and need to travel farther to reach productive fishing grounds is extremely important to these communities, particularly the community on Grogos because “their job is only fisherman. It is not the same with Gorom Island because here we still have nutmeg and clove. If there is prohibition to fish in Koon then where should they go or do to get money?” (Teacher 2, 8/22/17).

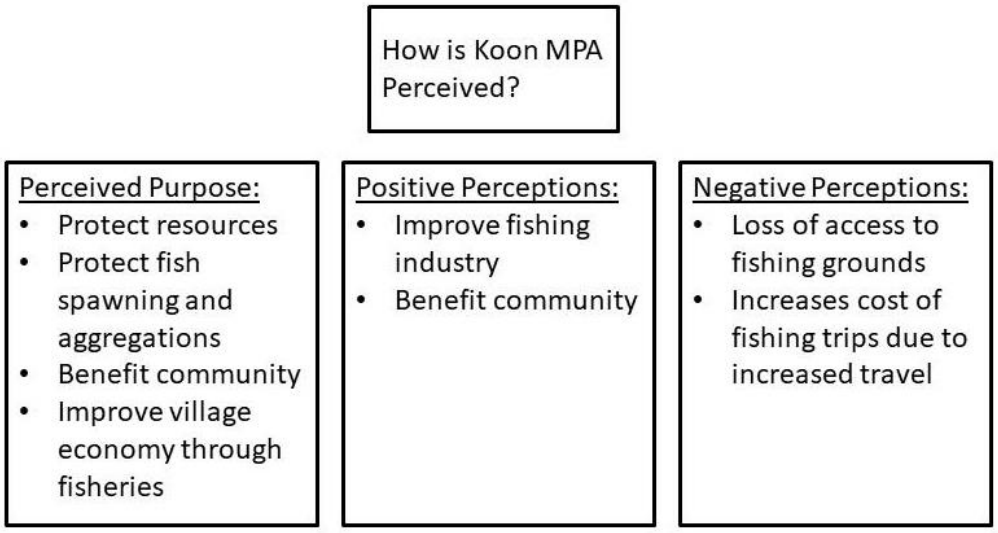

Figure 10: Answer to RQ1: How is Koon MPA perceived?

The positive and negative perceptions of the MPA can be expected to impact compliance to the regulations. Overall, respondents suggested that the majority of people comply with the rules and refrain from fishing in Koon MPA. However, some respondents suggested that many people still fish there and four of the five respondents from Grogos self-reported that they still fish in the MPA. The main driver for compliance in the Kataloka Kingdom is the respect that people have for their king's authority. One respondent explained that "here is an *adat* area, which is why the people follow what the king asks them to do, even if they don't understand what MPAs are" (Farmer 1, 8/19/17). Some believe that "if we don't follow the rules we will not have an increasing income. That is why we follow the rules, so that fish abundance will increase, like it was before. For example, if we put water in a glass and fill it until its full then the water will spill out from the glasses it is same with Koon now, if there are a lot of fish there then the fish isn't only in Koon but it will be spread out to the surrounded area like Grogos and Panjang Island as well" (Fisher 2, 8/18/17). In addition to following the king's orders, the concept of spillover and potential for increasing fisheries benefits motivates many fishers to respect the no-take MPA. According to the theory of planned behavior (TPB) compliance to Koon MPA rules is driven by the behavioral belief that conservation will benefit the community through increased income from fishing and the normative belief that people should comply because their king and community expect them to.

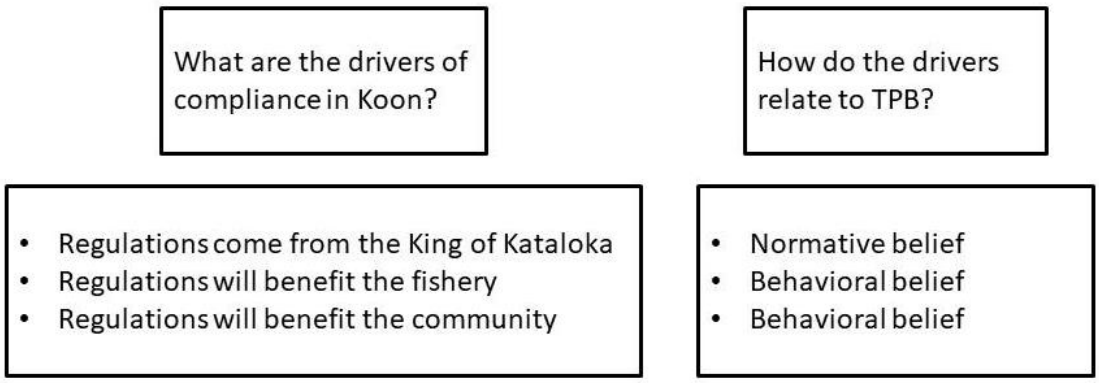

Figure 11: Drivers of compliance in Koon and how the drivers relate to the theory of planned behavior.

Respondents' reasoning for noncompliance to the Koon MPA was diverse. As the perceived negatives of the MPA suggest, a major driver of noncompliance is the fact that fishers must travel significantly farther to reach productive fishing grounds. Traveling to other fishing grounds largely "depends on the weather. If the weather is good then they will go to another area, but when the weather is bad and they only use small boat so they cannot go far" (Fisher 10, 8/21/17). Many of the fishers in this region rely on small canoes for fishing so when the winds pick up and the waves become large, it can be dangerous to be in those small boats and difficult to row long distances. A second driver of noncompliance is a fisher's need to cover daily expenses and the belief that they have no other option to get an income. The communities on Gorom can make an income through both farming and fishing but for "the community on small islands, like Grogos, the only way to get money is by fishing. So actually they want to obey the rules but they need to go fishing for their daily expenses" (Village Leader 2, 8/18/17). A third driver of noncompliance in these communities is the feeling of resentment or abandonment by the government. One respondent said, "our king told us to stop fishing in Koon, but until now our king didn't give us help so we still have some argument against our king" (Fisher 10, 8/21/17) and another explained that he "heard some issue that for the last 3 years, the government promised to give us help but until now we didn't get it. So, we are still fishing there freely and don't care about what they told us. They said that 'don't do this and we will give you this' but until now we get nothing" (Fisher 6, 8/21/17). The negative feelings towards the authority that is prohibiting fishing and the cost of compliance are important drivers

of noncompliance. The TPB can explain most of the drivers of noncompliance identified through these interviews. The control belief explains that people disobey the rules because they feel incapable of complying because of weather conditions and a lack of resources, such as boats with engines. The behavioral belief accounts for those that choose to disobey the rules because they expect a better outcome from fishing in the protected area. Those that fish in the protected area as a form of protest to the government may also have a behavioral belief that disobedience will encourage the government to provide the support they were promised.

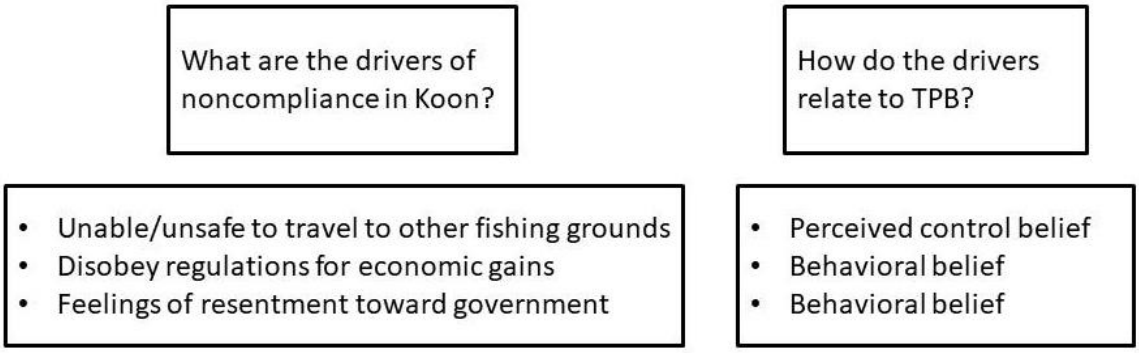

Figure 12: Drivers of noncompliance in Koon and how the drivers relate to the theory of planned behavior.

5. Case Study Synthesis

These two MPAs were established 5-6 years ago and both sites use a traditional resource management or governance system, have undergone socialization and awareness programs to explain the concept and purpose of marine conservation and have people working year-round in each location to develop and manage the MPA. The socialization efforts are apparent in both sites since most respondents know about the MPA and perceive the MPA as a good thing overall and believe it will provide benefits to the community through increased income from fishing or tourism. For Ay MPA the biggest concern was the loss of freedom since these are the first regulations on Ay Island, some community members resist these limitations. In Koon MPA, the most important negative perception is the loss of fishing grounds as it causes fishers to travel farther to productive fishing grounds which increases the time and cost of

fishing. The differences in perceptions of the MPA likely stem from variations in the social contexts of these two MPAs (Christie et al., 2009).

The management strategy and governance systems of these two locations affect the perception of the MPA and compliance to MPA regulations. In Ay Island, the bottom-up management strategy that relies on community-designed regulations and co-management with higher governance levels gives the community a sense of pride over their MPA. The community of Ay reached a consensus on these regulations and had a traditional ceremony to begin implementing the rules. Thus many people are proud of the regulations and feel a sense of ownership over the regulations and resources they are protecting which motivates residents to comply. The use of a participatory process in designing an MPA allows managers to understand and address the varied needs within a community and discuss the expectations and potential outcomes of various management strategies (Christie et al., 2005). Koon MPA utilizes more of a top-down management strategy in which the king gave a decree to cease fishing in the area, though community socialization efforts by WWF were high. The residents of Kataloka highly respect their king and many agree to follow rules without hesitation or explanation. However, many fishers feel abandoned by their king since these regulations prohibit them from fishing close to their island and they have not received sufficient support to fish elsewhere. Ainsworth et *al.* 2012 warns that a top-down management approach generally has little traction with fishers and recommends that managers dialogue with stakeholders to develop co-management strategies. The use of the bottom-up approach in Ay created a sense of ownership over the resources and regulations which generated support for the MPA, but in Koon even though many residents follow the king's regulations without question, there are many fishers that willfully disobey because they disagree with the management approach.

The interviews also show that coordinated and consistent support from the government is necessary for the success of these MPAs in terms of compliance. In this case, government support refers to policy support, empowering and encouraging local residents, as well as fiscal and institutional support for enforcement efforts and facilitating compliance by supporting current and alternative livelihoods with

equipment or supplies. Respondents from both sites asked for help from the government, though in Koon the desire for government support was more closely linked to their willingness or perceived ability to comply with regulations. Since the entire MPA around Koon is no-take, some residents feel unable to comply because they only have small canoes to fish from so traveling to farther fishing grounds seems impossible, too costly, or unsafe due to weather conditions and lack of cellular signal to call for help. Residents of Ay have two small core zones that they cannot utilize, but most of the water around the island can be utilized for either tourism or non-destructive fishing. Many respondents from Ay still want government support for their livelihoods, which may encourage compliance but is not directly linked to it. Though residents in both locations specifically asked for help from the local and provincial government, they also understand that WWF and CTC play an important role in the MPAs. WWF and CTC both coordinate between residents and the various levels of government as well as implement various capacity building programs and provide technical assistance for managing natural resources.

In addition to support from the government, many respondents from both sites mentioned the importance of a coordinated, unified stance on the MPA and conservation from the government to avoid confusion and demonstrate that the MPA is not optional. An early example of a co-managed MPA in Sumilon, Philippines demonstrates that an MPA will not be successful without political support, good communication between the government and conservation entity, and community involvement (White, 1987). In North Sulawesi, the Bunaken National Marine Park underwent successive natural resource management (NRM) projects. The first NRM project failed due to a lack of communication between government and community which resulted in confusion about the purpose of the park and the zoning plan, so the second NRM project utilized a management board with stakeholder representatives to address these issues and generate more community involvement and coordination between government agencies (Patlis, 2005). These two examples of MPAs that struggled without sufficient governmental support, involvement and coordination demonstrate the importance of finding that Ay and Koon MPA respondents desire increased government support. It is important to note that in addition to governmental support,

management plan design, multi-use zoning systems, community involvement, integration of science and local knowledge, and long-term support from non-governmental institutions also contribute to MPA success (Weeks et al., 2014).

Human geography is another important factor in both locations. Both sites have MPAs that are managed by only a portion of the regional community. The other communities on nearby islands in both regions need to be aware of the regulations and considered in compliance and enforcement efforts. In Koon, geography plays an important role as Koon MPA is largely considered the only nearby fishing grounds. While fishers in both locations mainly use canoes, rather than speedboats, the residents of Ay did not lose access the majority of their fishing grounds like the fishers near Koon. The Banda Islands are also much closer together than the islands around Koon so traveling to other fishing grounds is less costly. In Koon, the geographical setting pressures fishers to continue fishing in the protected area. Geography is often considered in MPA network design, particularly when considering larval connectivity (Weeks et al., 2014) and zoning of an MPA (Grantham et al., 2013). However, the human dimensions of geographical influences on marine resource management is an emerging sub-field of geography (Levine et al., 2015). Considering the site-level, human dimensions of geography within an MPA is important as it contributes to significant contextual factors that need to be considered when designing an MPA, as is shown in the case of Koon MPA.

The economic context of these locations also contributes to drivers of compliance and non-compliance. The need, or desire, to make money and support one's family was identified as a common driver for noncompliance, especially in Koon. The Kataloka Kingdom is located on both Gorom and Grogos islands. Gorom Island is large enough that the expansive clove and nutmeg farming operations support a large number of workers. There are also many fishers on Gorom, many of which are also farmers during harvest seasons and construction workers when needed. Grogos Island is too small for farming so the majority of men become fishers and many women collect intertidal invertebrates around Grogos Island. The combination of few economic opportunities and geography in Grogos was linked to

drivers of noncompliance because people feel they have no choice but to fish and no choice but to fish in Koon. Disobeying the village regulations of Ay to improve one's economy was also identified as a driver of noncompliance; however, residents have the opportunity to be fishers, farmers, homestay operators, or tour guides.

Traditional, *adat*, governance systems in these two sites affects the drivers of compliance. It is crucial to understand how *adat* and *sasi* systems operate in a particular location because in addition to connecting people to their natural resources, these traditional systems are linked to the socio-political, cultural and religious organization of these communities (Pannell, 1997). The traditional *sasi* resource management system had not been used in Ay Island for some time, but the community agreed to revitalize it because it is a fair and sustainable way to harvest resources. The use of this traditional system allows the people to directly benefit from conservation efforts when they harvest the *sasi* species, remember their heritage, and has the potential to encourage conservation efforts to preserve the island. In Koon, the preservation of authority of the kingdom of Kataloka is an example of an active *adat* governance system. The formal government of East Seram District and Maluku Province respect the kingdom by including the king in the formal governance system, such as city planning committees, and allowing the king to approach his community with new formal regulations. By respecting and utilizing the *adat* systems in these two locations, managers can likely expect stronger support for the MPAs (Campbell et al., 2013). Including traditional systems in MPA management is a way to build social capital, empower stakeholders and generate participation, all of which are linked to MPA success and compliance to MPA regulations (Campbell et al., 2012; Warner and Pomeroy, 2012). As community support grows for the MPAs, the community can be expected to participate in reporting and enforcement activities which can target migrant fishers.

6. Recommendations

Stakeholder Recommendations

Stakeholders recommend increasing compliance by increasing socialization efforts to spread awareness about the regulations and their purpose, increasing governmental financial or support, or increasing government enforcement efforts. While these are all good suggestions, they are not necessarily effective or practical. For example, simply knowing a rule and its importance does not necessarily lead to following that rule (Etienne, 2011; White et al., 2016) and as was mentioned by various government interviewees, extensive financial support is not always possible. The government has provided speedboats to both communities and is working to develop alternative livelihoods as well as capacity building and training programs. However, it is impractical to assume the government can provide each fisher family with a speedboat to increase compliance. Increasing enforcement efforts is an expensive endeavor as it requires manpower, boats and fuel, and a considerable amount of time to patrol both day and night. One practitioner suggested that using the local community in enforcement efforts would likely be more cost effective; however, some respondents said that community enforcement will not be effective. Community monitoring and reporting groups may not be perceived as a legitimate source of authority, which is why many respondents suggested involving the police or navy in enforcement. Two practitioners pointed out that in these small, close-knit communities there is often significant pressure to not report one's family member.

Researcher Recommendations

Designing ways to increase voluntary compliance in these two MPAs can be done by analyzing the drivers of compliance and noncompliance. In Ay, residents comply with regulations because they are enjoying the benefits from the MPA, they feel socially responsible to follow the rules and because they are proud of the rules they designed. Managers should begin tracking the benefits from the MPA in terms of tourism and fishing income, biophysical condition, trash removed from the village or beach, and trash recycled. All of this information should be reported to the community during village meetings to demonstrate how the MPA is impacting the community and to manage community expectations of the MPA (Chaigneau and Brown, 2016). Additionally, in Ay the use of peer pressure from the Conservation

Team, elders and religious leaders, as well as the village leader can encourage noncompliant individuals to follow the rules. Increasing community engagement by training individuals to participate in tracking and reporting benefits can strengthen the sense of ownership and pride that they already feel over the MPA and village regulations (Christie et al., 2009). In Koon MPA increasing compliance may need a different approach. Since the majority of the waters near Grogos and Koon islands prohibit fishing and fishers feel unable to travel to other fishing grounds, designing a new zoning plan for this region that allows fishing closer to Grogos and Koon could increase compliance. Additionally, if managers can identify which fish are spawning and aggregating in this area, and when, it would be possible to implement an open-closed season for those fish. Managers could utilize the *sasi* system to do so, which would respect traditional culture. Socialization efforts should be increased to reach the islands of the entire Koon-Neiden region. In both sites it could be beneficial to engage fishers in a discussion about fish biology and how that relates to suggested harvest sizes and seasons of target species (Ainsworth et al., 2012; Roff, 1983). Government support and enforcement efforts are necessary for MPA success in these two locations as the MPAs become authorized and officially managed by the provincial government of Maluku. This research and the recommendations listed are aimed at understanding and increasing voluntary compliance to MPA regulations to reduce the cost of enforcement efforts; however this research does not suggest that voluntary compliance can replace enforcement.

7. Conclusion

The drivers of compliance and noncompliance to MPA regulations can be identified through stakeholder interviews and a thorough understanding of the social context. To develop a complete understanding of compliance, this research asked respondents to describe their perception of the MPA and compliance to the MPA as well as provide suggestions for increasing compliance. This site-specific information will be useful as CTC, WWF, SEA Project and the Maluku provincial government work with the communities of Ay MPA and Koon MPA to develop, authorize and implement formal management plans over the next year. Additionally, this research demonstrates how compliance to marine natural

resource management regulations can be understood using the framework of two social psychological theories of human behavior. The Goal Framing Theory and Theory of Planned Behavior can be used in future research to design interview guides or questionnaires and interventions designed to increase compliance as was done in Elliott and Armitage (2009); Etienne (2011); Fairbrass et al. (2016); Ifinedo (2014). It is important to understand the contextual factors as well as the stakeholder perceptions when evaluating MPAs and compliance with MPA regulations (Oyanedel et al., 2016). This research in Ay and Koon reveals that the drivers of compliance and noncompliance can be linked to the positive and negative perceptions of the MPA, as well as contextual factors. These results also highlight that residents desire more involvement in the managing of resources from the government, which requires communication and trust between stakeholder groups.

References

Agardy, M.T., 1994. Advances in marine conservation: the role of marine protected areas. Trends Ecol. Evol. 9, 267–270.

Agostini, V.N., Grantham, H.S., Wilson, J., Mangubhai, S., Rotinsulu, C., Hidayat, N., Muljadi, A., Muhajir, A., Mongdong, M., Darmawan, A., Rumetna, L., Erdmann, M.V., Possingham, H.P., 2012. Achieving fisheries and conservation objectives within marine protected areas: Zoning the Raja Ampat Network.

Ainsworth, C.H., Morzaria-Luna, H., Kaplan, I.C., Levin, P.S., Fulton, E.A., Cudney-Bueno, R., Turk-Boyer, P., Torre, J., Danemann, G.D., Pfister, T., 2012. Effective ecosystem-based management must encourage regulatory compliance: A Gulf of California case study. Mar. Policy 36, 1275–1283. https://doi.org/10.1016/j.marpol.2012.03.016

Ajzen, I., 1991. The Theory of Planned Behavior. Organ. Behav. Hum. Decis. Process. 50, 179–211.

Arias, A., 2015. Understanding and managing compliance in the nature conservation context. J. Environ. Manage. 153, 134–143. https://doi.org/10.1016/j.jenvman.2015.02.013

Arias, A., Cinner, J.E., Jones, R.E., Pressey, R.L., 2015. Levels and drivers of fishers' compliance with marine protected areas. Ecol. Soc. 20. https://doi.org/10.5751/ES-07999-200419

ATLAS.ti. (2017). Berlin: Scientific Software Development GmbH.

Barber, C.V., Pratt, V.R., 1998. Poison and Profits: Cyanide Fishing in the Indo-Pacific. Environ. Sci. Policy Sustain. Dev. 40, 4–9. https://doi.org/10.1080/00139159809604600

Berry, J.M., 2002. Validity and Reliability Issues In Elite Interviewing. PS Polit. Sci. Amp Polit. 35, 679–682. https://doi.org/10.1017/S1049096502001166

Brady, J.J., 1977. The craft of interviewing. Vintage Books, New York.

Campbell, S.J., Cinner, J.E., Ardiwijaya, R.L., Pardede, S., Kartawijaya, T., Mukmunin, A., Herdiana, Y., Hoey, A.S., Pratchett, M.S., Baird, A.H., 2012. Avoiding conflicts and protecting coral reefs: customary management benefits marine habitats and fish biomass. Oryx 46, 486–494. https://doi.org/10.1017/S0030605312000348

Campbell, S.J., Kartawijaya, T., Yulianto, I., Prasetia, R., Clifton, J., 2013. Co-management approaches and incentives improve management effectiveness in the Karimunjawa National Park, Indonesia. Mar. Policy, Governing marine protected areas: towards social-ecological resilience through institutional diversity 41, 72–79. https://doi.org/10.1016/j.marpol.2012.12.022

Chaigneau, T., Brown, K., 2016. Challenging the win-win discourse on conservation and development: analyzing support for marine protected areas. Ecol. Soc. 21. https://doi.org/10.5751/ES-08204-210136

Christie, P., Lowry, K., White, A.T., Oracion, E.G., Sievanen, L., Pomeroy, R.S., Pollnac, R.B., Patlis, J.M., Eisma, R.-L.V., 2005. Key findings from a multidisciplinary examination of integrated coastal management process sustainability. Ocean Coast. Manag., Sustainability of Integrated Coastal ManagementSustainability of Integrated Coastal Management 48, 468–483. https://doi.org/10.1016/j.ocecoaman.2005.04.006

Christie, P., McCay, B.J., Miller, M.L., Lowe, C., White, A.T., Stoffle, R., Fluharty, D.L., McManus, L.T., Chuenpagdee, R., Pomeroy, C., Suman, D.O., Blount, B.G., Eisma, R.-L.V., Oracion, E., Lowry, K., Pollnac, R.B., 2003. Toward developing a complete understanding: A social science research agenda for marine protected areas. Fisheries 28, 22–26.

Christie, P., Pollnac, R.B., Oracion, E.G., Sabonsolin, A., Diaz, R., Pietri, D., 2009. Back to Basics: An Empirical Study Demonstrating the Importance of Local-Level Dynamics for the Success of Tropical Marine Ecosystem-Based Management. Coast. Manag. 37, 349–373. https://doi.org/10.1080/08920750902851740

Cohen, P., J., Steenbergen, D., J., 2015. Social dimensions of local fisheries co-management in the Coral Triangle. Environ. Conserv. 1–11. https://doi.org/10.1017/S0376892914000423

Crawford, B.R., Siahaineia, A., Rotinsulu, C., Sukmara, A., 2004. Compliance and Enforcement of Community-Based Coastal Resource Management Regulations in North Sulawesi, Indonesia. Coast. Manag. 32, 39–50. https://doi.org/10.1080/08920750490247481

Dalton, T., Pollnac, R., Forrester, G., 2015. Investigating Causal Pathways Linking Site-Level Characteristics, Compliance, and Ecological Performance in Caribbean MPAs. Coast. Manag. 43, 329–341. https://doi.org/10.1080/08920753.2015.1030332

Dexter, L.A., 2006. Elite and specialized interviewing, ECPR classics. ECPR Press, Colchester.

Dyson, R.G., 2004. Strategic development and SWOT analysis at the University of Warwick. Eur. J. Oper. Res. 152, 631–640. https://doi.org/10.1016/S0377-2217(03)00062-6

Elliott, M.A., Armitage, C.J., 2009. Promoting drivers' compliance with speed limits: Testing an intervention based on the theory of planned behaviour. Br. J. Psychol. 100, 111–132. https://doi.org/10.1348/000712608X318626

Etienne, J., 2011. Compliance Theory: A Goal Framing Approach. Law Policy 33, 305–333.

Evans, S.M., Gill, M.E., Retraubun, A.S.W., Abrahamz, J., Dangeubun, J., 1997. Traditional management practices and the conservation of the gastropod (Trochus nilitocus) and fish stocks in the Maluku Province (eastern Indonesia). Fish. Res. 31, 83–91. https://doi.org/10.1016/S0165-7836(97)00011-8

Fairbrass, A., Nuno, A., Bunnefeld, N., Milner-Gulland, E.J., 2016. Investigating determinants of compliance with wildlife protection laws: bird persecution in Portugal. Eur. J. Wildl. Res. 62, 93–101. https://doi.org/10.1007/s10344-015-0977-6

Flower, K.R., Atkinson, S.R., Brainard, R., Courtney, C., Parker, B.A., Parks, J., Pomeroy, R., White, A.T., 2013. Toward ecosystem-based coastal area and fisheries management in the Coral Triangle: Integrated strategies and guidance.

Grantham, H.S., Agostini, V.N., Wilson, J., Mangubhai, S., Hidayat, N., Muljadi, A., Muhajir, Rotinsulu, C., Mongdong, M., Beck, M.W., Possingham, H.P., 2013. A comparison of zoning analyses to inform the planning of a marine protected area network in Raja Ampat, Indonesia. Mar. Policy 38, 184–194. https://doi.org/10.1016/j.marpol.2012.05.035

Green, A., White, A.T., Kilarski, S. (Eds.), 2013. Designing marine protected area networks to achieve fisheries, biodiversity and climate change objectives in tropical ecosystems: A practitioner's guide.

Green, A.L., Fernandes, L., Almany, G., Abesamis, R., McLeod, E., Aliño, P.M., White, A.T., Salm, R., Tanzer, J., Pressey, R.L., 2014. Designing Marine Reserves for Fisheries Management, Biodiversity Conservation, and Climate Change Adaptation. Coast. Manag. 42, 143–159. https://doi.org/10.1080/08920753.2014.877763

Green, S.J., White, A.T., Christie, P., Kilarski, S., Meneses, A.B.T., Samonte-Tan, G., Karrer, L.B., Fox, H., Campbell, S., Claussen, J.D., 2011. Emerging marine protected area networks in the coral triangle: Lessons and way forward. Conserv. Soc. 9, 173. https://doi.org/10.4103/0972-4923.86986

Halim, A., 2002. Adoption of cyanide fishing practice in Indonesia. Ocean Coast. Manag. 45, 313–323. https://doi.org/10.1016/S0964-5691(02)00061-3

Harkes, I., Novaczek, I., 2002. Presence, performance, and institutional resilience of sasi, a traditional management institution in Central Maluku, Indonesia. Ocean Coast. Manag. 45, 237–260. https://doi.org/10.1016/S0964-5691(02)00057-1

Huffard, C.L., Wilson, J., Hitipeuw, C., Rotinsulu, C., Mangubhai, S., Erdmann, M.V., Adnyana, W., Barber, P., Manuputty, M., Mondong, M., Purba, K., Rhodes, K., Toha, H., 2012. Ecosystem based management in the Bird's Head Seascape Indonesia: Turning science into action.

Ifinedo, P., 2014. Information systems security policy compliance: An empirical study of the effects of socialisation, influence, and cognition. Inf. Manage. 51, 69–79. https://doi.org/10.1016/j.im.2013.10.001

Keputusan Bupati Seram Bagian Timur, 2016. Rencana Pengelolaan Dan Zonasi Kawasan Konservasi Pesisir Dan Palau-Palau Kecil Kabupaten Seram Bagian Timur.

Kritzer, J.P., 2004. Effects of Noncompliance on the Success of Alternative Designs of Marine Protected-Area Networks for Conservation and Fisheries Management. Conserv. Biol. 18, 1021–1031.

Kusumawati, I., Huang, H.-W., 2015. Key factors for successful management of marine protected areas: A comparison of stakeholders′ perception of two MPAs in Weh island, Sabang, Aceh, Indonesia. Mar. Policy 51, 465–475. https://doi.org/10.1016/j.marpol.2014.09.029

Levine, A.S., Richmond, L., Lopez-Carr, D., 2015. Marine resource management: Culture, livelihoods, and governance. Appl. Geogr. 59, 56–59. https://doi.org/10.1016/j.apgeog.2015.01.016

Lindenberg, S., Steg, L., 2007. Normative, Gain and Hedonic Goal Frames Guiding Environmental Behavior. J. Soc. Issues 63, 117–137. https://doi.org/10.1111/j.1540-4560.2007.00499.x

Little, L.R., Smith, A.D.M., Mcdonald, A.D., Punt, A.E., Mapstone, B.D., Pantus, F., Davies, C.R., 2005. Effects of size and fragmentation of marine reserves and fisher infringement on the catch and biomass of coral trout, Plectropomus leopardus, on the Great Barrier Reef, Australia. Fish. Manag. Ecol. 12, 177–188. https://doi.org/10.1111/j.1365-2400.2005.00440.x

Madden, T., J., Scholder Ellen, P., Ajzen, I., 1992. Comparison of the Theory of Planned Behavior and the Theory of Reasoned Action. PSPB 1, 3–9.

Mangubhai, S., Wilson, J.R., Rumetna, L., Maturbongs, Y., Purwanto, 2015. Explicitly incorporating socioeconomic criteria and data into marine protected area zoning. Ocean Coast. Manag. 116, 523–529. https://doi.org/10.1016/j.ocecoaman.2015.08.018

Marshall, N.A., Marshall, P.A., Abdulla, A., Rouphael, T., 2010. The Links Between Resource Dependency and Attitude of Commercial Fishers to Coral Reef Conservation in the Red Sea. AMBIO 39, 305–313. https://doi.org/10.1007/s13280-010-0065-9

Ostrom, E., 2008. The Challenge of Common-Pool Resources. Environ. Sci. Policy Sustain. Dev. 50, 8–21. https://doi.org/10.3200/ENVT.50.4.8-21

Oyanedel, R., Marín, A., Castilla, J.C., Gelcich, S., 2016. Establishing marine protected areas through bottom-up processes: insights from two contrasting initiatives in Chile: ESTABLISHMENT OF BOTTOM-UP MARINE PROTECTED AREAS. Aquat. Conserv. Mar. Freshw. Ecosyst. 26, 184–195. https://doi.org/10.1002/aqc.2546

Pannell, S., 1997. Managing the Discourse of Resource Management: the Case of Sasi from "Southeast" Maluku, Indonesia. Oceania 67, 289–307. https://doi.org/10.1002/j.1834-4461.1997.tb02622.x

Patlis, J.M., 2005. The role of law and legal institutions in determining the sustainability of integrated coastal management projects in Indonesia. Ocean Coast. Manag., Sustainability of Integrated Coastal Management 48, 450–467. https://doi.org/10.1016/j.ocecoaman.2005.04.005

Patton, M.Q., 2015. Qualitative research & evaluation methods: integrating theory and practice, Fourth edition. ed. SAGE Publications, Inc, Thousand Oaks, California.

Poulter, D.R., Chapman, P., Bibby, P.A., Clarke, D.D., Crundall, D., 2008. An application of the theory of planned behaviour to truck driving behaviour and compliance with regulations. Accid. Anal. Prev. 40, 2058–2064. https://doi.org/10.1016/j.aap.2008.09.002

Read, A.D., West, R.J., Haste, M., Jordan, A., 2011. Optimizing voluntary compliance in marine protected areas: A comparison of recreational fisher and enforcement officer perspectives using multi-criteria analysis. J. Environ. Manage. 92, 2558–2567. https://doi.org/10.1016/j.jenvman.2011.05.022

Read, A.D., West, R.J., Kelaher, B.P., 2015. Using compliance data to improve marine protected area management. Mar. Policy 60, 119–127. https://doi.org/10.1016/j.marpol.2015.06.008

Roberts, C., 2012. Marine Ecology: Reserves Do Have a Key Role in Fisheries. Curr. Biol. 22, R444–R446. https://doi.org/10.1016/j.cub.2012.04.030

Roff, D., A., 1983. An Allocation Model of Growth and Reproduction in Fish. Can. J. Fish. Aquat. Sci. 40, 1395–1404.

Russ, G.R., Cheal, A.J., Dolman, A.M., Emslie, M.J., Evans, R.D., Miller, I., Sweatman, H., Williamson, D.H., 2008. Rapid increase in fish numbers follows creation of world's largest marine reserve network. Curr. Biol. 18, R514–R515. https://doi.org/10.1016/j.cub.2008.04.016

Saaty, R.W., 1987. The analytic hierarchy process—what it is and how it is used. Math. Model. 9, 161–176. https://doi.org/10.1016/0270-0255(87)90473-8

Saldaña, J., 2016. The coding manual for qualitative researchers, 3E [Third edition]. ed. SAGE, Los Angeles ; London.

USAID, 2016. Sustainable Ecosystems Advanced (SEA) Project.

Varney, A., Christie, P., Eisma-Osorio, R.L., Labrado, G., Pinsky, M., White, A.T., 2010. Designing and planning a network of community-based marine protected areas.

Wallin, A., Zannakis, M., Johansson, L.-O., Molander, S., 2013. Influence of interventions and internal motivation on Swedish homeowners' change of on-site sewage systems. Resour. Conserv. Recycl. 76, 27–40. https://doi.org/10.1016/j.resconrec.2013.04.004

Warner, T.E., Pomeroy, R.S., 2012. Creating compliance: A cross-sectional study of the factors associated with marine protected area outcomes. Mar. Policy 36, 922–932. https://doi.org/10.1016/j.marpol.2012.01.003

Weeks, R., Aliño, P.M., Atkinson, S., II, P.B., Binson, A., Campos, W.L., Djohani, R., Green, A.L., Hamilton, R., Horigue, V., Jumin, R., Kalim, K., Kasasiah, A., Kereseka, J., Klein, C., Laroya, L., Magupin, S., Masike, B., Mohan, C., Pinto, R.M.D.S., Vave-Karamui, A., Villanoy, C., Welly, M., White, A.T., 2014. Developing Marine Protected Area Networks in the Coral Triangle: Good Practices for Expanding the Coral Triangle Marine Protected Area System. Coast. Manag. 42, 183–205. https://doi.org/10.1080/08920753.2014.877768

White, A.T., 1987. Philippine marine park pilot site: Benefits and management conflicts. Environ. Conserv. 14, 355–359.

White, A.T., Aliño, P.M., Cros, A., Fatan, N.A., Green, A.L., Teoh, S.J., Laroya, L., Peterson, N., Tan, S., Tighe, S., Venegas-Li, R., Walton, A., Wen, W., 2014. Marine Protected Areas in the Coral Triangle: Progress, Issues, and Options. Coast. Manag. 42, 87–106. https://doi.org/10.1080/08920753.2014.878177

White, A.T., Christie, P., D'Agnes, H., Lowry, K., Milne, N., 2005. Designing ICM projects for sustainability: Lessons from the Philippines and Indonesia. Ocean Coast. Manag., Sustainability

of Integrated Coastal ManagementSustainability of Integrated Coastal Management 48, 271–296. https://doi.org/10.1016/j.ocecoaman.2005.04.007

White, A.T., Green, A.L., 2014. Introduction. Coast. Manag. 42, 81–86. https://doi.org/10.1080/08920753.2014.877758

White, A.T., Gunawan, T., Green, G., 2016. From awareness raising to behavior change: Considerations in support of Strategic Approach #1 Indonesia Sustainable Ecosystems Advanced (SEA) Project.

Yin, R.K., 2014. Case study research: design and methods, Fifth edition. ed. SAGE, Los Angeles.