



LEHIGH
UNIVERSITY

Library &
Technology
Services

The Preserve: Lehigh Library Digital Collections

Respect the Locals: Integrating Sociocultural Dynamics for Effective Marine Conservation in Coastal Indonesia

Citation

Hozempa, Isabelle. *Respect the Locals: Integrating Sociocultural Dynamics for Effective Marine Conservation in Coastal Indonesia*. 2024, <https://preserve.lehigh.edu/lehigh-scholarship/undergraduate-publications/eckardt-scholars/respect-locals-integrating>.

Find more at <https://preserve.lehigh.edu/>

This document is brought to you for free and open access by Lehigh Preserve. It has been accepted for inclusion by an authorized administrator of Lehigh Preserve. For more information, please contact preserve@lehigh.edu.

**Respect the Locals: Integrating Sociocultural Dynamics for Effective Marine Conservation
in Coastal Indonesia**

by

Isabelle Hozempa

Senior Thesis

Fall 2023

Advisor: Armando Anzellini

Lehigh University

TABLE OF CONTENTS

List of Figures	i
Abstract	ii
Chapter 1: Introduction	1
1.1. The Importance of Environmental Conservation	2
1.2. Environmental, Political, and Sociocultural Review of Coastal Indonesia.....	3
1.3. Conservation Programs and Policy in Indonesia.....	5
1.4. Objectives and Arguments	7
Chapter 2: Environmental, Political, and Sociocultural Review of Coastal Indonesia	10
2.1. Ecological and Environmental Conditions of Indonesia.....	10
2.1.1. Climate Change	12
2.1.2. Overfishing and Destructive Fishing Methods.....	12
2.2. Indonesian National Parks.....	15
2.3. Indonesian National Government and State Influence.....	18
2.3.1. Legislation on Marine Conservation	19
2.4. Sociocultural Conditions of Coastal Indonesian Communities.....	21
2.4.1. Community Attitudes and Beliefs Toward the Marine Ecosystem	22
2.5. Summary of Environmental, Political, and Sociocultural Review of Coastal Indonesia...	24
Chapter 3: Conservation Literature Review	26
3.1. Competing Visions of Conservation	26
3.1.1. Trade-offs	26
3.1.2. The “Biodiversity First” Perspective.....	28
3.1.3. The “Biocultural” Perspective.....	30
3.2. Co-management and Bridging Organizations	32
3.2.1. The Centralization of Power.....	32
3.2.2. The Devolution of Power	34
3.2.3. Adaptive Policies.....	36
3.2.4. Co-management Success	37
3.3. Application of Local Wisdom and Indigenous Knowledge Systems (IKS).....	39
3.3.1. Local Environmental Knowledge and “Two-Eyed Seeing”	40
3.3.2. Indigenous Minority Marginalization.....	41
3.3.3. Religion and Spirituality in Conservation Policy	45

3.4. Compensation and Alternative Livelihood Options.....	46
3.4.1. Ecotourism.....	47
3.4.2. Seaweed Farming	48
3.4.3. Payments for Ecosystem Services (PES).....	51
3.5. Summary of Conservation Literature Review.....	52
Chapter 4: Arguments.....	54
4.1. Competing Visions of Conservation	55
4.1.1. Why the Biodiversity First Approach Fails.....	55
4.1.2. The Biocultural Approach Begets Environmental Protection	58
4.2. Co-management and Bridging Organizations	62
4.2.1. The Devolution of Power Ensures Local Autonomy.....	63
4.2.2. Co-management is a Balancing Act	66
4.2.3. The Importance of Bridging Organizations.....	70
4.3. Application of Local Wisdom and Indigenous Knowledge Systems (IKS).....	72
4.3.1. Benefits of the Two-Eyed Seeing Approach	72
4.3.2. Addressing Indigenous Minority Marginalization in Marine Conservation	74
4.4. Compensation and Alternative Livelihood Options.....	76
4.4.1. Why Payments for Ecosystem Services (PES) Fail.....	77
4.4.2. Problems with the Ecotourism and Seaweed Farming Industries	79
4.5. Local Initiation of Marine Conservation Programs.....	84
4.6. Summary of Arguments	87
Chapter 5: Discussion	88
5.1. Suggestions for Marine Conservation Improvement in Indonesia.....	88
5.1.1. Application of the Biocultural Approach	89
5.1.2. Devolution of Power in Co-management Relationships	93
5.1.3. Inclusion of Indigenous Minority Communities in Conservation Development	96
5.1.4. Improvements for the Ecotourism and Seaweed Farming Industries.....	100
5.2. Global Application of Successful Program Attributes.....	106
5.2.1. Prioritization of Local Social, Cultural, and Economic Needs.....	107
5.2.2. Initiation of Co-management at the Local Level.....	109
5.2.3. Inclusion of Indigenous Minority Groups in Conservation Design	111
5.2.4. Increased Alternative Livelihood Availability	114

5.3. Power Dynamics Between Local Communities and State and International Sovereignities	117
5.4. Summary of Discussion	120
Chapter 6: Conclusion.....	122
6.1. Limitations and Future Research.....	124
6.2. Closing	126
References.....	128
Appendix: List of Abbreviations	134

LIST OF FIGURES

<i>Figure 1.</i> Geographic Boundaries of the Coral Triangle Initiative (CTI).....	11
<i>Figure 2.</i> Projected Change in Maximum Catch Potential Compared to Fish as a Proportion of Animal-based Diets Throughout the World.....	14
<i>Figure 3.</i> Wakatobi National Park.....	16

ABSTRACT

Power dynamics between sovereign entities and local communities are a determinant component of conservation policy in terms of meeting ecological protection goals and ensuring the well-being of local people. There is high pressure for marine conservation programs to generate successful ecological outcomes in the face of our current environmental crisis. However, natural science should not be the only information guiding conservation policy; it is equally - if not more - crucial to consider the social aspect of conservation initiatives to develop effective long-term solutions. Indonesia is a global cornerstone of marine conservation due to its high levels of biodiversity and rich natural resources, which are currently threatened by overfishing, habitat destruction, and climate change. Preserving Indonesia's marine ecosystems is pivotal for the health of oceans worldwide. There are many conservation programs throughout the Indonesian archipelago, all of which have achieved varying degrees of ecological and social success. The goal of this thesis is to identify common attributes of successful Indonesian conservation programs and make general recommendations based on those characteristics for environmental policies worldwide. Through a review of current literature on Indonesian conservation, I have found that successful programs apply (1) a biocultural perspective, (2) co-management strategies with an emphasis on the devolution of power, (3) local wisdom/indigenous knowledge system (IKS) consideration and the inclusion of indigenous minority input, and (4) improved and diverse alternative livelihood options. While there is no one-size-fits-all approach to successful environmental conservation, applying these attributes to program implementation can lead to social and ecological success. Ultimately, local agency and the inclusion of regional context in policy design are paramount in the development of impactful conservation programs around the world.

CHAPTER 1: INTRODUCTION

Understanding power dynamics between sovereign entities and local communities in conservation policy is essential to generating beneficial programs for people and the environment. Analyzing environmental conservation efforts through an anthropological lens reveals trends of imbalanced power dynamics, indigenous minority marginalization, and erasure of culturally significant customs in the presence of environmental policy.

Moreover, it is vital for social scientists to understand the relationship between conservation initiatives and the sociocultural conditions of local communities. Instead of separating humankind from their environment, the interconnectedness of people and nature should be understood and fully considered to develop conservation programs that incorporate the economic, social, and cultural needs of local communities alongside environmental protections. This knowledge will also prepare policymakers to assess the effectiveness of existing conservation policies and suggest adaptations based on their understanding of local contexts for better social and environmental outcomes. The precise characteristics that define a successful conservation program are highly variable from place to place and are largely site-specific. However, there are commonalities between conservation programs that ultimately lead to their success or failure.

Marine conservation initiatives attempt to negate the harmful effects of environmental threats, such as climate change and overfishing, on the health of oceanic and coastal environments. Recently, marine conservation has evolved from its historical emphasis on protecting natural resources via strict access restrictions to more culturally cognizant approaches that consider both people and nature (Andradi-Brown et al. 2023). This shift toward people-based solutions largely stems from the past failures of ecological and science-based conservation initiatives (Mace 2014). During the 1960s, 70s, and 80s, programs focused on wildlife ecology, natural history, and

theoretical ecology failed to achieve desirable conservation outcomes. These recurrent failures encouraged policy designers to look at conservation from a new perspective, one that considered how humans interact with the environment, both positively and negatively, which led to the eventual inclusion of people in conservation solutions (Mace 2014). More emphasis was placed on the interdependency between humans and nature, and increased consideration was given to how people could play a role in environmental preservation efforts. New approaches that facilitate community collaboration are a common point of discussion in the conservation field, and improving coordination between coastal communities and marine protected areas (MPAs) has emerged as a crucial step in governing marine conservation space (SROCC-IPCC 2019). Consequently, the “role of communities in conservation initiatives has expanded from that of a passive recipient to that of an active participant,” reflecting the growing demand for stewardship of natural resources by indigenous groups and local communities (Clifton and Majors 2012, 1). With this shift to a more locally grounded conservation approach comes an increasing need to recognize the diverse attributes that ultimately dictate a program’s conservation outcomes (Andradi-Brown et al. 2023).

1.1. The Importance of Environmental Conservation

Preservation of the world’s oceans is essential to human well-being. Marine ecosystems provide invaluable environmental services (such as carbon absorption and the regulation of global temperatures) and are also a key food source for billions of people worldwide (SROCC-IPCC 2019). Over 4.5 billion people obtain more than 15% of their protein intake from seafood, and at least half of that seafood is provided by small-scale fisheries in the global South (“The State of World Fisheries and Aquaculture 2020” 2020). Unfortunately, issues of global climate change,

coastal pollution, and overfishing threaten the oceanic environment and those who depend on its resources. At their current extraction rate, marine resources will not be able to continue meeting global demand - some even predict that world fisheries could collapse by the year 2050 (Worm et al. 2006). The projected decrease in marine biomass and fish catch potential will negatively impact the income, livelihood, and food security of all dependent human communities (SROCC-IPCC 2019).

1.2. Environmental, Political, and Sociocultural Review of Coastal Indonesia

The Indonesian archipelago represents a vital pillar of global marine biodiversity. The nation's productive coastal ecosystems generate considerable social, cultural, and economic benefits for more than 180 million people living at or near Indonesia's coastlines (Estradivari et al. 2022). Indonesian coral reef fisheries are worth 1.5 billion USD annually, and the coastal protection provided by reefs (against storms, waves, rising water levels, etc.) has been estimated at 387 million USD annually (Estradivari et al. 2022). At least half of Indonesia's animal-based diets consist of fish and other marine products - the country's per capita consumption of fishery products is twice the global average (Estradivari et al. 2022; SROCC-IPCC 2019). In 2018, Indonesia was ranked as the eighth most fish-dependent country worldwide (Tranter et al. 2022).

Indonesian residents are not the only population dependent on the country's marine resources. Indonesia is the world's second-largest producer of seafood and consequently plays a crucial role in the global fish trade (Indonesia Fisheries, n.d.). The country's export of fish and marine products meets the demands of numerous nations and contributes substantially to global seafood consumption. For that reason, any disruptions or changes in Indonesia's fishing industry typically have widespread impacts on the availability and pricing of seafood internationally,

affecting global dependency on these products (“Indonesia Fisheries” n.d.; “The State of World Fisheries and Aquaculture 2020” 2020; Mordhorst 2021). It is not just Indonesian fisheries extracting resources from ocean areas surrounding the archipelago. Fisheries from China, Australia, the Philippines, Malaysia, and other South Pacific regions are known to exploit Indonesia’s marine resources (Leonardo and Deeb 2022; Clifton 2013b). High global demand for Indonesian fish is perpetuated by consumers worldwide and is ultimately provided for by both Indonesian fisheries and other external entities.

Indonesia is not immune to the negative effects of climate change and the increasing demands of the seafood industry. Destructive fishing practices (e.g., bomb fishing, fishing with cyanide, coral mining, etc.) and illegal, unreported, and unregulated fishing have threatened 95% of Indonesian marine ecosystems (Tranter et al. 2022). The pressure of overfishing combined with broader climate stressors has had mal effects on the environment, including coral reefs. As of 2019, most Indonesian reefs are considered to be in either fair¹ (37.4%) or poor² (33.8%) conditions (Tranter et al. 2022). The devastation of coastal habitats and their associated ecosystem services has also put resident’s livelihoods and physical well-being at risk. Current estimates predict that the decline in Indonesian fisheries from overfishing could result in a loss of 1.9 billion USD over 20 years (Estradivari et al. 2022). The ongoing degradation of maritime resources and environments will inevitably impact the future health and welfare of coastal populations, necessitating the implementation of more effective conservation initiatives (Tranter et al. 2022).

¹ Fair status demarks reef areas with live hard coral coverage between 25-50% ($25\% < \text{hard coral coverage} \leq 50\%$) (Hadi et al. 2020). Reefs with a fair health status have had 50-75% of their coral coverage die or be destroyed since its original recorded total coverage in 1993.

² Poor status demarks reefs with live hard coral coverage equal to or less than 25% of its original area ($\text{hard coral coverage} \leq 25\%$) (Hadi et al. 2020).

1.3. Conservation Programs and Policy in Indonesia

Marine conservation in Indonesia has a long history connected to the country's ever-changing political, social, and economic conditions. More contemporary conservation approaches employ a multitude of resource management tools, including MPAs, fish catch limits, payments for ecosystem services (PES), and alternative livelihood options. Management of conservation programs has been an issue of much dispute in Indonesian conservation, with power balances shifting between national sovereignties, regional governments, and local communities. In recent years, there has been increased advocacy for programs that prioritize the needs of local stakeholders and build resilient social-ecological systems (Andradi-Brown et al. 2023).

One defining characteristic of conservation programs is their emphasis on either environmental concerns or local social and cultural needs. These competing visions of conservation can be described as the “biodiversity first” approach and the “biocultural” approach, respectively. The biodiversity first perspective prioritizes ecological goals over the needs of local communities and often involves implementing highly restrictive conservation measures (Andradi-Brown et al. 2023). Those who advocate for the biodiversity first approach point to the immediate environmental benefits as evidence of its effectiveness. Conversely, the biocultural perspective has a heightened consideration for the local social, cultural, and economic needs of a conservation region and tailors initiatives to the requirements of impacted communities (Gavin et al. 2018). Advocates for this approach highlight how heightened social consideration encourages local participation in conservation initiatives and consequently increases environmental preservation over the long term. A debate currently exists between the effectiveness of these dualistic perspectives.

Conservation initiatives are also characterized by their management systems, specifically their centralization or devolution of power to various entities within the program. Co-management, or the conservation of marine resources through shared authority between national and state governments, local communities, NGOs, and research institutions, is a strategy implemented by many Indonesian conservation programs (“Co-Management Approaches | Reef Resilience” 2023). The balance of power within these systems is highly variable across programs. Some co-management relationships emphasize the centralization of power to state and international authorities and encourage the establishment and maintenance of conservation programs by national sovereignties (Clifton 2013b). Other co-management systems prioritize the devolution of power to local communities, regional leaders, and religious organizations to dictate conservation policy and enforcement; these programs are often established and maintained by community members and local leaders (Elliott et al. 2001).

The application of local wisdom and indigenous knowledge systems (IKS) also varies between conservation programs. The “two-eyed seeing” approach has been implemented in several conservation programs throughout Indonesia and involves the application of both Western science and indigenous knowledge systems (IKS) in policy design (Frid et al. 2023). Religious and spiritual belief systems contribute to IKS and can be highly beneficial when integrated with conservation policy (Thornton et al. 2020). It is widely agreed that local wisdom is an invaluable resource in program implementation and the dictation of natural resource use, but many initiatives fail to fully incorporate those knowledge systems in practice. Indigenous minority marginalization is a common issue throughout Indonesian conservation design, and this exclusion ultimately limits the IKS and local guidance available to conservation planners.

Compensation and alternative livelihood options are also defining attributes of Indonesian conservation programs. Alternative livelihoods are necessary for community members displaced from their previous employment because of conservation restrictions, such as fishermen who can no longer fish due to MPA constraints (Clifton 2013a). Employment in the ecotourism and seaweed farming industries are two of the most common alternative livelihood options in Indonesia, though they both demonstrate their pros and cons. Work in the ecotourism industry can be unreliable due to its seasonal nature, and there are typically inadequate financial opportunities for local people (Clifton 2009; Tranter et al. 2022). The seaweed farming industry, while lucrative, can be damaging to the natural environment (from overcrowded marine space, impacted water quality, and overexploited natural resources for farming activities) and fluctuate in its productivity over time (Steenbergen, Marlessy, and Holle 2017). Both the ecotourism and seaweed farming industries need various improvements to be more beneficial for local communities. Compensation via PES is another common tool used by Indonesian conservation programs. PES generate incentives for those who maintain environmental services, such as ecotourism programs or national parks, rather than punishing those who damage them (Neilson and Leimona 2010). A typical PES system involves outsiders (such as tourists or donors) making payments to conservation programs, and those payments are later allocated to local institutions and service providers. However, PES systems used in Indonesian conservation are highly susceptible to corruption and are frequently nonfunctional (Clifton 2013a; Tranter et al. 2022).

1.4. Objectives and Arguments

In this thesis, I question what attributes comprise successful conservation programs in Indonesia, and how unsuccessful projects can be improved. It is crucial to analyze the relative

successes and failures associated with various attributes of conservation initiatives, including their emphasis on ecological data, management strategies, inclusion of local knowledge, and availability of alternative livelihood options, to gauge their importance. By determining how conservation programs are successful (and, conversely, what causes a conservation program to fail), we can more effectively guide environmental policy in the future.

Through a review of current literature on Indonesian marine conservation programs, I have identified recurrent successes and failures across conservation programs and developed a more comprehensive analysis of Indonesian conservation as it currently stands. Moreover, in this thesis, I describe how some of the commonly successful attributes of Indonesian conservation initiatives have global applications in the broader field of environmental policy. I define a successful conservation program as one that achieves desirable ecological outcomes (i.e., species recovery, positive changes in population trends, or marine habitat protection), as well as desirable social outcomes (i.e., reductions in economic loss, local community acceptance, participation, and upheld or strengthened cultural resources).

I argue that successful marine conservation programs in Indonesia apply (1) a biocultural perspective, (2) co-management strategies with an emphasis on the devolution of power, (3) local wisdom/IKS consideration and the inclusion of indigenous minority input, and (4) improved and diverse alternative livelihood options. I also suggest that program initiation must be instigated at the local level instead of being founded solely by external or national powers. Finally, I discuss the complex dynamics between local communities and state sovereignties in conservation policy and the importance of local contextual consideration. I begin by providing a brief overview of the environmental, political, and sociocultural context of coastal Indonesia in Chapter 2. Next, in Chapter 3, I present the current literature on Indonesian marine conservation and reveal some of

the more prevalent debates within the field. Following my identification of the most crucial attributes of Indonesian conservation initiatives, in Chapter 4, I provide my arguments on how various aspects of Indonesian marine conservation initiatives garner success or failure through their impacts on local coastal communities and the environment. In Chapter 5, I discuss potential amendments for currently lacking Indonesian conservation initiatives and the global applications of my arguments for environmental policy worldwide. Lastly, in Chapter 6, I make my final conclusions and discuss the limitations of this study and areas of future research.

CHAPTER 2: ENVIRONMENTAL, POLITICAL, AND SOCIOCULTURAL REVIEW OF COASTAL INDONESIA

To better understand the complex drivers of conservation success and failure, it is important to situate ourselves within Indonesia's environmental, political, and sociocultural context. Indonesia is a diverse landscape - environmentally, politically, and socially - and it is impossible to summarize the country's full complexity within the confines of this thesis. It is also vital to note that, due to Indonesia's diverse and ever-changing conditions, generalizations about its people and social structures cannot and should not be made. In consideration of this, I summarize the environmental, political, and social conditions as they pertain to current marine conservation initiatives in Indonesia. For the purpose of my research, I focus primarily on coastal regions of Southeast Indonesia and the surrounding islands, as they have come to represent vital areas of marine conservation importance. I begin by summarizing the ecological and environmental conditions of the Indonesian archipelago. What follows is a summary of the Indonesian government's influence on conservation and the sociocultural landscape of coastal Indonesian communities.

2.1. Ecological and Environmental Conditions of Indonesia

The Indonesian archipelago comprises about 17,000 islands, of which 990 are permanently inhabited (UN Environment Programme n.d.). Indonesia is one of six countries within the Coral Triangle (CT) (Figure 1), a marine area in the western Pacific Ocean containing the highest diversity of coral and reef fish species in the world (Mordhorst 2021).

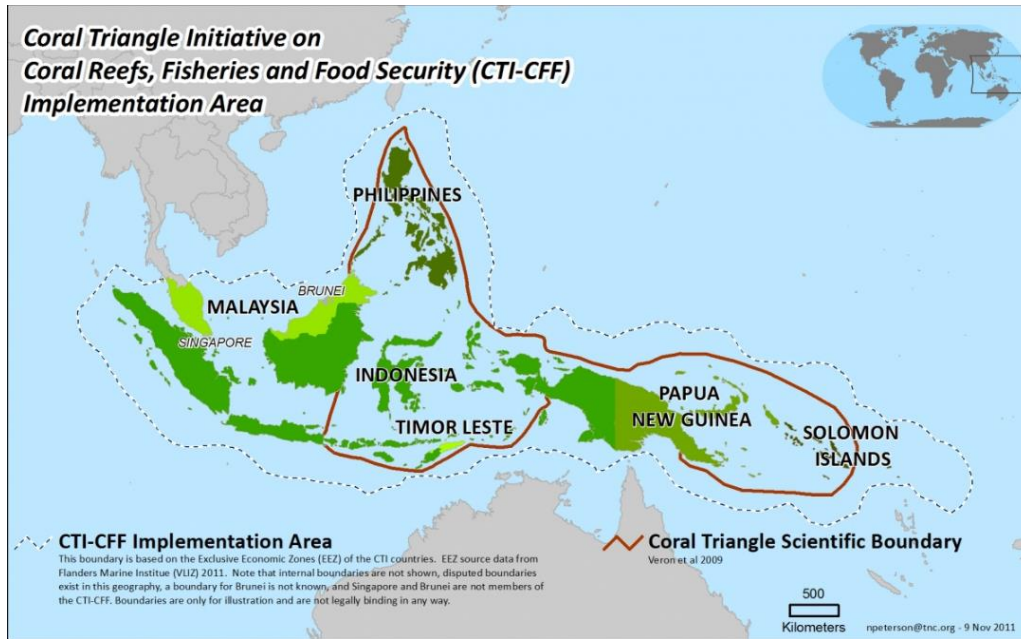


Figure 1. Geographic Boundaries of the Coral Triangle Initiative (CTI). The CTI’s boundaries are demarcated by a dotted line (“History of CTI-CFF” 2010).

Indonesia’s abundant coastal area, combined with its wide range of ecosystems - including mangroves, coral reefs, and rainforests - make it a suitable host for some of the most biodiverse locations on the planet (“Indonesia” 2023). The archipelago is characterized by high degrees of endemism and encompasses two of the 25 global biodiversity hotspots. Indonesia is second only to Brazil for the highest fauna biodiversity and accommodates 12% of the world’s mammal species (Clifton 2013a; “Indonesia” 2023). The country also boasts over 2,000 coral reef fish species and 500 coral species, demonstrating some of the highest marine biodiversity in the world (Estradivari et al. 2022). Unfortunately, this unique biodiversity is particularly susceptible to environmental threats such as climate change and overharvesting.

2.1.1. Climate Change

Indonesia's natural environment is highly vulnerable to the impacts of climate change. Extreme events such as floods, droughts, rising sea levels, shifts in rainfall patterns, and increasing temperatures all threaten the marine ecosystems throughout Indonesia ("World Bank Climate Change Knowledge Portal" 2021). Coral reefs are particularly susceptible to damage from rising sea surface temperatures, and, as a vital marine ecosystem and principal facilitator of biodiversity establishment, coral reef destruction almost always results in a wide-scale loss of biodiversity (Crabbe, Karaviotis, and Smith 2004; Marlow et al. 2020; Measey n.d.). Indonesia's marine turtle populations, a pillar of its marine fauna, are threatened by rising sea levels, extreme weather conditions, and warming temperatures (Measey n.d.). The impacts of climate change and a shifting ecological profile not only threaten marine biodiversity, but the people living in coastal areas are also susceptible to the negative effects of climate change. Coastal erosion, a loss of wetland ecosystems, and changes in marine life populations threaten food security, livelihood availability, and housing throughout multiple communities and simultaneously increase stress and lower health outcomes of coastal groups (Rizal and Anna 2019). As fish populations decline or migrate, Indonesian fisheries are forced to adapt their harvesting methods and potentially exacerbate the damage done to the natural environment.

2.1.2. Overfishing and Destructive Fishing Methods

Indonesia is the world's second-largest producer of seafood and consequently plays a vital role in global food security. Overfishing of local fish stocks is one approach used by Indonesian fishermen and external fisheries in an attempt to meet local and international fishery demands in the face of declining and migrating fish populations. Nearly half of Indonesia's wild fish stocks are

overharvested to meet the country's fishery targets, which are set collaboratively between the World Resources Institute (WRI) Indonesia and the government (Aquil 2022). As of 2022, the WRI Indonesia program director Arief Wijaya and Indonesian President Joko Widodo have emphasized the economic importance of the fisheries sector and encouraged an increase in national fishing practices and export (Aquil 2022; “WRI Indonesia” n.d.). Unfortunately, overfishing often does more harm than good for both people and the environment - destructive fishing practices drive food and economic insecurity in the long term by reducing available fish populations and damaging ocean habitats. For example, the exploitation of juvenile fish populations has had significant negative effects on fishery stocks and limited future potential catch totals (Vasilakopoulos, O’Neill, and Marshall 2011).

The health of local Indonesian communities is also threatened by overfishing. At least 50% of Indonesia's animal-based diets are composed of fish and other marine products. Conversely, the average maximum catch potential for Indonesian fisheries is predicted to decrease by at least 50% by the year 2100 (Figure 2) (SROCC-IPCC 2019). So, while Indonesia is one of the most fish-dependent countries in the world, it is also most at risk for declining fish catches. Indonesia’s local reliance on seafood paired with its unsustainable fishing practices is relatively extreme compared to the rest of the world - only a few West African countries share in Indonesia’s imbalance between overfishing and local demand (SROCC-IPCC 2019). Destructive fishing practices contribute to a large part of recent overfishing trends and can have catastrophic effects on the marine environment.

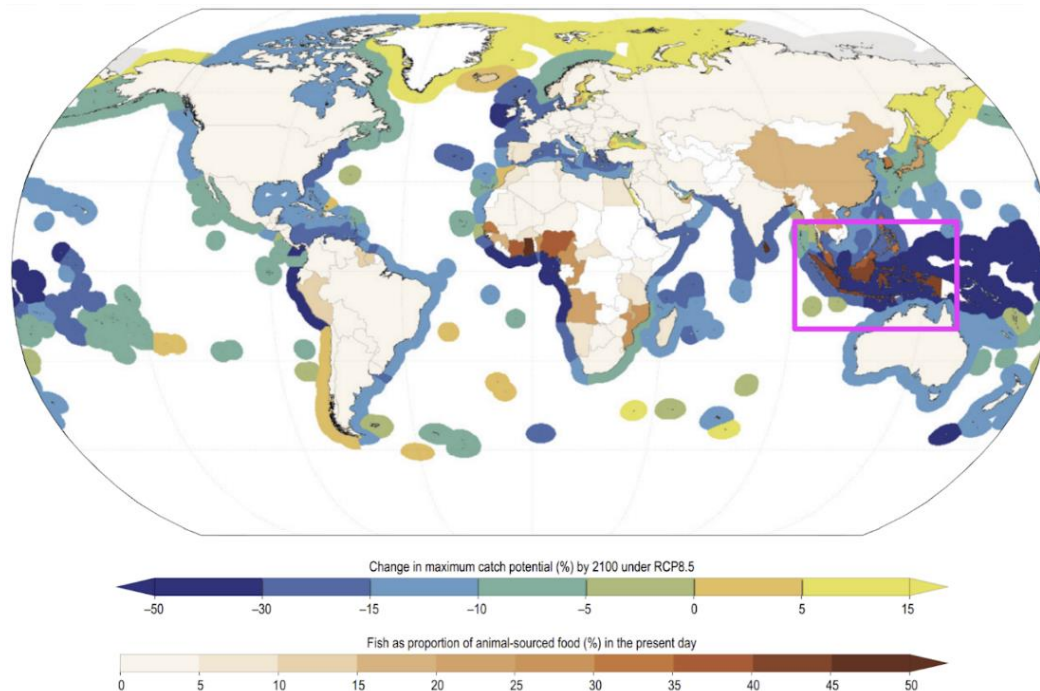


Figure 2. Projected Change in Maximum Catch Potential Compared to Fish as a Proportion of Animal-based Diets Throughout the World. Indonesia is boxed in pink (SROCC-IPCC 2019).

Common destructive fishing practices include cyanide poisoning, blast fishing, and coral mining. These practices are used throughout coastal Indonesian waters and cause major harm to the natural environment (Exton 2013). Blast or bomb fishing “involves the use of homemade explosives, typically fertilizer mixtures [of] ammonium nitrate and potassium nitrate in glass bottles” (Exton 2013, 7). These bottles are thrown in the water to kill or weaken fish – the resultant shock wave from the explosion either stuns or kills nearby fish before divers enter the water to collect the catch (Exton 2013). Dynamite can also be used in bomb fishing (Lynch 2017). The destructive impacts of blast fishing are not restricted to fish species alone, as the blast also destroys large sections of coral reefs and their reliant communities (Exton 2013; Yuliana et al. 2022). In the late 1990s, bomb fishing was estimated to destroy 3.75% of Indonesian coral reefs annually, and there was no evidence of recovery in the blast area after five years (Exton 2013). Cyanide

fishing (i.e., poison fishing) uses potassium cyanide or sodium cyanide mixed with water to produce hydrocyanic acid, which is highly toxic for marine animals and interferes with the oxygen metabolism in fish (Exton 2013). Cyanide poisoning causes a stunning effect that can be temporary, and is primarily used by Indonesian fisheries to harvest fish for ornamental aquariums and the live restaurant trade (Exton 2013). Poison fishing also leads to severe coral reef degradation via coral bleaching and polyp death (Exton 2013). Fish will often seek refuge in coral reefs when exposed to cyanide poisoning, and the ecosystem is furthered damaged when fishermen destroy the reefs in efforts to extract the fish (Exton 2013).

The environmental impacts of overfishing and the reduction of vital marine species also exacerbate the effects of climate change, fostering a vicious cycle between environmental collapse and destructive fishing practices (Mordhorst 2021). In an effort to offset both the effects of climate change and overharvesting from the natural environment, national parks and other conservation programs have been established throughout Indonesia to manage marine resources more effectively.

2.2. Indonesian National Parks

There are more than 50 National Parks in Indonesia encompassing both land and marine regions (“50 National Parks in Indonesia” 2022). These parks are spread throughout the archipelago in Sumatra, Java, Bali, Nusa Tenggara, Kalimantan, Sulawesi, Maluku, and Papua, and utilize an array of conservation spatial planning, regulation, and enforcement tactics. Of these 50 parks, ten are considered UNESCO World Heritage sites (“World Heritage - Grid” n.d.). Nine established parks are primarily marine areas and will come up the most throughout this thesis. One of the more notable of these parks is Wakatobi National Park (WNP) (Figure 3), located in

Southeast Sulawesi. While WNP is just one of the many national parks in Indonesia, it is significant in that a large amount of research has been conducted regarding its conservation policies and their consequent impact on local communities.

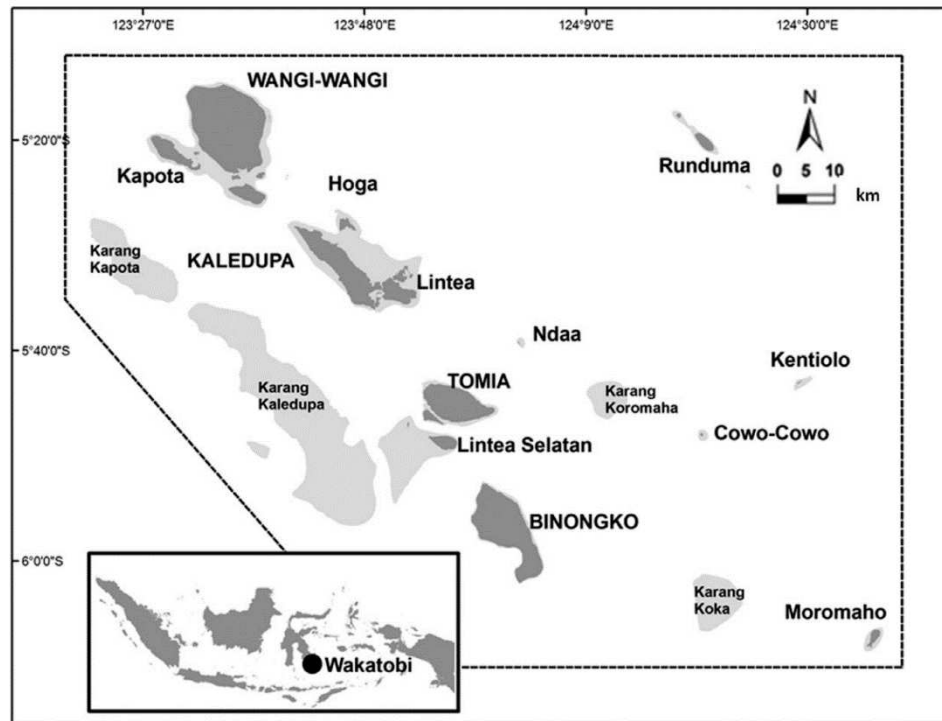


Figure 3. Wakatobi National Park. Islands included in the park are in dark shading, major reefs in light shading. The dashed line represents marine park boundaries (Clifton 2013a).

Wakatobi's name is derived from the four Tukangbesi islands (a group of islands off the east coast of Sulawesi) encompassed by the park's boundaries: **Wangi-wangi**, **Kaledupa**, **Tomia**, and **Binongko** (Figure 3) ("Wakatobi Biosphere Reserve, Indonesia" 2019). The park was first established in 1996 by the government of Indonesia and is home to around 100,000 people. Several ethnic groups live within the WNP, including the Bugis, Buton, Java, and Bajau (UNESCO World Heritage Centre 2006; Clifton 2013b). WNP is an environmentally biodiverse region hosting 942 species of fish and 400 species of coral reef ("Wakatobi National Marine Park - Indonesia Travel"

n.d.). The park also contains a wide array of habitat types, ranging from mangrove forests to lowland and mountain rainforests to coral reefs (“Wakatobi: Marine Life” n.d.). While WNP falls under the jurisdiction of the Indonesian National Government, it is also a part of the six-nation Coral Triangle Initiative (CTI) (Figure 1), a wide-scale conservation program coordinated by former Indonesian President Susilo Bambang Yudhoyono in 2009 (“History of CTI-CFF” 2010). The CTI has since adopted a Regional Plan of Action that “outlines a vision and policy agenda for regional conservation over a 10-year period” and “this vision suggests that biodiversity conservation, fisheries sustainability, and food security outcomes are expected from the long-term investment in CTI regional goals” (Berdej, Andrachuk, and Armitage 2015, 213).

Komodo National Park (KNP), Indonesia, has a local population of around 10,000 people and is composed of multiple indigenous ethnic groups including the Bugis and Bimanese in the town of Sape and the Manggarai in the town of Labuan Bajau (Walpole and Goodwin 2001). KNP is known especially for its emphasis on international tourism attractions, which has increased dramatically since local Komodo Dragon populations were discovered in 1910. The park receives thousands of tourists each year, and tourist development is largely confined to two gateway towns: the town of Sape on Sumbawa Island and the town of Labuan Bajo on Flores Island. The dominant economic activity in both villages is fishing, although there has been a shift to employment in the tourism and hospitality industries over recent years (Walpole and Goodwin 2001). However, most members of the Bugis, Bimanese, and Manggarai communities continue to fish due to their exclusion from the tourism industry and the limited employment opportunities provided by the park (Walpole and Goodwin 2001).

National and state influences have played a major role in Indonesian conservation, as displayed by the establishment of nationally protected park areas. As of January 2020, Indonesia

had a total protected marine estate of 23.9 million hectares (ha), with a target to reach 32.5 million ha by 2030 (Tranter et al. 2022). It is worth providing a brief overview of the Indonesian political system as it pertains to environmental policy to understand the justification of these conservation programs.

2.3. Indonesian National Government and State Influence

The management of marine resources in Indonesia had historically been governed by an extensive and complex regulatory framework outlined in the 1945 Constitution of the Republic of Indonesia until 1998. This foundation essentially stated that all natural resources were to be controlled by the state and utilized for the greatest possible benefit of the people (Dirhamsyah 2006). Under former President Suharto's New Order from 1966–1998, Indonesia experienced a dramatic increase in environmental exploitation and degradation for economic development via the harvesting and exportation of natural resources (Thornton et al. 2020). The consequent revolution in 1998, which overthrew the Suharto authoritarian regime and began the national process of democratization and decentralization, resulted in a dramatic change to the hierarchical legal system. Now, the management of coastal resources is primarily dictated by sectorally implemented regulations as opposed to a central statute (Dirhamsyah 2006). The new legal framework includes 16 laws on natural resource management and ocean activity regulation (Dirhamsyah 2006). These acts dictate how the Indonesian government can establish, maintain, and influence marine conservation initiatives throughout the country and how power should be delegated to local government institutions.

The Indonesian political system comprises five levels of government: the national government (led by the President), provincial government (led by a governor), cities and regencies

(led by a mayor and regency chief, respectively), sub-districts (led by a sub-district head), and urban suburbs and rural villages (led by a suburb head and village head, respectively) (Evans and Millott 2020). In this thesis, I will primarily be using the term “regional” to describe the third level of governance, cities and regencies. “Local governments” will similarly describe city and regency leadership systems. Urban suburbs and rural villages will typically be termed “villages”.

2.3.1. Legislation on Marine Conservation

Indonesia’s natural resource laws and regulations can be organized into several broad categories, including ocean and maritime jurisdiction claims, ocean activities management, coastal and marine resources management, and general legislation on environmental management (Dirhamsyah 2006). It is critical that we analyze a few of these laws, albeit briefly, to better contextualize current Indonesian conservation initiatives.

The Spatial Management Act is a general law that regulates the use, planning, and control of space, water, and land (including marine resources, reefs, and mangroves). Spatial use management activities include the designation of MPAs, which constitute a large portion of Indonesian marine conservation initiatives. This act allows provincial, district, and local governments to manage their respective regions but dictates that areas beyond their jurisdiction are to be addressed by the national government. It is important to note that this act does not clearly state the precise breadth of the area for which the regional government is responsible, and boundaries between regions can be unclear (Dirhamsyah 2006).

The Fisheries Act focuses on both economic and environmental interests and plays a large role in the management of coral reefs and their surrounding ecosystems. The Minister of Marine Affairs and Fisheries is granted the right to implement measures for controlling fisheries activities,

including the specification of fishing methods or gear, setting the maximum sustainable yield (MSY)/total allowable catch (TAC), rehabilitating marine resources and their corresponding habitats, and preventing harmful activities such as pollution and the use of destructive fishing tactics. This act prohibits the usage of specified fishing materials and equipment that can harm the oceanic ecosystem. This act also gives the central government the right to designate fishery zones or preservation areas, which can manifest as small-scale or artisanal fishery-use-only spaces (Dirhamsyah 2006).

The Biological Resources Act establishes basic principles for the management, conservation, and utilization of biological resources, habitats, and protected areas. These principles include the “conservation of animal and plant species diversity and their ecosystems,” the sustainable use of biological resources, and “the development of human capacity and quality of life” (Dirhamsyah 2006, 75). This act promotes two types of nature protection areas: nature reserve areas, which can be further classified as either nature reserve areas (*kawasan cagar alam*) or wildlife reserve areas (*kawasan suaka margasatwa*), and nature sustainable areas, which can be further classified as national park areas (*kawasan taman nasional*), grand forest park areas (*kawasan taman hutan raya*), and nature recreational park areas (*kawasan taman wisata alam*) (Dirhamsyah 2006).

Finally, the Autonomy Act, or Regional Government Act, grants regional governments the authority to manage their own natural resources and establish environmental preservation tactics (similar to the Spatial Management Act). The Autonomy Act further specifies that the marine area under the jurisdiction of a province extends up to 12 nautical miles from the coastal shoreline. If the territorial sea between two provinces is less than 24 nautical miles, then the area will be measured from the center point and an equal amount of space will be delegated to each province.

However, this arrangement has no valid artisanal fisheries ground, and confusion arises when trying to dictate protected marine areas for artisanal fishing. The Autonomy Act expands on the authority of regional governments over their natural resource jurisdiction. Except for some functions (such as maintenance of foreign affairs, security, defense, and national fiscal and monetary control) that are retained by the central government, the regional governments are granted full autonomy. Regional control includes “the exploration, exploitation, conservation, and management of the coastal resources of the sea areas,” administrative affairs, spatial planning, and enforcing laws related to local regulations that have been decentralized by the national government (Dirhamsyah 2006, 75).

There is a clear overlap between city/district, provincial, and national jurisdiction areas as they pertain to marine conservation. An undeniably important connection exists between the Indonesian National Government, regional governments, and local communities in conservation planning and implementation. Looking closer at those local communities, we will now try to gain a better understanding of the current sociocultural conditions of coastal Indonesia, including community attitudes toward the marine environment.

2.4. Sociocultural Conditions of Coastal Indonesian Communities

Indonesia is known for its rich cultural and ethnic diversity (there are over 1,300 ethnic groups throughout the country), especially at the provincial and district levels (“Indonesia Ranks Among the World’s Best Countries” 2023). Indonesia hosts a plethora of coastal fishing communities each with their own attitudes and beliefs toward nature, including the Buginese, Makassarese, Sangirese, and Bajau of Sulawesi and the Bawean from north of Java (Ananta et al. 2015; Yuniarni 2016); these are just a select few groups, as it is impossible to identify and

summarize all of Indonesia's fishing communities here. As such, I primarily describe the Bajau (sometimes called the "Bajo") communities of Southeast Sulawesi, but other groups and villages are similarly mentioned throughout this thesis and appropriate background is provided when necessary. In the context of this paper, I use the term "local community" to define a group of people located in the same geographical space (typically manifesting as villages or cities), positioned at the same level of sovereignty (e.g., on a sub-district, regional, provincial level, etc.), of the same ethnicity, speaking a common language, and generally sharing beliefs, attitudes, and customs surrounding the marine environment.

2.4.1. Community Attitudes and Beliefs Toward the Marine Ecosystem

Community attitudes toward the marine ecosystem are important to consider when analyzing conservation programs, as they can dictate how and if local people adhere to environmental restrictions and protection measures. Overall, the marine ecosystem plays a huge role in the lives of coastal villagers. Not only is Indonesia the world's second leading exporter of fish internationally, but fish are also a major cornerstone of the domestic Indonesian diet, and it is not uncommon to find some aspect of fish, shellfish, or other marine food products in every meal ("Indonesia Fisheries" n.d.). An estimated 40 million Indonesians living in rural areas rely on marine biodiversity for their subsistence needs (UN Environment Programme n.d.).

While the traditionally nomadic Bajau now live a more sedentary lifestyle (primarily in fishing communities of stilt houses over coastal areas), their livelihoods and culture remain entwined with the sea. Bajau communities depend on rich marine ecosystems and a biodiverse ocean for food and livelihood security. Fish and other ocean resources provide the basis for Bajau nutritional needs and are typically harvested using traditional line-and-net fishing tactics in dugout

canoes over coral reefs (Clifton and Majors 2012). Manual collection of marine invertebrates and other species at low tide (termed “gleaning”) is also a common resource collection method used by most people in the Bajau community, including small children. Many different members of the Bajau community, ranging in age, gender, and livelihoods, can be seen scouring the coastline at low tide and collecting marine animals and plants, demonstrating the community’s knowledge of their local marine environment and its resources. Mangrove areas are similarly harvested for wood for fuel and house-building materials, which are used in conjunction with broken coral fragments (Clifton and Majors 2012). While the Bajau comprise a small minority of the population in Southeast Sulawesi and the WNP area, they account for a disproportionately high amount of artisanal fishing activity. However, due to their low social standing and direct discrimination toward the Bajau, they have often been excluded from conservation policy development, and disputes have arisen between minority ethnic groups and majority groups over conservation regulations (Clifton and Majors 2012).

Bajau communities in WNP remain peripheral in the sense that they live in geographically excluded areas (their villages are literally built above the ocean), rely on a subsistence-oriented economy, utilize a distinct language, and retain traditional religious beliefs (Clifton and Majors 2012). The Bajau also display indicators of poverty, such as high infant mortality and low levels of formal education. As a result, Bajau communities are awarded a low social status across Southeast Asia, which is reflected by the Bajau (and other ethnic minority groups) being subject to various state development initiatives that promote conformity with national laws, religion, and education (Clifton and Majors 2012). These state development projects, which include conservation programs such as the CTI and WNP, tend to villainize the Bajau community and favor the demands of majority ethnic groups. Bajau communities are often associated with

destructive fishing practices such as bomb fishing, cyanide fishing, coral mining, and overfishing (Clifton and Majors 2012). This perceived nonconformity commonly results in continuous exclusion of Bajau and other minority communities from marine conservation planning (Clifton and Foale 2017; Clifton and Majors 2012; Lynch 2017).

Community attitudes and beliefs toward the marine ecosystem clearly have an important relationship with the development of conservation programs. Exclusion of local knowledge and participation can be dangerous, and I explore the significance of indigenous minority marginalization throughout this thesis.

2.5. Summary of Environmental, Political, and Sociocultural Review of Coastal Indonesia

I have summarized the broader aspects of Indonesian environmental, political, and sociocultural conditions in the context of marine preservation. While Indonesia is one of the most biodiverse regions on the planet, many of the country's ecosystems and natural resources are threatened by climate change and overfishing. These environmental stressors not only threaten plant and animal life – they also pose a major risk to the physical, economic, and social well-being of coastal community members. To alleviate the human-driven harm done to the marine environment, Indonesia has established more than 50 national parks, including Wakatobi National Park (WNP), the larger Coral Triangle Initiative (CTI), and Komodo National Park (KNP). These parks are managed (to varying degrees) by the Indonesian national government, regional governments (cities and districts), and sub-district and village leaders. Current legislation on marine conservation includes the Spatial Management Act, Fisheries Act, Biological Resources Act, and Autonomy Act, which dictate natural resource allocation between different levels of

government. Local indigenous communities encompassed by national parks have differing social and cultural connections with the marine environment, which are not always reflected by environmental policy and fishery restrictions. With this contextual knowledge of Indonesia's ocean ecology, legislation on marine resource management, and community attitudes toward the natural environment, we can begin analyzing the current literature on marine conservation programs in coastal Indonesia and their subsequent impact on local communities.

CHAPTER 3: CONSERVATION LITERATURE REVIEW

To situate my analysis of Indonesian conservation within a broader discourse, I visit the current literature on conservation program development and implementation. Four major themes emerge concerning marine protection policy and can be summarized as (1) competing visions of conservation, (2) co-management and bridging organizations, (3) application of local wisdom and indigenous knowledge systems (IKS), and (4) compensation and alternative livelihood options. Common issues of indigenous minority marginalization and disregard of local knowledge systems are found throughout recent literature.

3.1. Competing Visions of Conservation

It is vital to consider both the environmental and social repercussions of marine conservation programs throughout policy design (Berdej and Armitage 2016). However, the appropriate *balance* between ecological and social consideration is greatly disputed in the literature: which is more important, people or the environment? Ideally, we would not have to choose, but many Indonesian conservation plans make sacrifices for one or the other (Berdej, Andrachuk, and Armitage 2015). Some researchers believe that local communities must suffer if a conservation program benefits the marine environment, or vice versa. These sacrifices, or “trade-offs,” are where I begin my literature review.

3.1.1. Trade-offs

Social-ecological trade-offs typically concern the balance between marine protected area (MPA) establishment and local livelihood security. Trade-offs represent conservation scenarios

that favor either ecological conservation or the well-being of local communities (through livelihood security, preservation of cultural land use, etc.). Trade-offs can essentially be viewed as win-lose scenarios. Within the Southeast Pacific region especially, conservation planners tend to use the idea of trade-offs to defend programs wherein nature wins, but local people lose (Gill et al. 2019). Skeptics of win-win scenario feasibility (i.e., the biocultural approach - more on this later) argue that any restrictions necessary to improve environmental conditions, such as no-take zones (NTZs), inevitably incur some form of social loss (Gill et al. 2019). This loss can manifest as forfeited livelihood opportunities (fishermen who lose the ability to fish), restrictions on culturally significant practices and rituals, decreased food security, and entrenched marginalization of indigenous groups (Clifton and Foale 2017; Tam 2019; Thornton et al. 2020).

The mal effects of social-ecological trade-offs are demonstrated in Wakatobi National Park (WNP). Over the course of its establishment, WNP, which employs NTZs and partial-take zones (PTZs), has “been dogged by local community grievances, largely around restricted access to traditional fishing grounds” (Tam 2019, 4). In this case, the cultural importance of certain fishing practices is traded for the protection of the marine area. Conservation planners in WNP sacrifice the cultural access and autonomy of local communities for the protection of specific marine spaces. A pattern is observed wherein the exchange of local well-being for environmental protection ultimately leads to dissent among community members. This dissent is significant - if local people disagree with conservation restrictions, then they are likely to rebel against them. Nonconformity can manifest as clandestine fishing in NTZs, the use of destructive fishing methods (cyanide fishing or bombing) despite their prohibition, or the use of unregulated gear (Clifton 2013b). The WNP program consequently risks failure, and environmental protection could fall through (Al Amin et al. 2021).

A key perpetuator of social-ecological trade-offs is the biodiversity first approach. To focus marine conservation programs on their ecological and environmental goals, the biodiversity first approach is used to foster trade-off relationships wherein the environment benefits to the detriment of local communities.

3.1.2. The “Biodiversity First” Perspective

The “biodiversity first” perspective advocates that only fully protected MPAs “(i.e., MPAs that prohibit extractive activities or only allow those with minimal environmental impact)” should count towards a program’s biodiversity targets; targets that are typically established by the national government or private organization responsible for the program’s implementation (Andradi-Brown et al. 2023, 2). In other words, according to the biodiversity first approach, PTZs are not effective environmental protection measures because they leave opportunities for marine degradation. Instead, proponents of the biodiversity first approach advocate for NTZs that fully prevent natural resource extraction. MPAs designed using the biodiversity first perspective “prioritize biodiversity conservation, scientific input, and exclusion of human activity... over strategies that adopt a historical humans-in-nature perspective” (Berdej, Andrachuk, and Armitage 2015, 215). This perspective has also been called the “half Earth” approach for its goal of protecting half of the world's natural resources via conservation initiatives (Gavin et al. 2018). The biodiversity first perspective is defined primarily by its emphasis on the intrinsic value of biodiversity and the consequent need for strict environmental protections. Perhaps the most obvious problem associated with this perspective is the deliberate prioritization of ecological goals over social and community well-being (Berdej, Andrachuk, and Armitage 2015; Clifton and Foale 2017).

The biodiversity first perspective has caused controversy in protected areas of WNP. Scientific information (data collected on local ecology and future predictions of biodiversity loss) is “legitimated as the knowledge that matters” when planning and updating MPAs within the park (Tam 2019, 7). Preference for scientific knowledge gives Wakatobi’s sovereign entities power over local people - the government co-opts scientific data to legitimize its own vision of conservation and the imagined role of local communities (Tam 2019). In other words, MPA planning is justified solely by ecological data, and the opinion of local people goes ignored for the sake of environmental protection.

Many programs in the Coral Triangle Initiative (CTI) have also applied the biodiversity first approach. While the CTI’s Regional Plan of Action advocates for “people-centered biodiversity conservation” and calls for the involvement of indigenous and local communities, it simultaneously claims that the CTI’s goals and implementation activities should be based on “solid science” (Berdej, Andrachuk, and Armitage 2015, 216). In the CT, human interaction with the environment is limited via “temporal restrictions or fisheries closures, fishing quotas, gear or vessel controls, and more commonly, no-take areas” (Berdej, Andrachuk, and Armitage 2015, 215). MPAs in the CT employ a "crisis narrative," or a public depiction that emphasizes the immediate peril of marine resources and biodiversity loss. This narrative, while potentially beneficial for the environment, prioritizes scientific input over local concerns. For example, a primary goal of the CTI’s Regional Plan of Action “is to establish a marine protected area system in which at least 20% of each major marine and coastal habitat type is listed in strictly protected 'no-take replenishment zones'” (Berdej, Andrachuk, and Armitage 2015, 215–16). Local communities may suffer economically, biologically, and socially because of these severe fishing restrictions, and their complaints go ignored because they potentially threaten biodiversity

preservation objectives. The absence of local consideration discourages community acceptance of MPA regulations, and the CTI loses its effectiveness because it cannot preserve the natural environment without cooperation from local people (Berdej, Andrachuk, and Armitage 2015; Cinner 2007).

Ultimately, the biodiversity first approach does not benefit the environment or local communities of the CT. In opposition to the biodiversity first approach, the biocultural perspective has been proposed as an alternative method that considers both environmental and human conditions in conservation areas.

3.1.3. The “Biocultural” Perspective

The “biocultural” perspective differs from the biodiversity first approach in that it considers pluralistic worldviews and tailors initiatives to relevant social-ecological contexts (Gavin et al. 2018). Instead of emphasizing strict environmental protections, the biocultural approach supports adaptive governance or co-management strategies to facilitate partnerships between local stakeholders, NGOs, and government organizations (Gavin et al. 2018). A biocultural perspective does not advocate for trade-offs but attempts to install win-win scenarios wherein both people and the environment benefit. There is a debate in the literature over whether these win-win scenarios are feasible in present Indonesian conservation.

Some sources claim that the biocultural approach is effective because of its adaptive nature and consideration of social-ecological systems (Andradi-Brown et al. 2023; Gavin et al. 2018; Thornton et al. 2020). Andradi-Brown et al. (2023) suggest employing a biocultural approach to WNP by establishing community-led PTZs to complement existing MPAs. It is argued that PTZs are better able to balance the needs of the environment with the concerns of local fishing

communities, making them well-suited for the biocultural approach. Fishermen can continue using the area if they employ the proper gear, stay within certain fishing areas, and adhere to catch limits. These PTZs are also beneficial because they “offer more opportunities for locally relevant tailoring of MPA regulations than exclusively fully protected MPAs” (Andradi-Brown et al. 2023, 14). Local people can have a say in how PTZs are both utilized and protected, which “[generates] biodiversity outcomes without compromising access to resources, equability, food security, and local rights” (Andradi-Brown et al. 2023, 16).

Existing literature also emphasizes that the biocultural conservation approach, while a promising option, could still be improved. Researchers argue that the biocultural approach oversimplifies complex dynamics between indigenous communities, natural resources, government organizations, and financial stakeholders in conservation programs. It is important to note that “marine conservation interventions can have disproportionate effects on select populations,” and everyone does not benefit to the same degree from supposedly win-win scenarios (Gill et al. 2019, 359). For example, while PTZs may profit ecotour guides and those employed by WNP, the minority Bajau community does not receive the same benefits due to discrimination by WNP stakeholders and the Bajau’s subsequent exclusion from the program (Clifton 2009; Tam 2019). Since Bajau people are not employed by WNP, they do not receive the same benefits as the majority populations who are more involved.

The use of co-management and bridging tactics have been suggested as a potential solution to the exclusionary issues associated with top-down biocultural approaches. As we will see in the following section, co-management is a complex process that can give varying amounts of power to local communities and government organizations.

3.2. Co-management and Bridging Organizations

Co-management is a method of conserving marine resources through the sharing of responsibility and authority between national and state governments, local communities, NGOs, and research institutions (“Co-Management Approaches | Reef Resilience” 2023). Instead of a single group planning, implementing, and maintaining a conservation initiative, multiple organizations collaborate to develop a joint conservation plan. It is common for bridging organizations - entities that facilitate the connection between parties - to be involved in conservation networks and communication (Berdej and Armitage 2016). According to recent literature, co-management systems and bridging organizations have yielded mostly successful results in Indonesian marine conservation (Andradi-Brown et al. 2023; Berdej and Armitage 2016; Hendrik et al. 2021). Because of these observed successes, there is a call for increased co-management implementation (Alexander and Armitage 2015; Wahyudin et al. 2018). However, the appropriate balance between government and local community influence remains in question. Who should have a more prominent say in conversation initiatives: state and national governments or local stakeholders?

3.2.1. The Centralization of Power

One side of the current literature advocates for increased centralization of power in marine conservation programs. “Centralization” describes the concentration of authority under state or national government organizations. In arguing for the centralization of co-managed programs, researchers are essentially advocating for increased government influence in conservation policy design and implementation.

Dirhamsyah (2006) makes the important point that the control of marine resources in Indonesia has historically been dictated by a complex policy and regulatory framework. There is not one single law that oversees Indonesian marine resource protection. Instead, “conservation and management of coastal resources are regulated by a group of natural resource laws and regulations which are implemented in a sectoral manner” (Dirhamsyah 2006, 69). Many of these laws are highly complicated and lack detailed information (for example, failing to differentiate between “trawl nets” and “fish nets”), which often confuses regional policies. This confusion is compounded by overlapping and contradictory regulations across regional districts. Ultimately, the complicated legal framework currently utilized across Indonesia has contributed to the degradation, not protection, of many coastal and marine resources. Those advocating for centralization suggest that “this degradation has been exacerbated by the lack of a national marine policy” and “severe weaknesses in law enforcement of natural [resources]” (Dirhamsyah 2006, 68). For this reason, some advocates suggest that conservation authority be centralized at the national level under a more coherent set of regulation laws (Dirhamsyah 2006).

Centralization of power has also been suggested as a remedy for indigenous minority marginalization in conservation. Private stakeholders, tourism operators, and NGOs involved in the design of conservation restrictions have focused most of their attention on localized overfishing and illegal resource use by minority ethnic groups. However, these issues are miniscule compared to the recent expansion of unsustainable infrastructure by external organizations, such as fisheries based in China and Australia (Clifton 2013b). In WNP, Bajau minority communities are excluded from conservation planning and blamed for environmental degradation via harmful fishing practices. Since many of WNP’s MPAs are controlled by NGOs and the private tourism sector, they ultimately get the final say on which areas are restricted, and to whom. In other words, the

lack of national government involvement deprives the WNP of a (supposedly) neutral third party who could further evaluate the Bajau perspective (Clifton 2013b).

Other sources support private sector and NGO involvement in marine conservation but claim that increased state intervention is required to establish legitimate and durable programs (Bottema and Bush 2012). This claim has been made for the Yayasan Karang Lestari coral restoration project in Pemuteran and the marine tourism park around the island of Gili Trawangan off the west coast of Lombok. In both cases, entrepreneurial marine protected areas (EMPAs) have highlighted the need for augmented government involvement because of their poor management in the long term (Bottema and Bush 2012). While the private sector has successfully established EMPAs and new coral restoration technologies like Biorock³, it is also “faced with certain limitations, particularly its lack of capacity to create durable agreements” that are effectively enforced (Bottema and Bush 2012, 46). Bottema and Bush (2012) suggest that some national or state government intervention is necessary for protected areas to be legitimized in the eyes of the public. Moreover, government support of private sector actors can help in creating binding agreements with other resource users who EMPA planners would not have had access to without state intervention (Bottema and Bush 2012). Finding balance in co-management programs is key - on the other end of the spectrum, the devolution of power to local stakeholders has been proposed to take power away from national government organizations.

3.2.2. The Devolution of Power

In opposition to the centralization argument, other sources advocate for the devolution of power from government organizations to indigenous communities, regional governments, and

³ Biorock is a method of coral restoration technology that uses low voltage currents to grow limestone on steel structures in the ocean (Bottema and Bush 2012).

local stakeholders in conservation programs. The local instigation and maintenance of programs is the most devolved version of power in conservation.

A lack of community involvement in managing conservation programs risks local unfamiliarity with and disregard of MPA boundaries (Chuenpagdee and Jentoft 2007). For example, in WNP, 90% of local villagers were not well informed about WNP's regulations or the purpose of the park's restrictions because communities were excluded from the planning of policies and their subsequent management (Elliott et al. 2001). Devolved co-management that directly involves local people in program planning, specifically those who are most impacted by MPA restrictions, can ensure locals are familiar with new conservation restrictions and MPA boundaries (Elliott et al. 2001).

Some sources suggest that contrasting objectives between local and national organizations could be reconciled through the devolution of power in co-management relationships (Clifton 2003; Elliott et al. 2001). National conservation management objectives typically focus on economic growth via the implementation of tourism infrastructure. This tourism bias leads to international and nationally dominated programs failing to “address socioeconomic and cultural aspects of fisheries management, with the result that they tend to neglect the needs of local fishing communities” by favoring the needs of the tourism industry (Elliott et al. 2001, 298). In these cases, national and local objectives are not aligned, and local people suffer since they have less authority in centralized co-management relationships.

It is argued that more power should be entrusted to local communities so that conservation plans better contribute to mutual objectives between coastal villagers and state entities. Researchers claim that, in WNP especially, transparent communication between government organizations, park planners, tourism operators, NGOs, and local people must be prioritized

(Elliott et al. 2001). The Wakatobi program could then foster management plans that “more effectively address the needs of the communities, meet conservation goals, and reduce conflicts” between local stakeholders and state powers (Elliott et al. 2001, 312). A similar case is made for the CTI. Researchers advocate for the diversification of governance types and community-based management to ultimately delegate more authority to local communities (Tranter et al. 2022). In other words, there is a call for increased community management of MPAs to ensure that the goals of local people are better represented in CTI regulations (Tranter et al. 2022).

Government-dominated conservation management also tends to ignore local religious context, which can result in ineffectual and controversial conservation programs. Tranter et al. (2022) argue that co-management initiatives should incorporate more community planning and consultation to account for religiously significant marine spaces. Adaptive policies that are specifically tailored to local religious, social, and cultural contexts are typically generated from devolved co-management systems.

3.2.3. Adaptive Policies

Adaptive policies incorporate methods of co-management and the devolution of power to develop flexible, uniquely tailored conservation programs for local environments and communities. Consequently, most literature advocating for co-management and the devolution of power also suggests adaptive policy implementation.

Indonesian conservation policies are considered adaptive if developed in anticipation of future ecological, social, and cultural changes (Tranter et al. 2022). Ecological changes can include marine species loss or gain, warming ocean temperatures, natural disasters, etc. (Berdej, Andrachuk, and Armitage 2015; Tranter et al. 2022). Social and cultural changes can manifest as

evolving fishing methods, shifts in food security and demand, or a growing ecotourism market (Gill et al. 2019). Adaptive capacity allows coastal communities to benefit in the event of shifting cultural and environmental conditions. For example, a community that is vulnerable to the “spatial redistribution of... resources (e.g., traditional fish stocks shifting in or out of the local area) might utilize its adaptive capacity to adjust to emerging opportunities (such as new species redistributing into the area)” (Charles 2012, 353). Adaptable fishing regulations might include a malleable protected species list that reflects the current biodiversity in the local area. It is argued that policies able to adapt to changing ecological conditions will make it easier for local people to adjust their lifestyles alongside transformations in the natural world.

Advocates for adaptive policy argue that conservation planners should develop programs that “accept uncertainty and surprise, foster learning and flexibility (i.e., embrace change and focus on the ability to adjust), and build the resilience of ecosystem services” (Berdej, Andrachuk, and Armitage 2015, 217). Adaptability can only be achieved through the involvement of smaller organizations (NGOs, tourism operators) and local communities alongside state and national authorities. Marine conservation policies that have incorporated adaptive co-management have found the most success, as demonstrated by the following examples.

3.2.4. Co-management Success

The Nusa Penida MPA, located southeast of the Balinese coast, has successfully employed an adaptive co-management strategy. The Coral Triangle Center (CTC), a bridging NGO, facilitates the region's many stakeholders in managing the Nusa Penida MPA. As a bridging organization, the “major roles of CTC in the MPA include: identification and engagement of local partners; collection of stakeholder inputs and data to inform MPA design; coordination of activities

related to MPA planning; and technical advisory and training” (Berdej and Armitage 2016, 7–8). These local partners include “stakeholders from the Klungkung Regency and central governments, NGOs, community groups, tourism operators, traditional leaders... and local fishers” (Berdej and Armitage 2016, 8). In collaboration with these organizations, the Nusa Penida program has developed a zoning plan that involves a sustainable fisheries zone, a traditional fisheries sub-zone, a utilization zone for marine tourism, and a traditional sacred sub-zone, among others (Berdej and Armitage 2016). In short, the Nusa Penida MPA has created a wide-scale PTZ that accounts for the region’s diverse use of marine resources. As a result, negative impacts on local fishers and community members are limited, and the program is accepted by community members and government organizations alike (Berdej and Armitage 2016; “Coral Triangle Center | Nusa Penida MPA” n.d.; Gotama et al. 2023).

Communities along the Batang Haluan River in West Sumatra, Indonesia, have also employed a successful co-management system for biodiversity conservation. The Lubuk Landua village has employed unofficial sustainable use methods since 1856, primarily based on religious belief systems. In 2014, the government got involved in local conservation by “stating sustainable use zones in several villages... through a local government decree,” which acts as a “formal recognition of the conservation area” as a limited use zone (Hendrik et al. 2021, 155). Traditional village leaders, community leaders, religious scholars, and the government have all been involved in the execution of this conservation plan. The use of co-management in the Lubuk Landua Village has ensured that sustainable use and traditional use zones have been clearly marked and publicized, and as a result, both local villages and national authorities respect those boundaries (Hendrik et al. 2021).

While these case studies represent successful use of adaptive co-management methods, it is critical to note that the balance of power between government and local stakeholders is inconsistent between these two programs. In the Batang Haluan River region, local villagers initiated their conservation practices, and the government legitimized the program nationally. On the other hand, in the Nusa Penida MPA, government organizations, NGOs, and local people all collaborated to develop an original conservation plan - the MPA's initiation was a group effort. Additionally, just one of these studies (the Nusa Penida MPA) employed a formal bridging organization. It is also important to note that, as co-managed conservation programs, both the Batang Haluan region and the Nusa Penida MPA incorporated local knowledge into their conservation restrictions. In the case of Batang Haluan, local knowledge initiated the program and formed the basis for its fishing restrictions. In Nusa Penida, local knowledge helped inform the CTC (and thus other stakeholders to whom the information was communicated) on what zoning designations were appropriate for the area. Local knowledge is an invaluable source of information when designing marine conservation programs, and I explore that importance further in the next section.

3.3. Application of Local Wisdom and Indigenous Knowledge Systems (IKS)

Almost all recent studies on Indonesian conservation programs focus on local wisdom to some capacity. Most sources agree that local knowledge-based conservation approaches are the most effective method of environmental protection (Al Muhdhar et al. 2019). Despite this agreement in the literature, not all Indonesian conservation programs employ local wisdom in practice. The term "local wisdom" can also be vague when used by conservation developers. When

a program says it will consider local wisdom, what does that really mean? Who contributes to applied local wisdom, and to what capacity?

3.3.1. Local Environmental Knowledge and “Two-Eyed Seeing”

“Two-eyed seeing” is a conservation approach involving the application of both Western science and IKS, similar to the biocultural perspective (Frid et al. 2023). According to Frid et al. (2003), “the synergistic pairing of IKS and Western science can improve our understanding of ecosystems and the consequences of human interventions” (952). Many IKS throughout Indonesia have a “take only what you need and leave lots for the ecosystem” perspective, which aligns well with environmental conservation goals (Frid et al. 2023, 940). A combined perspective is utilized in the Bali Network MPA, wherein local wisdoms such as Tri Hita Karana (a philosophy emphasizing the interrelation and harmony between humans, God and nature) and Nyegara Gunung (six principles for maintaining the balance of nature that are comprised of soul, human, forest, lake or freshwater, sea, and the universe) “have been integrated... to merge scientific ideas of conservation (e.g., ecological connectivity, social networks) with the Balinese cultural perspective (e.g., “ridge to reef” thinking, harmony between humans and nature)” (Berdej and Armitage 2016, 12). Ridge to reef thinking describes the belief that the environmental status of upland environments (“ridge”) inevitably impacts coastal ecosystems (“reef”) - in other words, human interaction with the environment in one space will have an effect on the ecosystem in a different space (Berdej and Armitage 2016; “Ridge to Reef Approach” 2017). This approach is successful in garnering local participation and cooperation in conservation policies – since community members are more involved in the program development process, they are more willing to adhere to environmental resource restrictions (Al Amin et al. 2021; Berdej and Armitage

2016; Hendrik et al. 2021). It is important to note that, similar to the Nusa Penida MPA, the Bali Network MPA also employs a bridging organization (Conservation International Indonesia, or CI-I) (Berdej and Armitage 2016).

In rural conservation as well, IKS and community knowledge provide valuable information for program development. Local community members are more familiar with the historical dynamics of their landscapes and have been monitoring environmental changes throughout their history. This information is “particularly relevant for landscape-oriented conservation policies to prevent biodiversity loss,” as local knowledge informs what areas require the strictest conservation policies (Al Amin et al. 2021; Thornton et al. 2020). Ultimately, the application of local environmental knowledge via the two-eyed seeing approach can be a highly effective tool in environmental preservation, whether in rural or marine ecosystems.

However, it is crucial to realize that the two-eyed approach is imperfect and can introduce challenges to conservation development. Problems typically arise when Western viewpoints and local objectives do not align. For example, in collaborative fishery management, federal fisheries managers must plan around the nutritional and economic demands of large, highly diverse human populations around the globe. On the other hand, IKS typically come from smaller and more localized communities, which can make it difficult for the two perspectives to find common ground. As a result, IKS are usually excluded from wide-scale environmental policy (Frid et al. 2023).

3.3.2. Indigenous Minority Marginalization

Indonesia’s minority ethnic groups are often excluded from conservation program development. While this trend is found throughout Indonesian conservation programs, I will focus

mainly on the Bajau communities of Southeast Sulawesi, specifically in the WNP area, as an example.

Given their unique affiliation with the marine environment, the Bajau people can contribute valuable ecological knowledge to conservation programs (Von Heland and Clifton 2015). It is suggested that “any incentives designed to facilitate governance should explicitly recognize the status of the Bajau” due to their history of marginalization “through both state and NGO initiatives” (Clifton 2013b, 80). Despite representing less than 5% of the WNP population, the Bajau are still key stakeholders in the program because of their traditional and historical use of marine resources. Current literature argues they should be more involved in the WNP planning and implementation process because of their expertise surrounding the local environment (Clifton 2013b; Von Heland and Clifton 2015).

WNP consists of two distinct ethnic groups. The majority Butonese represent around 95% of the population and are of local origin. The minority Bajau are “dispersed throughout eastern Indonesia and are often misleadingly labeled ‘sea nomads’ on account of their historic use of houseboats and contemporary maritime lifestyle” (Von Heland and Clifton 2015, 157). Unlike the Butonese, the Bajau depend almost exclusively on marine resources found in the WNP and surrounding coastal areas (Von Heland and Clifton 2015). Bajau exclusion from the WNP program has largely stemmed from a lack of understanding and communication between government/conservation institutions and Bajau communities “despite the latter representing a key stakeholder group in marine resource management” (Clifton 2013b, 86). The Bajau are ostracized from the creation and management of the park, distrust government officials, are subject to confusion over the park’s purpose, and follow cultural values that do not always align with conservation goals, which ultimately results in Bajau noncompliance with park regulations.

(Clifton 2003). Many of the WNP's conservation goals consequently fail without community cooperation.

Minority community exclusion in conservation planning has also been observed in KNP (Walpole and Goodwin 2001). While the Bugis, Bimanesese, and Manggarai communities have been largely affected by increased tourism in the area (such as local inflation caused by an influx in visitors or an altered dress-code to accommodate tourists), they received almost “[no] derived benefits from tourism” and have minimal contact with tourists (Walpole and Goodwin 2001, 162). Furthermore, surveys taken by KNP communities suggest that locally born residents are included less in tourism employment (compared to external hires) and are consequently under-motivated to participate in the program's environmental protection measures (Walpole and Goodwin 2001). Overall, tourism in KNP is not targeting the “most local of local residents,” and instead bars them from the benefits of conservation (Walpole and Goodwin 2001, 164). Local communities within KNP are excluded from employment opportunities in the tourism industry, causing them to refuse to participate in conservation measures and generally ignore the KNP program.

A similar occurrence of local community exclusion was observed in a palm plantation initiative in a small village within Jambi, Indonesia. While this is an example of agricultural conservation, it demonstrates how local communities are excluded from natural resource management despite having the greatest familiarity and ownership rights over the area. In this case, an agreement was made between local Karang Mendapo villagers and a palm oil plantation under Primary Cooperative Credit for Members' scheme, wherein villagers loaned their land to the cooperative for plantation establishment over a four-year period. Unfortunately, a lack of transparency and benefit sharing resulted in local villagers permanently being restricted from their land. This conflict ultimately resulted in violence, with six villagers being shot with rubber bullets

during a confrontation (Dhiaulhaq, De Bruyn, and Gritten 2015). This occurrence in Jambi demonstrates an extreme case of community exclusion and discrimination, wherein villagers were eventually shut out from a conservation initiative and lost their autonomy and ownership of local land.

Indonesia's minority ethnic groups are also vilified by conservation planners. For example, the Bajau people are depicted as contributors to environmentally destructive practices in WNP (Elliott et al. 2001). While outside fishermen (coming from China, Australia, or other South Pacific islands) are known to be the main culprits of many harmful practices, the Bajau community is also perceived as a threat due to the misconception that they traditionally employ destructive fishing methods (Clifton 2003). These misconceptions are rooted in the historic marginalization and racial discrimination toward Bajau society. Authorities and dominant ethnic groups hold negative perceptions toward the Bajau and consequently blame them for environmental degradation, even if their claims are unsubstantiated (Clifton 2013b). Popular narratives suggests that the Bajau use dynamite and cyanide as destructive fishing methods, and this perception stems from the low social status accorded to the Bajau and their categorization as "outsiders" due to "low levels of formal education, a strongly subsistence-based economy, distinct religious beliefs, and other indicators of poverty" (Von Heland and Clifton 2015, 161). Correcting these misconceptions is not an easy process. Some sources recommend drawing more attention to the illegal activity conducted by the dominant ethnic group ("whether in terms of destructive fishing or fishing in no-take zones") to highlight that the WNP's failures do not originate in Bajau communities (Von Heland and Clifton 2015, 161).

Bajau traditional beliefs are heavily centered around their relationship with the sea and the marine environment. Animism contributes to a large portion of their relationship with marine

animals, water currents, and reefs, as they attribute spiritual characteristics to the natural world (Lynch 2017). One central aspect of the spiritual life of a Bajau individual is the belief that they have a supernatural twin that inhabits the ocean; when a Bajau is born, the placenta is ceremoniously placed in the sea to eventually become the child's spiritual twin (Lynch 2017). Bajaus also base much of their decision-making on their spiritual beliefs that are tied to the sea, as offending spirits of the ocean is "believed to result in bad luck for fishing, health, or other aspects of daily life" (Lynch 2017, 47). These belief systems, which are intrinsically tied to the use of the marine environment, can either compliment or conflict with conservation policy.

3.3.3. Religion and Spirituality in Conservation Policy

Religious belief systems contribute to Indonesian IKS used in conservation programs. Researchers claim that it is vital for conservation developers to "properly incorporate different worldviews into conservation approaches without treating [them] as merely 'myths' or 'stories'" (Thornton et al. 2020, 343). In other words, local communities' religious and spiritual beliefs, especially as they relate to the natural world, should not be ignored by conservation planners. Instead, they must be incorporated into new conservation programs to ensure the cooperation of local people. In cases where there has been a lack of formal recognition of traditional beliefs, degradation of coastal resources has been observed (Dirhamsyah 2006). This environmental degeneration results from local communities refusing to comply with conservation programs that do not consider – and may even contradict - their religious and spiritual beliefs (Dirhamsyah 2006).

In the Tabaru traditional community on Halmahera Island, religious-based control methods such as Sasi (a regulatory farming method involving the prohibition of harvesting certain natural resources that, if employed, will ensure God's protection over the crops and protection against

botanic diseases) are used in rural conservation policy justification (Al Muhdhar et al. 2019). These belief systems help dictate how local community members interact with the natural world, especially concerning farming practices. Agricultural conservation policies in Halmahera are developed around existing religious belief systems in the local community, which has contributed to their acceptance and ultimate ecological success (Al Muhdhar et al. 2019).

The Batang Haluan River region uses a similar religion-based system. Conservation regulations were “first set by a spiritual leader... together with the community” (Hendrik et al. 2021, 155). Those regulations, which are still in place today, are largely based on the spiritual relationships between local people and the Tor Thai Mahseer fish. This program has been successful for many years because it was originated by community and religious leaders and incorporated local spiritual values in MPA policy (Hendrik et al. 2021).

Despite the benefits of religion and spirituality use in policy development, the inclusion of religious consideration is often not enough incitement for communities that base their livelihoods on marine resource availability. Many Indonesian conservation policies also include alternative livelihood options or compensation in their programs to encourage local participation.

3.4. Compensation and Alternative Livelihood Options

A recurring issue in Indonesian marine conservation is the destabilization of local livelihoods. Community fishermen, sea farmers, and business owners can lose employment through the establishment of marine conservation programs. For example, local fishermen can be deprived of a considerable portion of their income if MPA restrictions decrease catch limits (i.e., restrict the number of fish that can be caught) or prohibit access to marine areas with abundant fish populations. Consequently, many Indonesian conservation programs provide some form of

compensation or alternative employment to account for income loss. As restrictions on the access of natural resources increase, conservation practitioners face the growing demand to provide recompense for traditional resource users (Clifton 2013a). Compensation and alternative livelihood options mostly include payments for ecosystem services (PES) and market-based jobs, such as employment in the tourism industry and seaweed farming (Jones et al. 2022; Steenbergen, Marlessy, and Holle 2017).

3.4.1. Ecotourism

One of the most common alternative livelihood options in Indonesia is employment in the ecotourism industry. Ecotourism is distinct from conventional tourism in that it emphasizes nature-based activities, preservation of environmental resources, minimized tourist impact, and the empowerment of local people (“What Is Ecotourism” n.d.).

Most unsuccessful ecotourism programs provide limited economic incentives to local employees. In the CTI, many ecotourism positions are established by NGOs and typically pay very little, if at all, to native people. The forms of employment offered to local communities through dive ecotourism are “low-paid roles such as maintenance and cleaning” and provide limited economic benefits for local communities (Tranter et al. 2022, 7). External organizations will typically hire tour guides and SCUBA experts from outside the local community. The ecotourism industry ultimately fails because former fisherfolk “[are] reluctant to engage in alternative employment such as mariculture or tourism for non-economic reasons” (Clifton 2009, 94).

In WNP, “employment opportunities offered through the tourism industry are usually low-level positions... and the availability of jobs is seasonal with the flow of tourists” (Tranter et al. 2022, 6–7). Not only do these jobs pay very little, but they are also unreliable positions. Since the

profitability of the ecotourism industry is dependent on temporal (time of year), geographic (where), and surrounding economic conditions (shops and lodging in the area), job availability is not always guaranteed (Clifton 2013a). This can make it difficult for displaced fishermen and sea farmers to find reliable alternative employment.

Indonesian ecotourism programs can also cause harm to the local environment. Surrounding ecosystems and communities can be negatively impacted when tourism expansion is not well regulated, manifesting as “[decreases in] water quality through coastal development and sewage run-off... [and] high sedimentation and eutrophication, [which] potentially [leads] to an increase in the prevalence and severity of coral diseases” (Tranter et al. 2022, 6). Such is the case in the Gili Matra Islands on the northwest side of Lombok, Indonesia, where “patterns of landscape change have been identified... as a result of sand mining, coral exploitation, and reclamation for construction of tourism facilities, along with a decrease in live coral cover in the Gili Matra Marine Park” (Tranter et al. 2022, 6). Ecotourism fails to meet its goal of conserving environmental resources when it ultimately damages the surrounding marine ecosystems.

Current literature suggests increasing the number of community-led tourism programs targeted toward the middle class of Indonesia, as opposed to international tourists, to improve the ecotourism industry (Tranter et al. 2022). Increased education and training of ecotour guides has also been suggested to ensure that local community members are well-qualified for ecotourism positions and can secure employment in the industry (Bottema and Bush 2012).

3.4.2. Seaweed Farming

Seaweed farming has also emerged as a popular alternative livelihood option among coastal Indonesian communities. Over the last three decades, seaweed cultivation has expanded as

a coastal livelihood activity at rates nearly unseen in Indonesia's history (Steenbergen, Marlessy, and Holle 2017). Demand-driven markets in China for hydrocolloids (a functional food ingredient used as a thickening and gelling agent, which are derived from seaweed) primarily fueled the increase in seaweed farming (Saha and Bhattacharya 2010; Steenbergen, Marlessy, and Holle 2017). Indonesia had become a major global seaweed producer by 2010, claiming two-thirds of the world's total tonnage and value (Steenbergen, Marlessy, and Holle 2017). Current coastal conservation initiatives and alternative livelihood programs identify seaweed farming as one of the top potential alternative employment options for more sustainable incomes (Steenbergen, Marlessy, and Holle 2017).

Increased seaweed farming has had beneficial impacts on the environment and quality of life for local community members. First, seaweed farming has been observed as a lucrative livelihood option that provides substantial returns on investment. Little capital injection is needed in seaweed farming, as most materials used in cultivation (such as seeds, wooden poles, and plastic bottles for flotation devices) can be obtained from local sources (Steenbergen, Marlessy, and Holle 2017). Government institutions provide technological and management instruments to local farmers in instances where materials cannot easily be found (Satria et al. 2017). Seaweed cultivation sites are also typically located close to villages, which provides easy access to everyone in the community. All members of the household can contribute labor, including men, women, and children, and everyone gets involved in various stages of production (Steenbergen, Marlessy, and Holle 2017). Seaweed farming is a reliable livelihood option compared to alternatives, such as fishing, since seaweed can be harvested throughout the year and is easily stored over long-term periods (Steenbergen, Marlessy, and Holle 2017). Decreased fishing activity benefits many marine conservation programs: locals spend less time fishing on the reef, so conservation teams can more

easily negotiate PTZs or gear restrictions with residents (Steenbergen, Marlessy, and Holle 2017). In areas where seaweed farming has been implemented, such as in Karimunjawa and Rote Ndao, there has been a notable decrease in destructive fishing practices, including the use of cyanide or bomb fishing (Satria et al. 2017).

While seaweed farming has been largely beneficial as an alternative livelihood option, unclear zoning legislation and the potential for environmental degradation remain a concern (Satria et al. 2017). For example, in Karimunjawa National Park and Rote Ndao (located in Savu Sea Marine National Park), there is a lack of detailed boundaries and utilization deadlines regarding the marine areas used for seaweed farming. In Rote Ndao specifically, IKS include customary rules such as *papadak* (a term used in the eastern part of Rote) and *hoholok* (a term used in the western part of Rote) which prohibit “a person to use or withdraw the property of others without permission. They also prohibit seaweed farmers from damaging natural resources especially in mainland areas” (Satria et al. 2017, 18–19). However, it is elites, not seaweed farmers, who are mostly involved in developing seaweed farming regulations, and local villagers consequently do not understand all of the rules pertaining to seaweed farming zones (Satria et al. 2017). *Papadak* and *hoholok* are included in local zoning regulations, but the absence of strong leaders willing to apply those beliefs, the profit-oriented nature of the program, and the lack of a robust *papadak* institutional system ultimately results in ineffective implementation of those rule systems (Satria et al. 2017). To amend this issue, Satria et al. (2017) suggest a reform of marine conservation legislation that allows for informal local rules to be recognized by Savu Sea Marine National Park managers and officially incorporated and enforced by formal regulations.

Furthermore, some seaweed farming programs have resulted in negative environmental impacts. In Tanimbar Kei, eastern Indonesia, wooden poles used to fasten seaweed lines have been

primarily harvested from local mangrove forest areas. According to Steenbergen, Marlessy, and Holle (2017), Tanimbar Kei villagers believe that declining mangrove coverage and regeneration (which was observed in tandem with the rise of seaweed farming) is partially the result of this practice. Uncontrolled cultivation of seaweed has also led to an increase in crop disease due to the exceedance of carrying capacity in some farming areas (Steenbergen, Marlessy, and Holle 2017; Zamroni 2021). Increased seaweed density in bay areas restricts water flow and results in stagnation, which prevents nutrient in-flow and waste out-flow. Increased water temperatures are also observed due to the shallowness of bay environments interacting with the overabundance of seaweed (Steenbergen, Marlessy, and Holle 2017). Ultimately, seaweed farming is still an imperfect method and can result in environmental damage. To avoid the uncertainty and potential adverse effects of alternative livelihood options such as ecotourism and seaweed farming, some conservation programs offer monetary compensation for local communities, also known as payments for ecosystem services (PES).

3.4.3. Payments for Ecosystem Services (PES)

PES is a general scheme that can encompass a variety of different monetary compensation methods. In general, the basic rationale behind PES is to generate incentives for those who maintain environmental services, such as ecotourism programs or national parks, rather than punishing those who damage them (Neilson and Leimona 2010). In many Indonesian conservation programs, PES take the form of fees paid by tourists to MPA organizations for access to the area. Around half of the revenue from these entrance fees is put into a community fund, while the other portion goes toward program management costs (Tranter et al. 2022).

The PES method has been used in the Raja Ampat Regency of Indonesia. After multiple unsatisfactory attempts to establish alternative livelihood options in the ecotourism industry, over 20 MPAs in Raja Ampat began employing PES systems (Tranter et al. 2022). While these payments have been able to sustain the management of most MPA programs and compensate local fishermen, there have also been some issues (Tranter et al. 2022). Specifically in the Kaimana MPA, entrance fees have been poorly publicized to visitors and have virtually gone unpaid. Consequently, PES have not been appropriately allocated to program management or the community fund (Tranter et al. 2022).

Further arguments against PES suggest that they are nonfunctional in systems with poorly defined regulations and weak institutions (Clifton 2013a). For example, PES strategies have not yielded much success in WNP or the CTI. This failure stems from the polycentric governance system involved in these programs, which cannot credibly track where PES revenues are allocated. Clifton (2013a) claims that applying PES systems in a “governance system characterized by weak or malleable decentralized state institutions has served to facilitate and reinforce inequalities in power” (291). These “inequalities” describe PES capture revenues that go toward elites and private organizations instead of local community members (especially the Bajau minority) (Clifton 2013a). This corruption “has clear implications with regards to maintaining positive levels of trust, norms, and values within a community, with negative implications for individual and community participation in conservation” (Clifton 2013a, 293).

3.5. Summary of Conservation Literature Review

The current literature on marine conservation policy in Indonesia can be organized under four broad themes, which I have summarized as (1) competing visions of conservation, (2) co-management and bridging organizations, (3) application of local wisdom and IKS, and (4)

compensation and alternative livelihood options. In competing visions of conservation, there is a prominent debate between the biodiversity first perspective and the biocultural approach. A question remains as to which perspective should be applied to marine conservation programs in coastal Indonesia. A similar debate exists regarding co-management and the ideal balance between local sovereignty and centralized power at the national level - who should have a more prominent say in the development and implementation of conservation initiatives? In looking at the application of local wisdom and IKS, the literature demonstrates that IKS are not fully considered in the development of marine conservation policy, despite their invaluable information on marine resources. Exactly who should contribute to local wisdom, and to what degree, is also a point of contention. Finally, the appropriate implementation of alternative livelihoods and PES is similarly under debate: what livelihood options should be available, to whom, and are they really successful at providing economic benefits to those impacted by conservation restrictions? In the following section, I will provide my arguments regarding all four of these topics and will conclude with my advocacy for the initiation of marine conservation programs at the local or regional level as opposed to being founded by international or state powers.

CHAPTER 4: ARGUMENTS

In the following chapter, I argue how various aspects of Indonesian marine conservation initiatives garner success or failure through their impacts on the social, cultural, and economic conditions of coastal communities, as well as their ecological effects. For the purpose of this thesis, I define a “successful” marine conservation program as one that achieves desirable ecological outcomes (i.e., species recovery, positive changes in population trends, or marine habitat protection) as well as desirable social outcomes (i.e., limited economic loss, local community acceptance, participation, and upheld or strengthened cultural resources). I use the term “local community” to define a group of people located in the same geographical space (typically manifesting as villages or cities), positioned at the same level of sovereignty (on a regional or provincial level), of the same ethnicity, speaking a common language, and generally sharing beliefs, attitudes, and customs involving the marine environment.

In my analysis of marine conservation initiatives in Indonesia, I have found that successful programs apply (1) a biocultural perspective, (2) co-management strategies with an emphasis on the devolution of power, (3) local wisdom/indigenous knowledge system (IKS) consideration and the inclusion of indigenous minority input, and (4) improved and diverse alternative livelihood options. Furthermore, I argue that program initiation must be instigated by local communities instead of being founded solely by external or national powers. Collaboration on conservation policy from inception is necessary for program success because it encourages local participation and acceptance of regulations.

4.1. Competing Visions of Conservation

The appropriate balance between ecological and sociocultural considerations in conservation development remains in question. At face value, the main goal of conservation programs is to preserve natural resources and limit ecological degradation. However, programs that fail to consider local sociocultural and economic context almost certainly fail in their conservation goals. I argue that a biocultural approach - as opposed to a biodiversity first perspective - should be utilized in marine conservation programs. The biocultural approach's consideration of local sociocultural and economic conditions naturally begets environmental protection. People are more willing to follow regulations tailored to local cultural context, their livelihoods, and their concerns - in short, application of the biocultural perspective facilitates conservation program success. Conversely, the biodiversity first approach almost certainly results in program failure.

4.1.1. Why the Biodiversity First Approach Fails

The biodiversity first perspective prioritizes environmental protection over local cultural and economic needs. Accordingly, the social-ecological trade-offs necessitated by the biodiversity first approach are supposed to foster relationships wherein the environment always wins while local communities lose. One might assume that a preference for ecological protection (i.e., the biodiversity first approach) would guarantee successful preservation of environmental resources. However, a pattern exists wherein application of the biodiversity first perspective frequently results in program failure. Even though the biodiversity first approach should guarantee ecological protection, it actually fails to preserve natural resources by fostering local dissent and the subsequent continuation of harmful fishing practices.

In Wakatobi National Park (WNP), scientific information and ecological data are prioritized as the information that matters in conservation design (Tam 2019). Consideration for local economic and social context is ignored in favor of scientific data. As a result, WNP excludes local knowledge from program development and has established multiple no-take zones (NTZs) that conflict with traditional marine area use (Tam 2019). The Coral Triangle Initiative (CTI) has similarly given preference to biodiversity and ecological needs over local concerns, as demonstrated by the program's installation of strict fishing gear restrictions, low total allowable catches (TACs), and NTZs (Berdej, Andrachuk, and Armitage 2015). WNP and the CTI both employ the biodiversity first approach to a certain extent, which subsequently excludes local input from program development and the designation of conservation policies. Only scientific data is considered, not local demands or livelihoods. Consequently, both programs fail to meet conservation goals, as local disapproval of marine protected area (MPA) restrictions manifests as nonconformity and the continuation of restricted fishing practices. In WNP, prohibited activities (e.g., coral mining, fishing with cyanide, bomb fishing, etc.) continue, and MPAs are exploited for natural resources despite their conservation status (Elliott et al. 2001).

The biodiversity first approach's failure to meet ecological conservation goals is demonstrated in WNP. From 2002-2016, WNP's coral reef coverage decreased from 2,217 ha to 2,039 ha, likely as a result of "destructive fishing activities, such as bombs and poisons" (Yuliana et al. 2022, 252). The decrease in viable coral reef habitat has contributed to a similar decline in reef fish biodiversity (Yuliana et al. 2022). Moreover, the exploitation rate of various fish populations continues to exceed recommended levels in WNP due to overfishing. Exploitation rate represents the proportion of total species biomass being removed by fishing, and must be under the value of 0.5 to be considered sustainable (Yuliana et al. 2022). In an ecological study conducted

by Yuliana et al. (2022) in WNP, 3 of 5 studied fish species had an exploitation rate over 0.5, meaning they were being over-exploited. These three species, *Siganus canaliculatus*, *Lethrinus ornatus*, and *Lethrinus variegatus*, have the highest index of relative importance (IRI) values in the Kaledupa Island mudflat region, meaning they play a vital role in the local ecosystem and food web (Yuliana et al. 2022). Complete loss of those species will likely set off a harmful chain of events throughout the mudflat ecosystem. Decreases in coral coverage and overexploitation of fish populations are direct results of breached conservation regulations - from 2003-2008, WNP authorities recorded bomb fishing as the most prevalent illegal fishing method used by the Bajau (Clifton, 2013). Despite the fact that ecological goals are prioritized in WNP, any conservation measure enacted by the program ultimately fails at benefiting the marine environment without community acceptance of the policy and their agreement with fishing restrictions.

The biodiversity approach also results in program failure because it fosters dualistic human vs. nature relationships. For example, the crisis narrative employed by the CTI places a “disproportionate focus on human impacts,” which “inevitably perpetuates a human-nature dualism, and downplays the historical co-evolution of oceans and coastal communities” (Berdej, Andrachuk, and Armitage 2015, 215). By enforcing a strict divide between humans and nature, the biodiversity first approach forces trade-off relationships wherein the environment and people cannot both win. Consequently, programs like the CTI fail to garner both ecological and sociocultural success.

Prioritization of biodiversity protection via strict NTZ implementation directly results in local dissent and rebellion against conservation policy. This disagreement largely stems from local cultural priorities that do not align with conservation goals, as the majority of conservation initiatives in the CTI and WNP are based solely on scientific data (Clifton, 2009). People disagree

with conservation restrictions, so they refuse to adhere to them. Since potentially harmful fishing activities continue, biodiversity first programs like the WNP and CTI fail to meet ecological preservation goals. The biodiversity first approach fails because it does not consider local context and thus discourages local participation in upholding the program. Overemphasis on the importance of ecological and biodiversity goals instead of local consideration is ultimately the downfall of the biodiversity first perspective.

This is not to say that environmental protection is unimportant. Sustaining biodiversity is vital for communities based in agriculture and fishing markets, such as those in Indonesia. However, instead of solely prioritizing ecological needs and biodiversity preservation, a more comprehensive and inclusive perspective should be applied to conservation development. The biocultural approach not only incorporates local social, economic, and historical context in policy design; it also generates more effective conservation solutions that coordinate with local livelihoods and ultimately encourage community participation. The biodiversity approach fails because, in its exclusion of sociocultural and economic considerations, it exacerbates community unrest and results in a lack of local cooperation with conservation restrictions. Had the WNP and CTI programs considered the needs of local community members and fishermen - in other words, had these programs pursued the biocultural approach - they could have avoided problems with local cooperation and adherence to conservation policy.

4.1.2. The Biocultural Approach Begets Environmental Protection

The biocultural approach tailors conservation initiatives to relevant social-ecological contexts of coastal Indonesian communities (Gavin et al. 2018). Instead of emphasizing strict environmental protections, a biocultural perspective supports adaptive policies that consider local

sociocultural and economic systems in tandem with ecological needs. The biocultural approach is an ideal alternative to the more science-based biodiversity first perspective, the application of which has resulted in ineffective policies in the CTI and WNP (Berdej, Andrachuk, and Armitage 2015; Cinner 2007; Clifton 2009; Tam 2019). Skeptics of the biocultural approach argue that any restrictions necessary to improve environmental conditions, such as the use of NTZs, inevitably incur some form of social loss, which manifests as forfeited livelihood opportunities, restrictions on culturally significant practices and rituals, decreased food security, and entrenched marginalization of indigenous groups (Gill et al. 2019; Clifton and Foale 2017; Tam 2019; Thornton et al. 2020). I disagree with these skeptics and instead suggest that environmental-use restrictions (NTZs, partial-take zones (PTZs), etc.) do not always have to incur social loss so long as community members can dictate policy development. I argue that the biocultural approach is an effective conservation method because it encourages local cooperation with marine preservation policy, which ultimately leads to environmental protection and program success.

A critical aspect of the biocultural approach is its consideration of local communities' economic conditions and how fishing restrictions might displace individual livelihoods. For example, instead of establishing NTZs (which completely restrict fishing activity) and forcing fishermen to find alternative livelihoods, policies designed using the biocultural approach might employ PTZs that allow fisheries to use marine areas within certain restrictions (during predetermined temporal periods, for the explicit purpose of catching a specific species, or with catch limitations). The biocultural perspective fully considers the impact of environmental protection policies on the livelihoods of local communities. In considering the economic impact of conservation, the biocultural approach attempts to minimize the negative consequences on local individuals, thus encouraging cooperation with program restrictions.

PTZs and NTZs can generate conservation success when designed using the biocultural approach, as demonstrated by the Nusa Penida MPA in the Klungkung Regency of Bali. The CTC bridging organization “engaged and included stakeholders from regency... and central governments, NGOs, community groups, tourism operators, traditional leaders, teachers, youth groups, and local fishers' and seaweed farmers' associations” to develop its complex MPA system (Berdej and Armitage 2016, 8). Within this system is a core zone for education and research purposes, a sustainable fisheries zone (including a traditional fisheries sub-zone), a temporally controlled special use sub-zone, a seaweed farming sub-zone, a utilization zone (for marine tourism), a marine harbor sub-zone, and a traditional sacred sub-zone (Berdej and Armitage 2016). The Nusa Penida zoning system integrates cultural perspectives alongside biodiversity conservation, which contributes to its environmental and social successes (Berdej and Armitage 2016). In a 2023 ecological study, Nusa Penida was found to support “high biomass of benthopelagic predators such as snappers, groupers, and jacks,” and “high coral coverage” with “increased structural complexity that could function as habitats for prey fish” (Gotama et al. 2023, 6). Nusa Penida’s diverse MPA system garners community support of conservation initiatives, which in turn preserves local marine species and habitats.

The biocultural approach involves local people in the development stages of PTZ designation. In this way, community members can provide input into what resources they want to be protected, which resources they should be allowed to harvest, and what type of fishing gear they should be able to employ. The biocultural approach works *with* local communities, not against or for them, while still implementing policies that protect the natural environment. When local people are heavily involved in a conservation program’s initiation, implementation, and enforcement, they are able to maintain the program internally sans external influence. The

biocultural approach negates the threat of a paternalistic relationship between Indonesians and national or international powers. The *direct* impact of the biocultural approach might have less environmental protection abilities compared to the biodiversity first approach. Remember that the biodiversity first approach is based solely on ecological data and holds biodiversity preservation as the highest priority, which manifests as highly restrictive conservation policies. But when the complexity of marine conservation is fully considered - meaning the social, cultural, and economic impact of policy on local communities - the biocultural approach is ultimately more effective. It encourages local participation and compliance in the long term. In other words, the *indirect* conservation abilities of the biocultural approach are higher than those of the biodiversity first approach.

The biocultural approach not only encourages local participation by establishing reasonable fishing restrictions and MPA boundaries; it also begets environmental protection by finding commonalities between community and ecological needs. For example, local fisheries specialized in catching larger marine species (such as grouper, tuna, or sharks) prefer to harvest bigger, matured fish, as they typically sell for more money in markets compared to younger, smaller fish. Catching mature fish that have already reproduced is also beneficial for the environment. When fishing of immature or juvenile fish exceeds half the population of mature fish, stock status falls below the precautionary sustainability limits (Vasilakopoulos, O'Neill, and Marshall 2011); but when fish are allowed to reach maturation, they can produce more fish and ensure that their population numbers remain stable over time. Catching larger fish is beneficial from both an economic and environmental standpoint. A biocultural approach would recognize this commonality and employ fishing restrictions on younger fish and eggs while allowing the capture of larger, mature fish. This win-win dynamic could benefit both fishermen and the natural

environment, likely resulting in conservation program success. Overall, the biocultural approach considers the sociocultural and economic conditions of coastal communities, which encourages marine resource protection by local people.

Issues still exist within the biocultural approach, namely in the oversimplification of complex dynamics between indigenous communities, natural resources, government organizations, and financial stakeholders (Gill et al. 2019). These issues can be resolved through the devolution of power, methods of co-management, and the use of bridging organizations, which I explore further in the following section.

4.2. Co-management and Bridging Organizations

Co-management is a method of conserving marine resources through sharing authority between national and state governments, local communities, NGOs, and research institutions (“Co-Management Approaches | Reef Resilience” 2023). A debate exists in the current literature over the appropriate balance between state and local control, with one side advocating for the centralization of power and the other supporting the devolution of power to local governments and communities. I argue that the devolution of power in co-management benefits both the environment and local communities through its assurance of local autonomy. However, co-management is a balancing act that may require more or less centralization of power depending on the particular region, and there is still a place for national assistance, intervention, and funding in conservation programs. I suggest the use of bridging organizations to facilitate relationships between state and local powers.

4.2.1. The Devolution of Power Ensures Local Autonomy

The devolution of power to indigenous communities, regional governments, and local stakeholders in conservation programs ensures local autonomy. By “local autonomy,” I am describing a community’s ability to dictate its financial, biological, and sociocultural fates without external intervention (i.e., state, national, or international influence). When power devolves to local communities, they typically have more leverage over MPA boundaries, gear restrictions, fishing limitations, etc. Government organizations should not be the only ones dictating conservation policy. Instead, choices should be left to local community members who will be most impacted by program restrictions.

An example of successful power devolution is demonstrated by the Batang Haluan River region of West Sumatra, where local community members of the Lubuk Landua Village designed culturally significant MPA boundaries and implemented fishing restrictions on specific species. Those living in the Lubuk Landua Village were the ones designing conservation policies for that region and were able to retain their autonomy as a result; villagers could dictate their financial fates by deciding which fish they would be allowed to catch and sell, and which species would be protected (Hendrik et al. 2021). They were also able to decide their sociocultural fates by conserving spiritually significant river regions and designating specific areas for cultural and tourism events (Hendrik et al. 2021). In short, local autonomy in the Batang Haluan River region was ensured through the devolution of power to local community members and spiritual leaders. Moreover, environmental protection was achieved via the preservation of the Tor Thai Mahseer fish and its habitat in the Batang Haluan River. The river has shown an improvement in water quality since the program’s establishment, demonstrating limited pollutants, high fertility, and high

levels of nitrate and phosphate, which are necessary for the maintenance of Tor Thai Mahseer fish populations (Hendrik et al. 2021).

We have also seen how the *centralization of power limits* local autonomy; the CTI is a good example of this. The national government directed most of the initial zoning of MPAs within the Coral Triangle (CT) and failed to involve community opinion. Consequently, local fisheries experienced negative food security impacts due to fishing restrictions imposed by the program. In the Sunda Banda Seascape (SBS) located within the CTI, local community members from 82 settlements across five MPAs (Flores Timur, Selat Pantar, Kei Kecil, Maluku Tenggara Barat, and Seram Bagian Timur) were surveyed on their perceived food security (Estradivari et al. 2022). Results showed that the average household was food insecure without hunger, meaning they “adjusted portion sizes and/or food sources in response to an inadequate food supply” (Estradivari et al. 2022, 6). Fisheries impacted by the CTI lost their autonomy, or their ability to control their biological fates, because MPAs did not provide enough fish-abundant areas for fishery use. Diets had to be altered to account for this lower food supply, which impacted the biological autonomy of local people. This food insecurity was a direct result of a centralized management approach; since local community members were not involved in the design of the SBS’s fishing restrictions, they could not voice their dietary needs. Without community collaboration, the national and state entities who managed the SBS program failed to fully consider how MPAs would affect the local population.

MPAs in WNP and the CTI also fail to account for socially and culturally significant spaces, such as traditional fishing grounds, which hinder the locals’ ability to dictate their sociocultural fates (Tranter et al. 2022). Local people are prohibited from using certain marine areas, even though they hold cultural importance. For example, in WNP, Bajau “resource access

is officially limited to protect an internationally valuable marine biodiversity, while Bajau consider it to be morally just to access local resources they have been accessing for centuries” (Lynch 2017, 104). To regain their autonomy, many fisheries within WNP refuse to observe MPA regulations. Bajau people resist national park regulations by “avoiding contact with or hiding from park rangers” and “allying with each other to illegally access resources or withhold information from authorities” (Lynch 2017, 104). Bajau fishermen will often hide their activity from park authorities by covertly fishing in seaweed farm areas or going to shallow waters where park rangers cannot follow (Lynch 2017). Low compliance with fishery restrictions established by the CTI and WNP programs has “contributed towards overexploitation of common fishery species populations in Indonesia, as is now the case for 50% of wild-capture fish stocks” (Tranter et al. 2022, 5). MPAs established by WNP fail to consider the local cultural and traditional uses of marine space. Consequently, many of those living within the park refuse to adhere to fishing restrictions, which ultimately harms the environment and results in the overexploitation of natural resources. Centralization limits local autonomy, resulting in defiance of conservation initiatives and the degradation of marine resources.

The centralization approach limits local autonomy because it excludes regional governments and local communities from the program’s development and implementation processes. Without community input, conservation policies are typically ignorant of culturally and economically significant marine spaces. Programs cannot be successful if government and state institutions are the only authorities designing policy. However, as we have seen in the review of conservation literature, the centralization of power to national authorities has its merits when applied in moderation. Ultimately, co-management is a balancing act requiring appropriate contributions from both government and local institutions.

4.2.2. Co-management is a Balancing Act

Co-management can foster success in marine conservation programs when power is appropriately balanced between local and national entities. While many initiatives, like that of the CTI, are overly centralized and give too much power to national authorities, it is also possible to have too *little* government influence in co-managed programs (Dirhamsyah 2006; Tranter et al. 2022). Centralization, to a certain degree, can be useful in creating a more cohesive regulatory framework and legitimizing conservation programs founded at the local level. For that reason, there must be an appropriate balance of power in co-managed relationships to foster local autonomy while still allowing for the beneficial resources that the state can provide. In encouraging the devolution of power in co-management, we mustn't entirely eradicate government influence. The use of balanced co-management systems is especially relevant in WNP, where current power structures are centralized and decentralized at inappropriate levels of the program.

Current literature on WNP argues for both the centralization and devolution of power in co-management, but at different stages and areas of the program (Elliott et al. 2001; Tranter et al. 2022; Clifton 2013b). According to Clifton (2013b), the centralization of power would prevent NGO and private sector discrimination of the Bajau community. He proposes that the national government could highlight the Bajau's opinion and legitimize their claim over the natural area. Unfortunately, this perspective is overly optimistic in that it relies on the central government legitimizing the perspective of an already marginalized community. It seems unlikely to me that the centralization of power would directly result in decreased minority marginalization and collaboration between all peoples within a conservation region. In an earlier paper, Clifton (2003) himself interviewed residents of WNP and found that there was a negative perception of the

program's management system and the presence of park rangers, largely due to the anti-Bajau attitudes amongst the park officials.

While centralization might, in theory, encourage minority inclusion in policy design, the reality of the situation is that national entities are likely not motivated enough to include those groups. Prior to 1998, under the Suharto administration, centralization of power was used to control minority ethnic groups (including the Bajau), often through violent means. This historical use of authoritative and centralized control to eliminate the autonomy of local people explains why many indigenous communities are apprehensive of centralized programs today. Park authorities are commonly distrusted by local residents, and for that reason, the use of more centralized co-management systems would not be beneficial for historically marginalized groups. In the case of WNP and the Bajau, centralization is not an effective management strategy because of the historical and political context of the region – since the Bajau are distrustful of centralized authority, implementation of national policies and external park authorities is not an effective plan. The devolution of power would likely be the best strategy for addressing the issue of minority inclusion in policy design.

Elliot et al. and Tranter (2001; 2002) suggest that the devolution of power would boost community acceptance of MPA boundaries and fishing restrictions in WNP. However, a downside to the complete devolution of power is the potential for disorganized conservation programs and a lack of official enforcement of MPA boundaries. Without some form of centralized power, there is limited justification for enforcement or punishment measures in the event of conservation policy disobedience. Moreover, centralization could aid in consolidating potentially contradictory environmental protections into a more cohesive policy. These conflicting viewpoints demonstrate

that WNP's co-management strategy needs to better balance the power distributed between the national government and local organizations.

I argue that increased centralization could help organize the WNP's legislation. Instead of having overlapped and sometimes contradictory marine-use restrictions, the national government could act as a neutral third party to help settle disputes between different communities encompassed by WNP. For example, two villages may want to claim exclusive fishing rights over the same marine area, and both would believe that they are entitled to that space. The national government could settle this disagreement by dividing the area equally between them or naming one village as the proprietor of that space. In this way, the centralization of power to the government level could potentially benefit conservation policy design within WNP.

Centralizing control within the entrepreneurial marine protected areas (EMPAs) of the Yayasan Karang Lestari coral restoration project in Pemuteran could enhance their legitimacy (Bottema and Bush 2012). These EMPAs, currently funded solely by the private sector, aim to boost tourism, diving industries, and coral reef restoration using innovative methods like Biorock. However, the absence of significant government backing leaves these conservation areas entirely under the sway of independent entrepreneurial organizations – namely, Yayasan Karang Lestari, Proyek Penyu, and Reef Gardeners (Bottema and Bush 2012). Despite the local community's acceptance and trust in these EMPAs' developers, the lack of collaboration or formal agreements between these entrepreneurial entities may hinder the translation of their established rules into formalized regulations by the community or government. This situation raises uncertainties about the sustainability of these arrangements without governmental influence.

Additionally, advocating for centralization might mitigate the Pemuteran community's reliance on a handful of individuals managing these entrepreneurial organizations. While the

rapport between locals and the private sector has been built on trust and collaboration, concerns exist regarding the community's potential over-dependency on these entrepreneurial figures due to their dominant role in forging relationships essential for marine conservation programs (Bottema and Bush 2012).

Centralization could help legitimize EMPAs in Pemuteran to create more lasting institutional arrangements. However, the inclusion of state and national entities must be decided by local community members, not EMPA developers. Pemuteran residents should be able to choose if and when to co-opt government institutions because local people can recognize if their relationship with the private sector becomes harmful or inequitable. Alternatively, even in the absence of government involvement, the legitimacy of EMPAS could still be achieved by connecting the private sector with existing local institutions (such as community fisheries or religious leaders) to encourage local compliance with conservation restrictions (Bottema and Bush 2012). For example, the private sector in Pemuteran has gained increased legitimacy “through investments in education programs for fishermen, employment of local communities, establishment of relations with local religious authorities and investment in non-financial benefits” (Bottema and Bush 2012, 46). While centralization is a potentially viable option, program legitimization and durability may still be possible through increased collaboration with preexisting local institutions.

Government influence should be limited at the initial stages of policy development. Devolution of power to local organizations and regional governments would ensure that marine conservation policy best reflects the economic, social, and cultural needs of the community. Under more centralized legislation, the national government might prioritize the needs of the tourism industry or ecological goals, possibly to the detriment of local communities. But under an

appropriately balanced co-management system, the national government would likely not have such a strong influence over policy design, and local communities - including historically marginalized groups like the Bajau - could be better represented in the conservation programs that directly impact their lives. This strategy's success is exemplified by the Batang Haluan River's conservation plan, which started as unofficial sustainable use methods in 1856 and was only later legitimized in 2014 by government institutions (Hendrik et al. 2021).

Balance in co-managed conservation programs requires transparent communication between government organizations, park planners, tourism operators, NGOs, and local people. Bridging organizations are essential to achieving this communication and are a valuable (though not crucial) component of a well-balanced co-management relationship.

4.2.3. The Importance of Bridging Organizations

Bridging organizations facilitate communication between two or more parties, including local leaders, religious organizations, NGOs, tourism operators, and regional and national governments. Bridging organizations are important components of successfully co-managed programs because they connect people and conservation actions across jurisdictional, cultural, and geographical boundaries (Berdej and Armitage 2016). The Nusa Penida MPA, which employs a bridging organization (the Coral Triangle Center (CTC)), unites the Klungkung Regency with central governments, NGOs, tourism operators, traditional leaders, and local fishers, which allows for collaboration in conservation program design. This collaboration has manifested as PTZs that adequately meet the needs of both local community members and the natural environment, thus fostering a successful marine conservation program (Berdej and Armitage 2016). The CTC helps to align the ecological goals of conservation initiatives with the social and cultural context of

surrounding communities. Local fisheries, villagers, and traditional leaders are able to contribute their opinions and demands to conservation policy, which the regency and central governments then legitimize as PTZs and corresponding fishery restrictions. The CTC facilitates communication between the *impacted* and the *impactors*, demonstrating the importance of bridging organizations in co-managed conservation programs. When those most impacted by conservation regulations can contribute to their designation, they are more willing to cooperate with the program, which ultimately benefits the marine environment.

While bridging organizations are an important component of the co-management arrangement, I cannot confidently say they are necessary for conservation program success. Looking at the case study conducted in the Batang Haluan region, we see a successful co-management relationship that did not involve a formal bridging organization. It is necessary at this point to compare the scale of programs like the Nusa Penida MPA and the Batang Haluan River conservation program. The Batang Haluan River program is significantly smaller than the Nusa Penida MPA (Berdej and Armitage 2016; Hendrik et al. 2021). The smaller scale of the Batang Haluan River region made it easier for the local community, religious leaders, and government organizations to connect - they did not require a bridging organization. People were geographically closer and fewer parties needed to collaborate. On the other hand, the Nusa Penida MPA, which is much larger and involves more organizations (NGOs, tourism operators, etc.), needed the assistance of a bridging organization to facilitate communication across boundaries and between many different groups. Overall, bridging organizations are likely necessary for larger conservation programs that cover greater geographical areas and involve many different organizations. Bridging organizations do not appear necessary for smaller co-managed programs, like that of the Batang Haluan River region. The difference in bridging importance based on scale illustrates the

complexity of conservation programs and demonstrates that there is no one-size-fits-all approach to successful conservation.

One role of bridging organizations is to facilitate the connection between government organizations and local communities. Local communities must be involved in conservation program design for a plethora of reasons, one of which is the invaluable local wisdom and indigenous knowledge they can contribute. Bridging organizations can also facilitate the two-eyed seeing approach that has been used in recent conservation programs.

4.3. Application of Local Wisdom and Indigenous Knowledge Systems (IKS)

The consideration of local wisdom and IKS in conservation development is essential to creating a successful program (Al Muhdhar et al. 2019; Frid et al. 2023; Hendrik et al. 2021). However, a question remains as to who should contribute to local wisdom and to what capacity. I argue that those most impacted by conservation policy should be at the forefront of its design, with an emphasis on historically marginalized communities. We have also seen that local wisdom does not always align with Western science, which can create controversy within conservation programs. The two-eyed seeing approach is an effective tool in addressing this issue because of its use of bridging organizations and consideration of local religious and spiritual beliefs. I further argue that more conservation programs must account for indigenous minority marginalization in their application of local wisdom.

4.3.1. Benefits of the Two-Eyed Seeing Approach

The two-eyed seeing approach employs both Western science and IKS in the development and maintenance of conservation programs, similar to the biocultural perspective (Frid et al. 2023).

The alignment of Western scientific viewpoints and local objectives is a key attribute of the two-eyed seeing approach, and ultimately leads to its success. For example, application of the two-eyed seeing approach has been successful in the Bali Network MPA, which employs the bridging organization Conservation International Indonesia (CI-I) (Berdej and Armitage 2016). Because of the CI-I, local wisdom has been integrated with Western scientific ideas to develop MPA restrictions within Bali. This zoning system is highly dynamic to account for local communities' utilization of marine space. It includes traditional cultural sites, sustainable fisheries zones, and tourism areas, among others (Berdej and Armitage 2016). The work of the CI-I ensures that community demands are fully understood and accounted for in the Bali MPA zoning policy. By providing an avenue by which local wisdom and Western scientific thinking can be shared, the use of bridging organizations in the two-eyed seeing approach is beneficial at aligning potentially conflicting viewpoints.

Religious belief systems contribute to IKS and should be considered accordingly in the two-eyed seeing approach. Programs that incorporate local religious and spiritual practices, especially those related to the natural environment, are often successful. These programs include those in the Tabaru traditional community on Halmahera Island, the Batang Haluan River region, and the Bali Network MPA (Al Muhdhar et al. 2019; Berdej and Armitage 2016; Hendrik et al. 2021). While consideration of religious practices is not the sole reason for these programs' successes, it is likely a contributing factor. In all of these programs, local spiritual beliefs are directly involved in conservation policy. In Bali, the Tri Hita Karana spiritual philosophy is integrated with MPA restrictions - adhering to the environmental protections set down by the MPA correlates with adherence to Tri Hita Karana, as respecting the MPA boundaries results in perceived harmony between people, nature, and God (Berdej and Armitage 2016). Local people

are more willing to adhere to environmental restrictions when religious and spiritual systems are incorporated into conservation program development. These programs do not just avoid contradicting local religious and spiritual beliefs; they actively employ those beliefs in policy to encourage local participation. Overall, involving religious and spiritual belief systems in the two-eyed seeing approach helps ensure community cooperation and can contribute to conservation program success.

It is important to note that religious and spiritual beliefs are not always consistent within communities, villages, or families, and program developers must keep that inconsistency in mind when designing their policies. It is also true that different regions encompassed by the same conservation program can be highly diverse, consisting of different ethnicities, religious belief systems, languages, livelihoods, etc. Indigenous minority marginalization in conservation development is a major issue that excludes minority ethnic groups from program design, implementation, and maintenance. The exclusion of indigenous minorities often results in program failure due to local unfamiliarity with or resistance to conservation initiatives.

4.3.2. Addressing Indigenous Minority Marginalization in Marine Conservation

In programs like WNP, conservation planners have not fully addressed indigenous minority marginalization or taken steps to include minority communities in program design and implementation. Consequently, WNP has failed to address the social needs of local communities or ensure local financial and cultural autonomy. This is especially true for the Bajau community, which contributes a disproportionately large amount of fishing activity compared to their population size (Clifton and Majors 2012). I argue that it is necessary to address the

marginalization of the Bajau and similarly discriminated groups to increase local participation and adherence to conservation policy, which could ultimately encourage conservation success.

Discrimination against the Bajau is occurrent in the WNP project. In an interview of 80 Bajau village leaders, elders, and fishermen in the WNP, “none stated that they were consulted at any stage of the Wakatobi MNP establishment, from initial survey work through to designation and subsequent planning of resource usage” (Clifton 2003, 392). While the Butonese majority groups were consulted throughout WNP’s implementation, the Bajau were knowingly excluded. Consequently, only 30% of those surveyed were able to refer to any rules regarding the use of marine resources from park regulations (Clifton 2003). Since the Bajau were not consulted during the program’s planning and implementation, they were ultimately unaware of many of the park’s restrictions, including no fish areas and gear restrictions. At least 70% of respondents engaged in daily fishing activity in protected zones surrounding Hoga Island and Kaledupa, despite the practice being prohibited (Clifton 2003). The Bajau were excluded by program developers, so they unknowingly continued fishing in protected zones. Bajau exclusion led to program unfamiliarity, which led to unintentional policy infringement. For that reason, Bajau groups must be involved in program implementation and zoning in WNP. Had Bajau fishermen been invited to design their own NTZs, PTZs, and traditional use areas, they would have more likely been aware of fishing restrictions and been better prepared to adhere to them. Environmental preservation would likely follow.

Minority groups in the KNP program have similarly experienced exclusion from the ecotourism industry. Of the Bugis, Bimanese, and Manggarai people surveyed by Walpole & Goodwin (2001), only 3.5% had provided guiding services in the tourism industry while 15.1% of respondents had provided “other services” to tourists. Consequently, indigenous people derived

few economic or social enrichment benefits from the tourism industry. Moreover, many KNP residents experienced mal effects from the increased number of tourists in the area, including local inflation and altered dress codes to accommodate visitors (Walpole and Goodwin 2001). In this way, KNP failed to foster program success in that it did not enhance or maintain the well-being of local people, especially those in indigenous groups. Residents excluded by the conservation program and consequent tourist efforts were less supportive of KNP, evidenced by the fact that “those not receiving a share of the [employment] benefits become more disenchanted with tourism and display more negative attitudes [toward KNP]” (Walpole and Goodwin 2001, 164). Locally born folks were less involved in the program compared to immigrants from elsewhere in Indonesia. This exclusion of indigenous groups resulted in less interaction with tourists, fewer economic benefits, and unfavorable attitudes toward the industry (Walpole and Goodwin 2001). In other words, local residents specifically were the ones excluded from the program in KNP, and their resultant opinion of the park was diminished. Communities like the Bugis, Bimanese, and Manggarai should be involved in conservation programs and ecotourism efforts to increase local favorability toward conservation initiatives and their resultant participation.

Historically marginalized groups must have autonomy over natural resource restrictions and the alternative employment industries imparted by conservation programs. Conservation developers should ensure that alternative livelihoods are available to all people impacted by programs, including indigenous minority groups.

4.4. Compensation and Alternative Livelihood Options

The elimination of local livelihoods is a recurrent issue in Indonesian marine conservation. For example, fishery employment opportunities can disappear when former fishing areas are marked off-limits by conservation programs. Suddenly, people are not able to work as they once

did. Job loss is not limited to fishermen - individuals involved at all stages of the fish market have their livelihoods threatened by conservation programs. To compensate for this lost employment, many conservation programs provide payments for ecosystem services (PES), alternative livelihoods, or a combination of both. Unfortunately, many of these strategies have yielded only limited success. I propose that current PES systems are ineffective methods of compensation because of their inefficient broadcasting and high susceptibility to corruption. I suggest moderate centralization of PES control to fewer entities to improve PES systems, though this solution does present its own risks. Furthermore, increased emphasis should be placed on creating accessible alternative livelihood options - the ecotourism and seaweed farming industries could both be improved and expanded. Alternative livelihoods should cover many different employment types (tourism, hospitality, farming, crafting, etc.), be inclusive to all individuals impacted by a conservation program and provide equivalent financial gain to pre-conservation.

4.4.1. Why Payments for Ecosystem Services (PES) Fail

The principal motivation behind PES is to generate incentives for those who maintain environmental services, such as upholding national park or MPA boundaries, rather than punishing those who defy them (Neilson and Leimona 2010). As we have seen in the cases of the Raja Ampat Regency MPA, WNP, and the CTI, PES have been largely unsuccessful due to a lack of publication, disorganized allocation, and corruption at higher levels of governance (Clifton 2013a; Tranter et al. 2022). PES systems inherently involve at least two entities in their transaction: a service buyer and an environmental service provider (Neilson and Leimona 2010). An unfortunate caveat is that service buyers can avoid paying for ecosystem services in cases where PES are poorly advertised or enforced, and service providers consequently miss out on compensation. An

explanation for this lack of publication is the absence of a centralized power involved in implementing PES schemes. Payments often go untracked or unpaid without a centralized entity controlling or advertising them. In the Raja Ampat Regency MPAs, increased centralization might benefit the PES strategy, as broadcasting and enforcing PES could be easier under a single organization. This strategy would benefit the Kaimana MPA, which currently employs a PES system but has failed to publicize its entrance fees; consequently, PES have largely gone unpaid (Tranter et al. 2022).

Corruption of PES systems has been observed throughout WNP and the CTI (Clifton 2013a). In these instances, poorly defined regulations and weak, polycentric governing institutions have allowed for corruption of PES distribution. PES are hoarded by government and conservation program elites instead of being allocated to local community members, who are often the actual providers of ecosystem services (Clifton 2013a). Centralization of power could theoretically help alleviate this issue: by organizing PES systems under a single entity, appropriate distribution would potentially be easier to coordinate and monitor. Centralization could ensure the proper amounts of money go to local communities and program management funds. However, since PES are already being hoarded by government organizations, it would be unrealistic to think that corruption might improve under a more centralized system. Instead, the devolution of PES management to local agencies and governments could alleviate issues of PES corruption. If PES are paid directly to the community groups or individuals providing the service, then there may be less chance of money falling into the wrong hands. A more personal, decentralized payment system (i.e., paying community members directly) could potentially prevent corruption, since interaction would be limited to just the service providers and buyers.

We have seen in our analysis of co-management relationships that everything is a balancing act. PES systems risk alienating local communities from conservation programs by allocating too much power to government organizations. Local people may be unwilling to provide ecosystem services if they do not directly earn PES. In funneling most of the control to central state or national powers, local communities could feel discouraged from participating in marine conservation programs or upholding MPA boundaries. It is also necessary for PES models to be tailored specifically to the social, legal, and economic context in which they are employed. Without this specificity, PES systems risk failure and potential corruption. I argue that PES should not be the only compensation method used in conservation programs. Instead, PES should be combined with more accessible alternative livelihood options to ensure local economic security and autonomy.

4.4.2. Problems with the Ecotourism and Seaweed Farming Industries

We have seen that ecotourism is a popular alternative employment option in Indonesian conservation. However, issues of limited economic incentives and the potential for environmental degradation exist in the industry. In the case of KNP, we have also seen that tourism excludes minority groups and is minimally beneficial for the social and economic well-being of local communities. For this reason, we must further analyze issues within the ecotourism industry to discuss potential improvements later on.

Ecotourism can threaten the marine environment when not properly regulated or sustainability developed. For example, the expansion of intensive tourism infrastructure can decrease surrounding water quality via coastal development and sewage run-off, resulting in high sedimentation and eutrophication (Tranter et al. 2022). These changes in water quality, acidity, and temperature threaten local coral populations and can increase the severity of coral diseases,

which ultimately opposes conservation goals (Tranter et al. 2022). Marine degradation has been seen in the Gili Matra Island, where sand mining, coral exploitation, and reclamation of marine space for tourism activities have negatively altered the landscape and local environment, including coral reefs. There has been an observed decrease in live coral cover across the Gili Matra Marine Park since 2015 (Tranter et al. 2022). Tourist activities can also result in coastal marine pollution from ships and plastic waste, further exacerbating harm done to the natural environment (Yuliana et al. 2022). Without appropriate consideration for their ecological impacts, ecotourism programs can result in conservation program failure when they ultimately harm the marine environment.

Ecotourism that does not provide adequate economic incentives results in conservation program failure because it limits local autonomy over financial well-being. The CTI's ecotourism programs pay very little - if at all - to Indonesian residents, and typically consist of roles in low-paying maintenance and cleaning positions (Tranter et al. 2022). More specialized roles (like guiding SCUBA tours) are delegated to dive experts from outside the local community, which excludes local individuals from the ecotourism program and prevents them from gaining financial compensation (Tranter et al. 2022). Local community members typically lose their ability to control their financial fates when ostracized from the tourism industry. Since many locals within the CTI are former fishermen who have fewer work opportunities since the program's initiation, they are reliant on alternative employment options to earn a wage. Indigenous communities like the Bugis, Bimanese, and Manggarai in KNP are also excluded from the tourism industry and do not receive the benefits of alternative employment (Walpole and Goodwin 2001). When alternative employment is inaccessible or not financially lucrative, local people are usually unable to control their economic well-being.

Displaced individuals - former fishermen especially - are reluctant to engage in the tourism industry or mariculture if it is not economically beneficial (Clifton 2009). There is evidence that the refusal to engage in tourism “may not be associated with a reduction in fishing effort,” meaning that prohibited fishing activities likely continue when local people are not participating in tourism (Clifton 2009, 94). Not only do non-lucrative ecotourism programs limit local financial autonomy, but they also threaten conservation failure through their inadvertent encouragement of destructive fishing practices. Moreover, in WNP, the “limited economic benefit for local communities” from the tourism industry has resulted in “negative attitudes and distrust towards the [program] and the tourists who visited” (Tranter et al. 2022, 7). These feelings of mistrust and betrayal toward the WNP program result in local resistance toward conservation regulations. Consequently, conservation programs fail in that they do not garner local support and perpetuate local disfavor of the park.

Ecotourism programs can also be harmful to traditional cultural customs, as demonstrated in KNP. In a survey conducted by Walpole and Goodwin (2003) with the local Bugis, Bimanes, and Manggarai people, “around one-third felt that tourism was damaging their culture (32.2%)” and 18.5% “felt that tourism was eroding traditional customs” (163). The KNP program thus fails at fostering social success in that it does not encourage local autonomy over cultural practices.

While seaweed farming programs have had beneficial impacts on the marine area and quality of life for participating community members, unclear zoning legislation and potential environmental degradation remain a concern (Satria et al. 2017; Steenbergen, Marlessy, and Holle 2017). In the review of current literature, we saw that a lack of clear farming boundaries in Karimunjawa and Rote Ndao within Savu Sea Marine National Park has caused confusion over marine space allocation. In both cases, the conflict can be traced back to misunderstandings of

regulations regarding national park zonation. Satria et al. (2017) found that confusion resulted from “regulations not [being] effectively communicated to seaweed farmers by conservationists... and because seaweed farmers were not involved much in planning” (21). Farmers could not agree on marine area ownership and farm zone designations because they were unable to participate in the creation of those boundaries. Instead of seaweed farmers, it was the “elite who were mostly involved, so there were problems with representation” in developing the seaweed farming boundaries in those areas (Satria et al. 2017, 21). Seaweed farming in Karimunjawa and Rote Ndao failed because it did not involve community collaboration in the dictation of boundaries. As a result, conflicts emerged between seaweed farmers, and it became difficult to establish lucrative farms in the long term.

Seaweed farming has resulted in both beneficial and harmful effects on the environment. Uncontrolled cultivation of seaweed in bay areas has led to saturation and exceedance of carrying capacity. The mal effects of seaweed overpopulation have been observed in Tanimbar Kei, eastern Indonesia, where restricted water flow in and out of the local bay area has caused water stagnation (Steenbergen, Marlessy, and Holle 2017). The resultant lack of fresh nutrient in-flow, waste out-flow, and increased water temperature has caused an increase in crop stress and crop vulnerability to disease outbreaks (Steenbergen, Marlessy, and Holle 2017).

Seaweed crowding and overpopulation in Tanimbar Kei resulted in a decrease in farm productivity in 2011 (Steenbergen, Marlessy, and Holle 2017). The associated drop in community income revealed the vulnerabilities of local livelihoods and the potential dangers of overreliance on the seaweed farming industry. The initial success of seaweed farming had raised people’s expectations of financial results from livelihood activities. Household income from seaweed farming (estimated at 2,000 USD per year per household) was a marked increase from previous

income in the fishery industry (Steenbergen, Marlessy, and Holle 2017). The financial benefit of seaweed farming is clearly a successful attribute, as it helps to improve the economic well-being of local community members; however, this rise in income can be unsustainable when over-farming negatively impacts the marine environment. With increasingly low seaweed production rates, income dropped in the local community and many people chose to return to former employment options, such as copra production from coconuts (Steenbergen, Marlessy, and Holle 2017). Unfortunately, these other livelihood activities were more difficult and less lucrative compared to seaweed farming. In the case of Tanimbar Kei, the seaweed farming industry also failed because it was not a reliable, consistently profitable alternative employment option. Consequently, local people lost autonomy over their financial fates and their ability to control their livelihoods.

One way that more accessible employment industries can be fostered is through collaboration with impacted communities. If local people can dictate what employment options are available to them - and how they are managed - then programs are more likely to coincide with local financial and environmental demands. We have seen that local control over conservation policy is a vital component of various aspects of marine conservation; however, the steps that proceed program implementation are equally important as those that follow (Chuenpagdee and Jentoft 2007). As my final argument, I suggest that the *initiation* of marine conservation programs must involve local participation and agency instead of being founded solely by external or national powers.

4.5. Local Initiation of Marine Conservation Programs

I propose that the collaborative initiation of marine conservation programs in Indonesia is the best method for fostering program success. Through a participatory initiation process, conservation programs can establish features I have demonstrated to be most successful in marine preservation, including the biocultural approach, a co-management system, the inclusion of local wisdom, and alternative livelihoods best suited for the local community.

Conservation programs founded by local communities have generated high success in Indonesia, such as the Batang Haluan River program. Programs that utilized a co-management or participatory approach at initiation, such as the Nusa Penida MPA, the Bali Network MPA, and the Tabaru traditional community on Halmahera Island, have also been largely successful (Al Muhdhar et al. 2019; Berdej and Armitage 2016; Hendrik et al. 2021). On the other hand, programs founded at the national level, such as WNP and the CTI, have had many issues generating success, especially concerning local well-being and acceptance of the programs (Berdej, Andrachuk, and Armitage 2015; Cinner 2007; Clifton 2003; Tranter et al. 2022). Of course, it is difficult to compare these programs just by looking at their implementation strategies. Many confounding variables influence conservation programs' success, including scale, specific conservation goals, longevity, demographics, and location. However, we can see that programs emphasizing community initiation of policy design have generally encouraged local well-being, acceptance of regulations, and environmental preservation.

Using what we know about co-management systems, the devolution of power, and the inclusion of local wisdom in policy design, we can infer why some marine conservation programs are more successful than others. Programs like the Nusa Penida MPA and Bali Network MPA are legitimized in the eyes of the public and maintain cohesive conservation policies by embracing co-

management strategies. However, the decentralization of power is what truly makes these programs successful; through this, local communities can contribute their opinions regarding MPA boundaries, fishery restrictions, and resource protection. By instigating or collaborating on conservation policy, local people can design programs best suited to their social, cultural, and economic needs. Consequently, communities are more willing to follow conservation regulations and preserve the natural environment. Decentralized co-management can also ensure that problems in fisheries (such as conflicts between groups or the use of illegal fishing methods) are well-identified. Local people can bring such conflicts to the attention of higher authorities, who can then use their power to mitigate those issues. Ultimately, a decentralized co-management system allows for a more collaborative and inclusive approach to marine conservation.

Co-management takes a more centralized slant in programs such as WNP and the CTI. While this administration system still legitimizes the programs in the public view, it fails to consider local opinion in full. As we have seen in WNP, indigenous minority marginalization prevents some impacted communities from participating in program design or implementation. Minority populations are not represented in environmental restrictions and are thus compelled to rebel against them. This nonconformity with conservation policy threatens the marine environment and often results in program failure. A similar issue occurs in the CTI due to its emphasis on ecological goals instead of local well-being. The program's overarching national control prevents local opinion from being included in the majority of conservation policy. MPA regulations often conflict with local fisheries and traditional use of the marine area, resulting in widespread disagreement and rebellion against many restrictions. Both WNP and the CTI fail to meet environmental conservation goals due to a lack of local cooperation, which can be traced back to community exclusion from program implementation and development.

Ecological conservation failure is evidenced by the continuation of harmful fishing practices, such as cyanide fishing, bombing, and coral mining. In WNP, nearly 85% of fishermen interviewed by Elliot et al. (2001) stated that fish were less abundant than in previous years and that this decline was likely linked to destructive fishing practices such as bombs and cyanide. The United Nations' Intergovernmental Panel on Climate Change's Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC-IPCC) estimates that by 2100, the maximum catch potential for marine fish across Indonesia will decrease by at least 50%, on average (SROCC-IPCC 2019). Globally, this is the highest predicted decline in potential marine fish catch. Coral populations in WNP have also been threatened by destructive fishing methods. Blast fishing has resulted in large coral bleaching events, and coral mining practices are responsible for the loss of large non-branching corals on the Sampela reef off Kaledupa in WNP. From 2002 to 2011, coral cover declined from 40% (at around 5 m depth) to <5%, and those numbers have continued to decline into 2020 (Crabbe, Karaviotis, and Smith 2004; Marlow et al. 2020).

In analyzing the case studies here, it is evident that a participatory or co-managed initiation of conservation programs garners the most success. Conversely, the exclusion of local collaboration and initiation results in program failure. However, it is difficult to identify a single cause of conservation initiative success or failure in Indonesia due to the individuality of each program's cultural, social, economic, political, and geographical circumstances. While local initiation is a common thread among successful programs, consideration of regional context is ultimately paramount. The most important aspect of marine conservation is sensitivity to the unique local context. No two locations have the same social or economic conditions, and so no two conservation initiatives should be identical.

4.6. Summary of Arguments

I have argued that the establishment and maintenance of successful marine conservation programs in Indonesia depend on (1) a biocultural approach to conservation program policy, (2) co-management strategies with an emphasis on the devolution of power, (3) local wisdom/IKS consideration and the inclusion of indigenous minority input, and (4) improved and diverse alternative livelihood options. Furthermore, I have reasoned that the initiation of marine conservation programs must involve local participation instead of being founded solely by external or national powers. Ultimately, we can see that each conservation program is unique and can include any combination of these factors to varying degrees of success. There is a risk in applying a one-size-fits-all approach to marine conservation, as it lacks local contextual consideration and reduces participation. One thing above all else has become clear: incorporation of local context is paramount in designing successful marine conservation initiatives. In the next chapter, I discuss how unsuccessful Indonesian conservation programs can be improved via the incorporation of the previously described attributes. Following that, I explore how these successful characteristics can be applied on a global scale.

CHAPTER 5: DISCUSSION

I have argued that successful marine conservation programs in Indonesia apply (1) a biocultural perspective, (2) co-management strategies with an emphasis on the devolution of power, (3) local wisdom/indigenous knowledge system (IKS) consideration and the inclusion of indigenous minority input, and (4) improved and diverse alternative livelihood options. I have also suggested that program initiation must involve local agency instead of being founded solely by external or national powers. In the following chapter, I discuss how these successful attributes can be applied to currently lacking Indonesian conservation programs. I continue by describing the global applications of the biocultural perspective, devolution of power in co-management relationships, inclusion of indigenous minority opinion, and incorporation of alternative livelihood options in conservation programs. Finally, I discuss the complex dynamics between local communities and state sovereignties in conservation policy and the importance of local contextual consideration.

5.1. Suggestions for Marine Conservation Improvement in Indonesia

As we have seen, successful marine conservation programs in Indonesia share several common attributes. The absence of one or more of these characteristics can result in a program's failure to preserve the natural environment, garner community participation, or support local economic and social institutions. Luckily, conservation initiatives can be adapted and changed over time, and currently ineffective programs have the potential for improvement. There is no one-size-fits-all conservation approach that can be applied to every region in Indonesia. However, there are common strategies and collaboration tactics that have yielded successful conservation results,

and these strategies can be employed in other coastal Indonesian regions to create impactful conservation initiatives.

5.1.1. Application of the Biocultural Approach

The biocultural approach can be applied to current Indonesian conservation programs by placing less emphasis on Western scientific knowledge and instead prioritizing local socioeconomic and cultural systems. While one might think that the biocultural approach leads to environmental degradation (by allowing unrestricted fishing practices, overharvesting of natural resources, etc.), we have seen that perspective to be untrue. Instead, the biocultural approach begets environmental protection because it highlights common goals between local communities and the environment. Sustaining biodiversity is vital for communities based in agriculture and fishing markets, such as those in Indonesia, and local people have a strong comprehension of their co-dependent relationship with the natural world. For this reason, the biocultural approach can and should be applied in Wakatobi National Park (WNP) to increase program success.

WNP currently prioritizes scientific information and ecological data over social concerns (Tam 2019). The park's resultant no-take zones (NTZs) are overly restrictive of local fishing practices and impede local livelihoods. To amend this issue, I have suggested the use of a biocultural perspective to redesign the park's various marine protected areas (MPAs). But what would the application of a biocultural perspective really look like in the local context? First, NTZ restrictions would be lessened to account for traditional fishing use. While traditional fishing methods do yield surprisingly large catch sizes, the majority of fishermen are already aware of local sustainability needs. They are also open to learning about environmental threats and how to make their fishing practices more sustainable (Clifton 2013b). By integrating local knowledge in

MPA decision-making, mutual respect and collective learning between different knowledge systems could be encouraged throughout WNP. Inclusion of local wisdom systems would also constitute the involvement of minority Bajau communities in policy development. Bajau people must be included in MPA designation to ensure their cooperativity and retention of autonomy over their financial and sociocultural fates. The biocultural approach would emphasize Bajau opinion in policy development and incorporate their local knowledge systems when determining total allowable catch (TAC) restrictions, where fishing is allowed, and what gear can be used. By having the opportunity to contribute to the development of WNP's policies, Bajau people would likely be more willing to adhere to natural resource-use restrictions, which could ultimately facilitate program success.

I have demonstrated that the biocultural approach, which combines local sociocultural perspectives with ecological research, generates conservation success (such as in the Nusa Penida MPA). Fostering collaboration between local community members and natural scientists could therefore be an effective way of ensuring WNP meets its conservation goals. Knowledge from local fishermen, community organizations, and religious leaders could be used to adapt recommendations based upon exclusively ecological research to derive activities and restrictions that effectively integrate local knowledge into resource management (Clifton 2013b). The Nusa Penida MPA was successful at connecting multiple entities (environmental experts, NGOs, community groups, tourism operators, traditional leaders, local fishers' and seaweed farmers' associations, etc.) to develop its complex but successful MPA network (Berdej and Armitage 2016). Instead of only focusing on the perspective of external researchers and NGOs, the Nusa Penida MPA fostered collaboration between both scientific and local sociocultural experts to create its conservation restrictions (Berdej and Armitage 2016). WNP could employ a similar

biocultural approach by connecting local social actors and natural science experts to develop more agreeable MPA boundaries and restrictions. The use of bridging organizations in WNP may be helpful in accomplishing this level of collaboration – the Nusa Penida MPA found success through its bridging organization, the CTC (Berdej and Armitage 2016). If WNP increased communication and collaboration between local groups, including the Bajau, and the scientific experts who currently dictate conservation policy, it could potentially find more success. Western scientific data should not be the only information guiding WNP’s policies.

The wider Coral Triangle Initiative (CTI) could also be improved through application of the biocultural approach. The CTI’s current enforcement of strict fishing gear restrictions, low TACs, and NTZs is largely guided by Western scientific data (Berdej, Andrachuk, and Armitage 2015). Application of the biocultural perspective in the CTI could involve alleviating some of these restrictions and reforming them under the control of local communities. First, TAC limits could be raised to reflect the needs of local fishermen. This would not entail the complete elimination of TACs - otherwise, unnecessary overfishing might delay conservation goals. Instead, local fishermen should have the opportunity to determine the size of the catch necessary to sustain their current livelihoods, and restrictions could be formatted around those demands. Aspects of the Batang Haluan River program’s biocultural approach could be applied to the CTI. The Batang Haluan River MPA relies on community determination of partial-take zones (PTZs) and restricted marine species, which consequently fosters environmental protection (Hendrik et al. 2021). The CTI could similarly employ locally dictated conservation restrictions on specific species. Specifying maximum catch restrictions to individual regions and communities within the Coral Triangle (CT) may generate conservation success. Because the CTI covers a large area that comprises many different communities, each with their own fishing practices, economic demands,

and relationships with the natural environment, it is also necessary that zoning regulations be developed with complete transparency. Communities should not only be communicating with policy makers – they must also collaborate with other community groups so that agreements can be made on marine space allocation. Issues may arise if one community is allowed greater access than another, as we have seen with the Bajau and Butonese in WNP (Clifton and Majors 2012). In the CTI, application of the biocultural approach would involve tailoring the program's restrictions to the local context and including communities' environmental knowledge alongside Western scientific data, while simultaneously giving equal voice to all communities within the region (Cinner 2007; Clifton 2009).

Local and indigenous knowledge systems are often comprehensive of environmental sustainability. For example, the Bajau people of WNP base most of their livelihoods in fishing, aquaculture, boat building, and trading marine products, and they are highly knowledgeable about local coral reefs and the marine environment (Lynch 2017). Current restrictions imposed by WNP “do not take into consideration local historical resource use, and instead, favor the protection of local ecological processes and tourism” (Lynch 2017, 104). Consequently, Bajau people have to defy WNP policy in order to fish, harvest food and other supplies, and survive. We have seen how Bajau fishermen will covertly defy park authorities by fishing in restricted spaces or harvesting protected coral species (Lynch 2017). The prioritization of scientific knowledge and environmental protection is a driving factor behind Bajau resistance. If the WNP employed a biocultural approach – that is, if the program allowed Bajau knowledge to dictate MPAs and protected species – there would likely be less resistance from the community. The biocultural approach could beget environmental protection by working with local communities and using their

expertise of the marine area to develop conservation restrictions that benefit both the natural world and residents.

Overall, the biocultural approach can be applied to currently lacking Indonesian conservation programs such as WNP and the CTI by incorporating local wisdom and placing less emphasis on Western scientific knowledge. Since local needs are often aligned with those of the environment, the biocultural approach naturally encourages environmental preservation without detracting from the social and economic security of local communities. Consequently, the biocultural approach often requires the use of co-management systems that emphasize the devolution of power to local communities. Unsuccessful conservation programs in Indonesia often lack a devolved co-managed system and a biocultural perspective, which together discourages local participation. In the next section, I describe how devolved co-management systems can be applied to conservation programs in Indonesia that currently emphasize state influence and centralized power.

5.1.2. Devolution of Power in Co-management Relationships

The devolution of power to indigenous communities, regional governments, and local stakeholders in conservation programs ensures local autonomy. When local people have more control over their financial and sociocultural fates in conservation initiatives, they are further motivated to participate in the program and support environmental protection. Programs that have failed to delegate power to local authorities, such as the CTI, often fail to reach their conservation goals due to a lack of local support and sustainable legislation (Tranter et al. 2022). Furthermore, the CTI's centralization of power limits local autonomy by restricting economically significant fishing areas. To improve the co-management systems in the CTI, power should be devolved to

individual communities and regional governments, and bridging organizations could be employed to connect singular regions with the larger CTI program.

The national Indonesian government currently has the most control over MPA designation within the CTI (Tranter et al. 2022). Consequently, many of MPA regulations are misrepresentative of the needs of residents and fishermen. In devolving power to local communities, more agency would be given to individual regions in determining fishing restrictions and PTZ designations. Since the CTI encompasses such a large area and comprises many different communities, it is crucial to devolve power to regional authorities to ensure that the needs of local people are properly represented in policy development and MPA restrictions. We have seen that the devolution of power is an effective method of designing representative and inclusive environmental policy, like in the Nusa Penida MPA or Batang Haluan River region (Berdej and Armitage 2016; Hendrik et al. 2021).

However, we have also seen that co-management is a balancing act that may require a certain degree of influence from state or national powers. For this reason, bridging organizations could be used within the CTI to facilitate communication between local communities, regional governments, the national government, and the CTI program in full. As exemplified by the Nusa Penida MPA, bridging organizations can employ public meetings, community consultations, and focus group discussions to elicit information about the interests and resource use patterns of affected stakeholder groups, such as local fishermen (Berdej and Armitage 2016). The use of bridging organizations in the CTI could also help to translate the complex legislative framework established by the national government into local context. In instances where local jurisdiction over spatial use is unclear, bridging organizations could aid in communication and clarification by state powers. Regional governments should be aware of their spatial and natural resource

jurisdiction, and sometimes clarification is needed by national organizations. Local opinion could be better incorporated into regionally dictated MPA restrictions if locals are aware of their jurisdictional area.

WNP could also benefit from bridging organizations to reduce conflict between different ethnic groups within the park. A bridging organization in WNP would likely help ameliorate issues of indigenous minority marginalization by providing a channel through which the Bajau and program developers could communicate. As we have seen, WNP's co-management system needs both increased devolution and centralization of power in different areas. The use of a bridging organization could facilitate this balance by incorporating both local and national influence in different areas of policy design, and each side could easily communicate its issues, needs, and goals to the other. In this way, both the devolution of power to local indigenous communities and the use of bridging organizations could facilitate co-management in WNP.

Bridging organizations are useful tools, but they are not always necessary in co-management relationships. The importance of bridging organizations appears to be largely dependent on the scale of the conservation program: The Nusa Penida MPA, being much larger, required a bridging organization, whereas the Batang Haluan River region, which encompasses a smaller area, did not require a bridging organization (Berdej and Armitage 2016; Hendrik et al. 2021). This correlation could potentially be applied to other Indonesian conservation programs. For larger programs that have issues connecting local leaders, religious organizations, NGOs, tourism operators, and regional and national governments (such as the CTI), a bridging organization could be an effective solution. On the other hand, smaller programs that cover less geographical space and include fewer parties likely do not require a bridging organization. Smaller

programs should not be unnecessarily complicated by the addition of bridging organizations, but they could be considered as an option if the program expands in the future.

Bridging organizations in larger-scale programs contribute to conservation success because they enhance communication between government organizations and local communities. Through this connection, communities can share local wisdom and indigenous knowledge systems as they pertain to fishing practices and the marine environment. The inclusion of these local wisdoms is essential for conservation program success. Current programs in Indonesia that fail to incorporate local knowledge systems cannot effectively conserve the marine environment, as they alienate local community members and discourage participation. It is also crucial to note that local wisdom can come from multiple different sources, and excluding any one of these groups can lead to program degradation.

5.1.3. Inclusion of Indigenous Minority Communities in Conservation Development

The consideration of local wisdom and IKS in conservation development is essential to the creation of a successful program (Al Muhdhar et al. 2019; Frid et al. 2023; Hendrik et al. 2021). It is necessary to incorporate the opinions and knowledge systems of all stakeholders in a conservation region, including historically marginalized minority communities. To amend issues of indigenous minority marginalization and the exclusion of local wisdom, programs should shift biopower control to be more inclusive of all stakeholders and impacted communities.

Conservation planners must address indigenous minority marginalization and take steps to include minority communities in program design and implementation. As we have seen in the case of WNP, the Bajau minority community has historically been marginalized and excluded from the park's development. Consequently, the Bajau are either unaware of or discontented with

conservation policy, resulting in their defiance (both accidental and purposeful) of conservation restrictions. To better address the issue of indigenous minority marginalization in marine conservation, it would be beneficial to take a look at the application of biopower - in this case, biopower that is held by conservation programs over those impacted by conservation policy.

Foucault defines biopower as a sovereign entity's ability to control living populations of both human and nonhuman actors by managing their biological states (Foucault, Davidson, and Burchell [1978] 2008). This dynamic can be put in the binary context of either "making live/letting die" or "letting live/making die." Protected areas within Indonesian conservation have an overarching goal of "making" wild nature (e.g., marine animals) and human actors (e.g., Indonesian fishermen) live while "letting" those who do not participate within the program "die." However, marginalization of certain groups from conservation initiatives flips this relationship and instead generates a "making die," "letting live" scenario.

Indigenous minority marginalization and racism support biopower by separating the human species into two subgroups: a minority or "bad" group and a majority or "good" group. Those in the minority "bad" group in terms of biopolitics and are "left to die" through systems of biopower. On the other hand, the majority "good" group in biopolitics and is "made to live." A person's race is not based on their biology or genetics, but minority and majority labels are often claimed to be rooted in science and are hence made justifiable in the realm of biopolitics. Thus, the first function of racism is to form groups within the population that biopower can act upon (Foucault, Davidson, and Burchell [1978] 2008).

In the context of WNP, the Bajau are labeled as the minority or "bad" group while the Butonese are labeled as the majority or "good" group. Consequently, the Bajau are being "made to die" and "left to live." Fishery restrictions force them to suffer biologically, as fishing is their

main source of income and seafood is a pillar of their daily diets. They are only able to survive (i.e., eat, work) if they act in opposition to conservation regulation. They are “left to live” if they make the effort to do so. Biopower held by conservation sovereignties literally threatens Bajau people’s physical health: if Bajau are restricted from traditional fishing areas, then they are unable to harvest food for their community and could suffer malnourishment and potentially die. On the other hand, non-minority groups who are involved in the establishment and implementation of WNP are being “made to live,” “left to die.” Opportunities to earn a livelihood through the ecotourism or hospitality industry (i.e., live) are being given to them. Their financial perspectives are also considered more in policy development, which can ensure that MPAs do not overly restrict fisheries run by majority populations. The majority population must actively choose not to participate in conservation programs to suffer or “die.”

Sovereign entities, or those designing and implementing conservation programs, are not necessarily making Bajau communities suffer on purpose. Instead, inequality in biopower influence results from the Bajau’s exclusion from policy design and implementation. For that reason, it is essential to include indigenous minority communities throughout the program’s development and to consider their unique cultural and economic conditions in full. To alleviate issues of minority exclusion, program developers of WNP should incorporate both Butonese and Bajau opinions in their design of conservation policy - in other words, there should not be a "good" and "bad" partition between WNP's encompassed communities. Considering that the Bajau constitute a disproportionately large amount of artisanal fishing activity, more emphasis should be placed on their input in the designation of fishing restrictions within WNP (Clifton and Majors 2012).

The Bajau also have historically significant indigenous knowledge systems regarding the marine environment. For this reason, their wisdom surrounding the ocean and sustainable fishing activities should be invaluable to conservation planners (Clifton & Majors, 2012). WNP must increase its incorporation of Bajau environmental wisdom and local opinion to foster a successful conservation program. By considering local Bajau perspectives, the WNP will be better able to design conservation policies that account for Bajau fishing practices, resource use, and fishing methods. Consequently, the Bajau will likely be more willing to participate in the program as it does not threaten their economic or sociocultural autonomy. Furthermore, collaboration between the WNP and Bajau could help to identify and eliminate any destructive fishing practices performed by the Bajau while offering sustainable alternatives. Communication between the WNP and minority communities within the park could be further facilitated by neutral third-party actors, such as bridging organizations.

The use of bridging organizations facilitates the two-eyed seeing approach and helps to ensure that all local communities within a conservation program are involved in policy design. Bridging organizations, like the CI-I in the Bali Network MPA, benefit the two-eyed seeing approach by providing an avenue through which local wisdom and Western scientific thinking can be shared (Berdej and Armitage 2016). The employment of a bridging organization could be especially useful in WNP in incorporating local knowledge from the Bajau, Butonese, and other communities into the program's ecological goals. One of the WNP's shortcomings is a lack of PTZs that allow for traditional fishing practices by the Bajau (Berdej, Andrachuk, and Armitage 2015). A bridging organization could allow for communication between Bajau who have lost their marine area access with MPA developers, allowing for the Bajau to air their grievances and

collaborate on new MPA boundaries and restrictions (like turning NTZs into traditional-use-only zones, for example).

Local religious belief systems contribute to IKS and should be considered in conservation policy development. Successful application of religious beliefs in policy has been seen in the Tabaru traditional community on Halmahera Island, the Batang Haluan River region, and the Bali Network MPA, all of which have been mostly successful conservation programs (Al Muhdhar et al. 2019; Berdej and Armitage 2016; Hendrik et al. 2021). Current initiatives that fail to incorporate local belief systems, like the WNP, should make efforts to include those systems in their consideration of IKS. When local spiritual beliefs are applied in the design of conservation policy, local communities are typically more understanding of the program's environmental goals and restrictions. They are also usually more willing to adhere to conservation restrictions when framed in a familiar context. In WNP, local Bajau belief systems (especially those involving marine resources) could be incorporated in policy design to encourage Bajau participation and make the program more comprehensible to local communities.

Overall, local wisdom and IKS are invaluable resources in Indonesian conservation policy design. Local knowledge can also help inform policy developers of local livelihood motivations and traditional resource use. Using this information, communities can collaborate with program developers to design alternative livelihood options that effectively replace or complement existing employment in the fishery sector.

5.1.4. Improvements for the Ecotourism and Seaweed Farming Industries

As we have seen in the review of current literature, both ecotourism and seaweed farming have their pros and cons. The ecotourism industry emphasizes the preservation of natural resources

and biodiversity, which can be beneficial for reaching conservation goals. However, the availability of positions is often restricted and inconsistent throughout the seasons. There are also limited economic incentives, and many positions require some form of education or training that is inaccessible to local communities (Clifton 2009; Tranter et al. 2022). I have argued that the shortcomings of the ecotourism industry contribute to conservation program failure by hindering conservation goals and limiting local autonomy. To increase employment accessibility and compensation, I suggest the ecotourism industry apply the following improvements.

Financial opportunities should be guaranteed for local people who have lost their source of income to conservation efforts. In KNP, the indigenous Bugis, Bimanes, and Manggarai communities face exclusion from local tourism programs and consequently miss out on alternative employment opportunities – remember that only a small percentage of the local population has provided services in the tourism industry (Walpole and Goodwin 2001). The financial and biological well-being of these populations is threatened by their exclusion from the program. Without employment in either the fishery or tourism industry, there are few other options to make a living. Those excluded from alternative employment shared generally unfavorable opinions of the KNP, and the program consequently fails at benefiting the lives of local community members (Walpole and Goodwin 2001). To improve the KNP program, it is essential that local indigenous groups be at the forefront of the tourism industry. Those willing be involved in ecotourism should have the ability to do so. If ecotourism programs in KNP increase local agency in their design and implementation, then more local individuals could be hired within the industry and receive financial benefits.

Moreover, for future ecotourism endeavors to be successful, they must be consistently lucrative for local participants. In KNP, improvements would involve year-round ecotourism

attractions and greater community involvement in determining the types of activities and goods available to tourists. Instead of offering diving ventures as the sole tourist activity (which can only take place at certain times of the year, involve smaller paying groups, and require diving experts and specialized training), locals should have the ability to determine their own ecotourism activities, projects, and sites within the marine park. Locals are typically the most familiar with the landscape and can use their knowledge to establish new tourism activities, such as hiking or wildlife tours, which require less training and can occur throughout the year.

Education and training should be available to all community members interested in the ecotourism industry. Increased education would eliminate the need for externally sourced employees in tourism-based positions. Both KNP and WNP hire external dive experts and other tourism guides as opposed to hiring internally from local communities (Tranter et al. 2022; Walpole and Goodwin 2001). By increasing education and training availability, organizations that might have hired tour guides or SCUBA instructors from outside the community could instead hire local employees who have received the appropriate certifications. The ecotourism industry would be made more accessible to local individuals whose livelihoods were displaced by conservation programs through training and education, especially if this education were provided directly by ecotourism employers. Furthermore, training programs would foster interest and dedication to conservation initiatives and generate a better understanding of how conservation programs can benefit the community. Ultimately, this could help to increase the participation of local communities. People may become more interested in how their environment can be conserved and shared through tourism.

Finally, a wider array of employment options emphasizing local culture should be available to native Indonesians. Many ecotourism ventures advertise only nature and diving tours, while

local goods, services, and lodgings go ignored. This issue is evidenced in KNP, where local customs (such as attire) are modified, instead of being shared, to accommodate tourists (Walpole and Goodwin 2001). More villagers could potentially earn money through ecotourism if local crafts, food, and hospitality were emphasized to visitors. Instead of being made to guide tours, locals could sell their goods and services throughout the tourist season. This would be especially beneficial in KNP, since local people have difficulty entering the ecotourism industry as tour guides or dive instructors (Walpole and Goodwin 2001). Local entrepreneurship should be promoted among tourists to uplift the local economy without an overreliance on external ecotourism developers. Selling local goods is a more self-sustainable option that can be maintained within the community, whereas ecotourism programs often rely on an external organization. It is necessary for local markets to be locally sustainable to avoid paternalistic relationships with external forces - independence from state or international authorities ensures that local communities are able to maintain conservation programs over time and on their own terms.

The seaweed farming industry has been largely successful as an alternative employment option in Indonesian conservation. Seaweed farming is advantageous in that it is inclusive, easily accessible, and environmentally friendly (for the most part). However, unclear zoning legislation and environmental degradation from seaweed overpopulation remain prevalent concerns (Satria et al. 2017; Steenbergen, Marlessy, and Holle 2017). I propose that local community members and regional governments be responsible for the designation of seaweed farming areas. Moreover, I suggest that seaweed farming be conducted only in moderation and that alternative aquaculture products or farming methods be used to help reduce environmental degradation.

Local communities and seaweed farmers should control the distribution of marine farming areas. Unclear zoning legislation is typically the result of government intervention in the

implementation of seaweed farming programs, which results in miscommunication between local people regarding farm boundaries and ownership (as in the cases of the Karimunjawa National Park and Rote Ndao seaweed farming areas). Alternatively, informal local rules regarding marine area ownership could later be recognized and validated by the state and converted into formal regulation. In other words, seaweed farm zoning should involve a system of co-management that is initiated at the local level (Satria et al. 2017). Zoning specifics should be left to local communities and individual farmers to ameliorate miscommunication, but more centralized powers can help validate those agreements over the long term. In Karimunjawa, conflicts between seaweed farmers and park officials have arisen due to unclear zoning and the accidental farming of protected areas (Satria et al. 2017). To amend this issue, there could be increased collaboration and transparent communication between farmers and park officials to design zoning legislation that is better understood by both sides.

Moreover, local seaweed farmers should have the greatest say in zoning legislation because of their familiarity with local marine areas and the necessary resources required for seaweed farming practices. In Rote Ndao, increased enforcement of local customary rules such as *papadak* and *hoholok* would benefit both people and the environment because of their emphasis on respecting marine farm boundaries and the preservation of natural resources (Satria et al. 2017). Currently, centralized systems of zonation prevent those local knowledge systems from being employed in full, since many farmers are excluded from the zoning process (Satria et al. 2017). Communities are most familiar with their local farming zones and historical ownership of the area; thus, government organizations are ill-suited for zoning dictation. Allowing farmers to control area allocation would reduce confusion regarding zoning legislation. Moreover, by incorporating state influence after the establishment of informal local rules, farmers could still maintain their

autonomy and settle minor marine area disputes between themselves. In other words, farming land allocation should first be left up to local communities. If unsolvable disputes arise, the state could provide aid by settling larger disputes and ensuring that all farmers get access to the areas they are owed. State mediators could be recruited, but only as a last resort, as we have seen how the centralization of power can easily lead to minority exclusion and the loss of community autonomy. Local solutions should be prioritized.

Furthermore, seaweed farming should be conducted in moderation and alongside alternative marine botanicals. We have seen that seaweed farming harms the marine environment in areas where it grows in abundance, such as Tanimbar Kei. Overly dense seaweed populations restrict water flow and increase water temperature, which results in a chain of negative impacts on local marine life. To ameliorate overpopulation, seaweed farming could be spread over larger areas or limited when within a single marine space. It is also possible that interspersing seaweed farms with alternative aquaculture products (such as shrimp, lobster, crab, or catfish farms) could cause less harm to the environment. In seaweed farms where environmental degradation is a concern, conservation programs may consider recruiting an ecological expert who could make recommendations to improve the environmental impacts of the practice. Their recommendations could be considered with those of local employees in the aquaculture industry; program planners should also understand the potential repercussions of changing farming practices within a region.

Overall, seaweed farming practices could be improved through decentralization and the planting of alternative crops over larger marine areas. A question emerges as to how programs can encourage diversification of aquaculture products while also decentralizing authority. Ultimately, this comes down to the appropriate balance of authority within a co-management system. In other

words, decentralization versus centralized dictation of aquaculture products must be determined on a case-by-case basis.

Local control over environmental protection policy is a vital trend that we have observed throughout various topics in Indonesian conservation, from the biocultural approach to co-management to indigenous minority inclusion in policy design. Attributes of successful conservation initiatives, such as local collaboration and the creation of alternative livelihoods, are not limited only to Indonesian programs.

5.2. Global Application of Successful Program Attributes

By analyzing marine conservation programs throughout the Indonesian archipelago, I have been able to identify key attributes of successful programs, including the application of (1) a biocultural perspective to conservation policy, (2) co-management strategies with an emphasis on the devolution of power, (3) local wisdom/IKS consideration and the inclusion of indigenous minority input, and (4) improved alternative livelihood options. Due to Indonesia's diversity of cultures, fishing customs, marine environments, and conservation initiatives, analyzing programs across the archipelago has demonstrated aspects of conservation development that are truly comprehensive. For example, since the biocultural approach has garnered success in many different Indonesian programs, it is likely that the biocultural perspective is an effective conservation strategy overall. These methods of success can therefore be applied to other conservation programs around the world. It is vital that we recognize common attributes of successful conservation development to apply those methods to other regions that have not yet found achievement in their own programs. Based on my analysis of Indonesian conservation, global conservation programs should (1) prioritize local social, cultural, and economic needs over

Western scientific knowledge, (2) initiate co-management at the local level, (3) be inclusive of indigenous minority and local knowledge systems, and (4) provide diverse alternative livelihood options. Incorporating these four strategies in conservation development will facilitate environmental, sociocultural, and economic prosperity in regions across the globe.

5.2.1. Prioritization of Local Social, Cultural, and Economic Needs

All conservation programs can benefit from the prioritization of local social, economic, and cultural needs over Western scientific knowledge. The biocultural approach lends itself to conservation success regardless of location; this is because the biocultural approach begets environmental protection. In my analysis of Indonesian conservation programs, we saw how consideration of local economic needs (such as catching larger fish) begets environmental protection (sustaining fish populations by allowing individual animals to reach reproductive age). IKS and Western science practices have many commonalities that can foster a biocultural perspective in conservation development, and this alignment of local economic and ecological goals is not specific to Indonesian fishing cultures.

Communities that base their livelihoods on the health of their environment have unique understandings of what harms and helps the natural world. For that reason, local knowledge and utilization practices concerning the environment should be considered to at least an equal degree as Western scientific knowledge when designing conservation programs. In both IKS and Western science, knowledge is derived from collective observations that are transmitted socially and intergenerationally. Both knowledge systems emphasize that ecosystems are characterized by the interconnectedness between component parts (human activity, climate, natural disasters, etc.) (Frid et al. 2023). IKS and Western science also highlight that ecosystems are dynamic in the face of

human activity and that humans are ecological forces that can support or damage biodiversity (Frid et al. 2023). However, only Western scientific knowledge portrays humans as the sole cause of environmental degradation while often excluding human activity from the list of potential conservation tactics.

Western science-based conservation programs tend to present the cause of environmental degradation as human-driven, while the solution is framed as a required diminution of human activity (Berdej, Andrachuk, and Armitage 2015; Lynch 2017). The biodiversity first perspective (i.e., a preference for Western scientific knowledge) suggests that people are the problem, but that they cannot be the solution. For that reason, programs based on the biodiversity first perspective have mainly employed fully protected areas (or NTZs) that completely prevent community access to the environment, often to the detriment of local livelihoods. Instead, conservation programs could place more emphasis on fostering healthy relationships between communities and their natural space, potentially via the implementation of PTZs and dynamic MPAs with varying levels of protection (Andradi-Brown et al. 2023). Human interaction with the natural environment is inevitable, especially in regions where livelihoods are based on natural resource harvesting. Instead of trying to reduce human activity in the environment as much as possible, conservation developers should use the biocultural approach to foster programs that emphasize sustainable interactions between people and nature.

Local livelihoods should be *adjusted* to work in tandem with environmental protections, as opposed to being completely *eliminated*. Moreover, environmental protections themselves should reflect local economic and social context. Adoption of partial protection approaches (such as PTZs) would increase the diversity of regulations available to MPA managers, which could potentially ensure that MPAs are better tailored to the local context (Andradi-Brown et al. 2023).

Partial protections allow for local people to continue using natural resources while promoting sustainable interactions between communities and the environment. A biocultural approach that prioritizes local social, cultural, and economic needs is necessary for conservation success as it increases environmental protection by fostering community cooperation. On the other hand, a strictly Western science-based approach limits human activity in natural areas, resulting in livelihood loss and dissatisfaction with conservation programs. Consequently, local people are less willing to follow conservation initiatives and may instead degrade the natural environment by increasing destructive practices. Programs must use a biocultural approach because it incorporates local demands in policy design and tailors restrictions to local context, thus ensuring community cooperation. Environmental protection measures can be developed in the best interest of local communities via the biocultural approach - a win-win scenario is possible.

For the biocultural approach to be effective, there must be open communication between community members and conservation planners; co-management strategies can facilitate such communication. In developing conservation strategies, what precedes the implementation of co-management systems is just as important as what happens later in the process (Chuenpagdee and Jentoft 2007). In other words, initiation of co-management at the local level can ultimately determine whether or not a conservation program is successful.

5.2.2. Initiation of Co-management at the Local Level

Co-management of conservation programs should be initiated at the local level to ensure the retention of local autonomy. We have seen that co-management relationships are either conceptualized based on existing ecological goals and research initiatives (like that of the WNP or CTI) or evolved from informal practices at the local level without any government intervention

(like the Batang Haluan River region) (Chuenpagdee and Jentoft 2007; Clifton 2013b; Hendrik et al. 2021; Tranter et al. 2022). Of these two strategies, initiation at the local level was the most effective at garnering successful environmental protection. This method of grassroots initiation and devolved power in co-management relationships can be applied to all conservation programs around the world.

Initiation of conservation programs at the local level is beneficial because it focuses initiatives on specific socio-ecological problems relevant to the lives of community members. For example, if gear conflicts between fishers is a recognized problem within the community, then local initiation of a conservation program would be prepared to target those issues and develop specific solutions tailored to local context. Conservation programs have a clear focus and well-specified goals when initiated by the impacted community (Chuenpagdee and Jentoft 2007). Clear goals lend themselves to concrete, applicable solutions that residents are willing to follow. Cooperation with conservation programs is facilitated by local initiation, as local initiation ensures familiarity and agreement with conservation programs. Conservation is consequently successful because more people are contributing to environmental protection measures.

Devolution of power to local organizations and regional governments ensures that conservation policy best reflects the economic, social, and cultural needs of the community. However, as we have seen in Indonesian marine conservation, there is still a place for national (and sometimes international) influence by government organizations and NGOs. All conservation programs are unique, and thus the degree of external involvement will vary. One benefit of co-management relationships (as opposed to exclusively locally-run programs) is the legitimization of conservation initiatives. Formalization of conservation programs can be achieved by a certain degree of centralization to state, national, or international powers. This formalization is not for

nothing - stakeholders can situate their initiatives within a broader framework and better realize their opportunities when they can compare their experiences to an ideal model of other co-managed projects. While exact replication of conservation programs is an ineffective method that excludes local consideration, it is still useful to have a legitimized and well-organized program that can be compared to analogous management systems. This way, issues that arise in co-managed projects can be modified by looking at similarly organized initiatives (Chuenpagdee and Jentoft 2007).

The ideal balance of power in co-management relationships can only be determined on a case-by-case basis. In some instances, as in the Batang Haluan River region, centralization works for legitimization following local initiation. Conversely, programs like the Pemuteran MPA may find success by maintaining internal control and gaining legitimacy through interactions between local institutions (Bottema and Bush 2012; Hendrik et al. 2021). However, the basic principle of local initiation can and should be applied in all conservation programs. Indigenous minority inclusion in policy development can be facilitated by devolved co-management approaches.

5.2.3. Inclusion of Indigenous Minority Groups in Conservation Design

All conservation programs must be more inclusive of indigenous minority opinions and the perspective of local community members. The two-eyed seeing approach can be applied in all conservation programs to increase local involvement and ensure that local concerns and demands are well represented. As discussed in the previous sections, the two-eyed seeing approach can be facilitated by the use of bridging organizations and the consideration of local religious and spiritual beliefs, especially as they relate to the natural environment. Furthermore, biopower systems must be adjusted to equally consider all local opinions and effectively increase the inclusion of minority groups. Local knowledge systems and indigenous opinion can be better incorporated into

conservation policy through a combination of the biocultural approach and the devolution of power to local communities.

For biopower relationships to positively shift within conservation policy, at least one of the following practices must be employed: (1) devolution of power to local communities to create new sovereign entities in conservation policy and (2) equal inclusion of all groups encompassed by a conservation region in the program's implementation.

By devolving power to local communities and regional groups, the sovereign power within conservation policy design can shift away from national or international entities. We have seen that current biopower relationships, like that of WNP, exclude minority groups from conservation policy. In WNP and similar programs, the sovereign entities of conservation design are state organizations disconnected from local communities. These disconnected powers designate minority groups as "bad" and force them into a situation of being "made to die/left to live" by conservation policy. Transferring sovereignty to local communities instead of national organizations would help prevent biopower from being used negatively toward minority groups. If the sovereign powers themselves came from indigenous minorities, local communities, and city/district or village governments, then they would be more likely to develop policies that benefit local people. In this way, no group would be "made to die" and "left to live" by overly restrictive or exclusionary regulations. Instead, sovereign entities would be knowledgeable and inclusive of the groups most impacted by conservation regulations. This dynamic can be further reinforced if power devolves to multiple groups and leaders within an area - in WNP, this would include Bajau and Butonese representatives. Smaller, local-scale sovereignties would be better enforcers of biopower in that they would encourage local well-being and make conservation programs more beneficial for residents.

Equal inclusion of all groups encompassed by a conservation region can be fostered by the devolution of power to local entities, as we have just seen. It is also possible for current sovereignties in conservation policy to be more mindful and inclusive of communities within a conservation area. Bridging organizations can be employed in large-scale conservation programs to incorporate IKS and local wisdom into policy design. Bridging organizations would also be useful tools in ensuring all groups are equally involved and represented in environmental policy design. By connecting minority ethnic groups, local government organizations, and religious leaders, bridging organizations can re-situate biopower dynamics to be more beneficial for community members. If all groups, including indigenous minorities or historically underrepresented peoples, can effectively communicate with conservation planners, then they can communicate desirable outcomes and potential issues with a conservation policy. Opening communication channels between all local communities and conservation planners is key to ensuring that programs are not beneficial to one group but harmful to another. Furthermore, communities must not be separated into the binary “good” or “bad” that is either made to live/left to die or made to die/left to live by conservation policy. Instead, sovereign entities must collaborate with all groups so as to not give preference to one community over another. All parties should have their well-being guaranteed by conservation programs - no person or group of persons should have to suffer in the name of environmental protection. As we have seen in Indonesian conservation, bridging organizations are valuable tools for facilitating such communication, and thus could be used in conservation programs that wish to incorporate IKS and local wisdom in policy.

Another vital aspect of healthy biopower dynamics is the inclusion of diverse and accessible alternative livelihood options. In instances where conservation programs disturb or

eliminate existing livelihoods, alternatives must be available to ensure local financial and social well-being.

5.2.4. Increased Alternative Livelihood Availability

Creating alternative livelihoods in areas where conservation initiatives eliminate or reduce existing employment options is a crucial aspect of sustainable conservation efforts. We have seen that Indonesian conservation programs encourage ecotourism and seaweed farming as the most common alternative livelihood options. While the exact nature of alternative livelihoods will differ from location to location, some common aspects of successful alternative livelihood methods can be replicated in all conservation programs. Replicable attributes of successful alternative employment strategies include collaboration with communities, assessment and application of local skills and resources, skill development and training, and diversification of employment options.

It is vital that alternative livelihood planning involves local communities in the decision-making process. Community members should be engaged in the design of alternative livelihood projects to ensure that they meet the needs and aspirations of people living in the area. Community engagement would involve listening to the concerns, ideas, and needs of local people as they pertain to their economic stability and livelihood opportunities. Local knowledge and expertise should be recognized and leveraged as a tool in designing sustainable livelihood initiatives that reflect local environmental, cultural, and traditional contexts. It is also crucial to build trust between displaced community members and conservation designers. Interaction with communities must be transparent and honest to facilitate the long-term success of livelihood projects. Community members should be provided with the tools and knowledge to actively participate in

and manage livelihood initiatives, including training in project management, financial literacy, and other relevant skills. Education may include training in business management, SCUBA, local ecology, environmental stewardship, and sustainable practices.

Organizations involved in the establishment of alternative livelihoods must also ensure that community members have a sense of ownership over new employment projects. Planners should allow locals to make decisions about project priorities, resource allocation, and the overall direction of the initiatives (i.e., what type of work is made available and in what locations). Local ownership increases commitment and sustainability of alternative livelihoods, as more people are willing to participate in employment that reflects their needs and skill sets. Appropriate customization and diversification of livelihood options should coincide with local collaboration - what works in one area may not work in another, so it is crucial to design projects that are relevant to the local context. It is necessary to consider social inclusivity at this point - all members of a community, including historically marginalized groups, must have an equal opportunity to participate in and benefit from alternative livelihoods. External conservation organizations seeking to establish alternative livelihoods based on local participation are thus obliged to invest in gaining a necessary understanding of community context and the dynamics of local ways of life (Steenbergen, Marlessy, and Holle 2017). Cultural traditions, religious systems, and values of the community must be respected to ensure that project activities do not conflict with local customs or beliefs.

Furthermore, environmental preservation should be ensured and encouraged through alternative employment options. Creating new livelihoods that do equal or worse damage to the natural environment as previous employment options is counterproductive. Instead, it is crucial that alternative livelihoods be cognizant of environmental context and ecological protection

strategies. Livelihoods and industries that are adaptable are best suited for environmental protection. For instance, although Indonesian ecotourism aims to benefit the marine environment, it inadvertently led to environmental harm due to increased pollutants and coastal development runoff. If the ecotourism industry were able to efficiently adapt – perhaps by switching to more fuel-efficient tour boats or encouraging tourists to stay at existing local hostels – the industry could significantly mitigate its negative environmental impacts. Alternative livelihood options must contribute to ecological protection goals to be justifiable.

Direct incentives, like PES, should not be used in conservation programs because they are not reliable forms of payment and are easily corrupted. Instead, diverse alternative livelihood options must be made available to all people impacted by conservation programs. As we have seen in the Indonesian ecotourism industry, offering employment that is limited to one or two specific fields (providing eco-tours or SCUBA diving activities) fails to include all members of a community or be sustainable in the long-term. Instead, employment options must be more diverse and capitalize on the knowledge of local communities.

I have discussed how successful attributes of Indonesian conservation can be carried over to global conservation programs by (1) prioritizing local social and economic needs over Western scientific knowledge, (2) initiating co-management at the local level, (3) being inclusive of indigenous minority and local knowledge systems, and (4) providing diverse and adaptable alternative livelihood options. Ultimately, we know that each conservation program is regionally specific and can include any combination of these factors to varying degrees of success. There is a risk in applying a one-size-fits-all approach to marine conservation as it lacks local contextual consideration and reduces participation. Consideration of local context is paramount to designing a successful marine conservation initiative. In the next section, I will explore how existing power

dynamics between local communities and state and international sovereignties can determine the extent of local contextual consideration in policy design.

5.3. Power Dynamics Between Local Communities and State and International Sovereignties

All Indonesian marine conservation programs involve interaction between local communities and state and international sovereignties. We have seen how the dynamics of those power relations can determine the success or failure of a conservation initiative in terms of ecological outcomes (such as species recovery, changes in population trends, or marine habitat protection) and social outcomes (such as reductions in economic loss, community acceptance, participation, and upheld or strengthened cultural resources). Overall, projects that were initiated at the local level and retained a high degree of local governance, such as the Batang Haluan River region, Nusa Penida MPA, Tabaru traditional community on Halmahera Island, and Bali Network MPA, have been the most successful (Al Muhdhar et al. 2019; Berdej and Armitage 2016; Hendrik et al. 2021). On the other hand, programs that were founded by national entities and have limited collaboration with local communities typically resulted in environmental and/or social failure, such as WNP or the CTI (Berdej, Andrachuk, and Armitage 2015; Cinner 2007; Clifton 2003; Tranter et al. 2022). A pattern was revealed in Indonesian conservation wherein programs founded and sustained at the local level were more successful than those founded and maintained by state or international entities. This pattern is applicable to conservation programs around the world. Moreover, it provides insight into the importance of local and state power dynamics and environmental policy success in general. People-based solutions - programs founded by and for

local communities - generate the most success because they encourage community autonomy and are more sustainable in the long term.

Local communities and regional governments must have the power to dictate their own environmental policy. By ensuring that local people (as opposed to state or international entities) have the capability to design and enforce environmental policy, conservation programs can best be tailored to local context and the specific demands of individual communities. We cannot distill environmental protection from human influence. People must inevitably interact with the natural world, often in substantial ways that dramatically impact the health of the environment. Consequently, people are often the cause of environmental degradation, habitat loss, and biodiversity decline. But this does not mean that the ideal conservation solution is a complete elimination of human activity. People depend on the natural world for their livelihoods, traditional practices, ceremonies, and enjoyment. For that reason, we mustn't exclude people from environmental protection efforts. Solutions that are not people-based certainly fail because they do not consider the well-being of local communities in the long term. Instead, local people should dictate how their environment is sustained and conserved. People can then continue to access natural resources, but in more sustainable and environmentally conscious ways.

It is also crucial that programs be locally sustainable and not require an overabundance of external influence. Ensuring that local people have the power to both enact and maintain conservation programs is essential to their longevity and ultimate success. In instances of over-centralization in co-management relationships (like in the case of WNP), programs risk fostering paternalistic relationships between communities and external sovereignties. In other words, external (national or international) entities may restrict the freedoms (for example, the natural resource use) of local people in the supposed best interest of communities and the environment.

This power dynamic can result in the over-reliance of local communities on the resources of external sovereignties (for example, supplementary food being provided to replace fishing hauls). We have also seen that centralized governance of conservation programs reduces local autonomy and ultimately fails at environmental protection. For this reason, local communities and regional governments must have the most power and influence over environmental policy. If communities can sustain conservation programs internally, then there is less dependence on external aid in the long term. Ultimately, local initiation of conservation programs can foster a positive feedback loop of self-sustainability: residents are empowered to manage and benefit from their natural resources, reducing vulnerability to economic shocks or changes in external funding. Consequently, communities require less state or international influence in the future.

Locally sustainable conservation programs are also more likely to align with the cultural values, traditions, and practices of the communities living in the area. Conservation efforts can best respect the cultural heritage and identity of local populations when founded by community stakeholders and those directly impacted by conservation policies. Furthermore, internally sustainable conservation programs can promote social equity by ensuring that benefits are distributed fairly within the community, which can help reduce disparities and conflicts related to access to and management of natural resources.

Preservation of biodiversity and the health of ecosystems is also ensured by internally maintained programs. Local communities are often the first to experience the negative consequences of environmental degradation, so they have a strong incentive to protect their natural resources. Community agreement with conservation policy also encourages cooperation with natural resource restrictions in the long-term, which fosters ecological protection.

Overall, decentralized power dynamics that give more authority to local institutions are most effective at generating successful environmental policy. Both the initiation and maintenance of conservation programs should occur at the local level. However, we have also seen that there is still a place for external intervention in conservation program development - state institutions can be used to legitimize programs and facilitate funding. For this reason, power cannot be completely extracted from state or international sovereignty. At this point, it is vital to consider who should initiate co-management relationships: local communities or state and international authorities? Ultimately, local communities must be able to determine when and how external organizations are involved in conservation programs. In other words, regional governments and local stakeholders should determine how external influence is applied to an internal conservation program – local communities must initiate co-management relationships. Maintaining power within local communities ensures those who are most familiar with the needs of a conservation area can delegate responsibility and foster collaborative relationships with external entities. State or international entities will not be recruited unnecessarily, and paternalistic relationships can be avoided by increasing local sovereignty in conservation policy.

5.4. Summary of Discussion

I have discussed how the following attributes of successful conservation initiatives can be applied to currently lacking Indonesian programs: (1) a biocultural perspective, (2) co-management strategies with an emphasis on the devolution of power, (3) local wisdom/IKS consideration and the inclusion of indigenous minority input, and (4) improved and diverse alternative livelihood options. I also described potential global applications of the biocultural perspective, devolution of power in co-management relationships, inclusion of indigenous

minority opinion, and incorporation of alternative livelihood options in conservation programs. Finally, I discussed the complex dynamics between local communities and international and state sovereignties in conservation policy and the importance of local contextual consideration.

I have argued that the devolution of power to local communities is of paramount importance in designing conservation programs and policies. The inclusion of local context is also essential to developing sustainable conservation programs that accurately reflect the needs of both local people and the environment. The importance of the devolution of power and consideration of local economic, social, and cultural context is true for all conservation programs around the world. For that reason, it would be entirely ineffective to apply a one-size-fits-all approach to conservation programs. The complex, context-specific nature of environmental conservation requires uniquely tailored, site-specific strategies. Effective conservation programs should be developed with a deep understanding of the ecological, cultural, economic, and social characteristics of the target region rather than relying on standardized, universal approaches.

CHAPTER 6: CONCLUSION

Conservation programs in Indonesia have suffered from several issues and concerns that have led to partially successful or even unsuccessful implementation. By analyzing the current literature on marine conservation initiatives in Indonesia, this thesis has revealed common attributes of successful programs that effectively benefit both the environment and local communities. A successful conservation program achieves desirable ecological outcomes (i.e., species recovery, positive changes in population trends, or marine habitat protection) as well as desirable social outcomes (i.e., reductions in economic loss, local community acceptance, participation, and upheld or strengthened cultural resources). As I have identified in this thesis, the common attributes of a successful conservation program are (1) a biocultural perspective, (2) devolution of power in co-management relationships, (3) inclusion of indigenous minority opinion, and (4) incorporation of diverse alternative livelihood options.

The biocultural perspective contributes to program success because it identifies and utilizes common goals shared between local communities and environmental conservationists. Instead of solely emphasizing a Western scientific opinion, the biocultural approach considers whole socio-ecological systems with an emphasis on local economic, social, and cultural needs. This consideration for both the social and the natural ensures that demands of local communities are represented in conservation policy and preference is not given to ecological preservation over the well-being of local people. Systems of co-management that emphasize the devolution of power are necessary for effective implementation of the biocultural approach in conservation design.

Devolved co-management systems generate successful conservation programs from both an ecological and social perspective by ensuring local autonomy and thus encouraging local acceptance of and cooperation with policy. When those most impacted by a conservation program

can develop its regulations, they are more willing to cooperate with the program. In this way, local social and economic concerns are best reflected in conservation policy and do not contradict local ways of life. Moreover, devolution in co-managed systems supports adaptive policies, as communities can directly alter conservation programs to complement shifting environmental, cultural, and economic trends. A co-managed system, as opposed to a solely community-dictated policy, is practical because it allows state and international authorities to legitimize and publicize programs founded at the local level. The inclusion of indigenous minority groups in conservation design is a necessary component of a devolved co-management relationship because it ensures that all groups within a conservation region have agency in conservation policy and agree with regulations.

All conservation programs must be more inclusive of indigenous minority opinions and the perspective of local community members. Unsuccessful conservation programs are sustained by imbalanced biopower systems that specifically exclude indigenous minority communities from policy development. Consequently, conservation regulations are breached by those same groups because they are either unfamiliar with the program or, more commonly, must resist regulations to preserve their biological and physical well-being. On the other hand, conservation policies based on indigenous minority opinions garner more success because they incorporate the needs of local communities into regulation. Local people tend not to resist conservation programs that accurately reflect their needs and traditional uses of the natural environment. Diverse and accessible alternative livelihood options contribute to balanced biopower relationships and the inclusion of historically marginalized groups in conservation programs.

Creating alternative livelihoods in areas where conservation initiatives eliminate or reduce existing employment options is a crucial aspect of maintaining local social and financial autonomy.

While alternative employment options vary between locations, there are some replicable attributes of successful alternative employment strategies, including collaboration with communities, assessment and application of local skills and resources, skill development and training, and diversification of employment options. Many people living within a conservation region depend on alternative livelihood options when previous employment has been removed by conservation regulations. For that reason, employment options must be available to all those interested in participating, and alternatives must be as lucrative as the jobs they are replacing. Overall, my review of the current literature on Indonesian conservation revealed that local agency and economic, social, and cultural contextualization are vital to the development of successful environmental policy.

6.1. Limitations and Future Research

In looking at the current literature on conservation policies across various regions of Indonesia, I have had the opportunity to identify recurrent successes and failures throughout programs and formulate a more comprehensive analysis of Indonesian conservation. However, there are limitations to solely performing a literature review in analyzing environmental policy. For example, community attitudes toward conservation initiatives can be oversimplified in the current literature, hindering a researcher's ability to gauge program success and precise grievances with existing initiatives. Ultimately, there is no replacement for ethnographic studies and direct observation in this type of anthropological research. My future investigations into environmental conservation would benefit from participant observation and interviews with those most impacted by conservation programs. Gaining a more in-depth perspective on local opinion and acceptance

of current conservation initiatives would provide invaluable information on how programs garner success or failure through community initiation and involvement.

Several further issues may be explored through the type of analysis I have conducted in this thesis, which may be of wider significance for anthropology in general and the study of Indonesian conservation in particular. First, the impact of conservation programs across intersectional lines (with an emphasis on gender and livelihood identity) should be further investigated (Lynch, 2017). Such research could reveal diverse vulnerabilities to various conservation measures and crucial applications of local involvement in policy design. How intersectionalities across gender, social class, age, and livelihood impact a community member's relationship with conservation programs is especially relevant to my findings on the inclusion of minority opinion in conservation development and consideration of local context when designing environmental policies.

The differences between land-based and marine-based environmental policy is another area of further exploration. The fishery sector, being particularly mobile, does not have the same concrete administrative borders as land-based zones. The mobile nature of maritime practice may influence the types of approaches used to develop marine conservation laws and policies, as well as the common attributes of program success that are exclusive to oceanic and coastal areas. A deeper understanding of how the versatile aspects of fishery and marine resource regulation impact related laws and policies could reveal commonalities between land-based and marine-based environmental preservation tactics; these commonalities could further reveal if and how marine conservation policy can be tailored specifically to a mobile and more dynamic context.

This thesis briefly discussed the importance of scale consideration in balancing co-management relationships. Further research is needed to determine the precise relationship

between the size of a conservation region and the need for devolution or centralization in co-management (Berdej and Armitage 2016). When, if ever, is the centralization of power to state or international powers necessary? Future analyses of conservation initiatives across scales and with varied management strategies could help answer this question. My research has suggested that the ideal balance of power in co-management systems is unique to each program and that scale may only be one of many contributing factors. In other words, co-management - and all other aspects of conservation policies - can only be determined on a case-by-case basis.

6.2. Closing

There is no one-size-fits-all approach to successful environmental conservation. The natural conditions of a region, such as climate, topography, and geology, differ significantly across the globe. Ecological and geological differences alone justify site-specific conservation strategies in terms of natural resource-use restrictions. My research has also highlighted that differences in socioeconomic and cultural practices necessitate uniquely tailored programs that are considerate of local context. Site-specific strategies can manifest as differences in co-management balance, increased emphasis on specific marginalized groups, and varied alternative employment options. Effective conservation programs should be developed with a deep understanding of the unique cultural, economic, and social characteristics of their target region rather than relying on standardized approaches. The most effective method of generating successful, contextually considerate conservation is through the initiation of programs at the local level. Ultimately, when power is devolved to local communities to dictate and enforce their own policies, there is greater acceptance of conservation programs, and they achieve more socio-ecological success.

Local initiation and agency in policy design are paramount to creating durable and accepted programs that foster success. Ultimately, local communities should be the sovereign entities in policy generation to maintain local autonomy, protect social and cultural values, and garner community acceptance of policy regulations. State and international powers should not be the ones initiating policy design, as they often fail to consider local context or tailor regulations to the best interest of residents. This is not to say that external forces should be excluded completely from policy implementation - they can still play a role in the legitimization and publication of regulations. However, it is vital that local communities maintain agency over policy development and enforcement. Analysis of marine conservation in Indonesia has demonstrated the importance of local initiation and collaboration in policy design, and these findings can be applied to environmental policy around the world.

In the face of unprecedented global climate change and biodiversity loss, developing effective environmental conservation initiatives is more crucial than ever. While ecological consideration is a necessary component of policy design, it is social consideration that truly dictates whether or not a program will be successful in its conservation goals; the salvation of nature requires respect for man. Despite current marine conservation programs not being entirely successful, there are grounds for optimism that past management and enforcement failures can be amended. By encouraging local instigation of conservation programs and the inclusion of regional context in policy design, initiatives can benefit both people and the environment to great success.

REFERENCES

- “50 National Parks in Indonesia.” 2022. November 24, 2022.
https://web.archive.org/web/20131009143318/http://www.dephut.go.id/uploads/INFOR_MASI/TN%20INDO-ENGLISH/tn_index.htm.
- Al Amin, MA, L Adrianto, T Kusumastanto, and Z Imran. 2021. “Community Knowledge, Attitudes and Practices towards Environmental Conservation: Assessing Influencing Factors in Jor Bay Lombok Indonesia.” *Marine Policy* 129 (July): 104521.
<https://doi.org/10.1016/j.marpol.2021.104521>.
- Al Muhdhar, Mimien Henie Irawati, Fatchur Rohman, M. Nasir Tamalene, Wawan S. Nadra, Alfian Daud, Bahtiar, and Hudan Irsyadi. 2019. “Local Wisdom-Based Conservation Ethics of Tabaru Traditional Community on Halmahera Island, Indonesia.” *International Journal of Conservation Science* 10 (3): 533–42.
- Alexander, Steven M., and Derek Armitage. 2015. “A Social Relational Network Perspective for MPA Science.” *Conservation Letters* 8 (1): 1–13.
- Ananta, Aris, Evi Nurvidya Arifin, M. Sairi Hasbullah, Nur Budi Handayani, and Agus Pramono. 2015. *Demography of Indonesia’s Ethnicity*. Institute of Southeast Asian Studies.
- Andradi-Brown, Dominic A., Laura Veverka, Amkieltiela, Nicole L. Crane, Estradivari, Helen E. Fox, David Gill, et al. 2023. “Diversity in Marine Protected Area Regulations: Protection Approaches for Locally Appropriate Marine Management.” *Frontiers in Marine Science* 10. <https://www.frontiersin.org/articles/10.3389/fmars.2023.1099579>.
- Aquil, Andi Muhammad Ibnu. 2022. “Overfishing Looms as Indonesia Struggles to Meet Fisheries Target: Study.” *The Jakarta Post*. December 22, 2022.
<https://www.thejakartapost.com/indonesia/2022/12/23/overfishing-looms-as-indonesia-struggles-to-meet-fisheries-target-study.html>.
- Berdej, Samantha, Mark Andrachuk, and Derek Armitage. 2015. “Conservation Narratives and Their Implications in the Coral Triangle Initiative.” *Conservation and Society* 13 (2): 212–20. <https://doi.org/10.4103/0972-4923.164208>.
- Berdej, Samantha, and Derek Armitage. 2016. “Bridging for Better Conservation Fit in Indonesia’s Coastal-Marine Systems.” *Frontiers in Marine Science* 3.
<https://www.frontiersin.org/articles/10.3389/fmars.2016.00101>.
- Bottema, Mariska J. M., and Simon R. Bush. 2012. “The Durability of Private Sector-Led Marine Conservation: A Case Study of Two Entrepreneurial Marine Protected Areas in Indonesia.” *Ocean & Coastal Management* 61 (June): 38–48.
<https://doi.org/10.1016/j.ocecoaman.2012.01.004>.
- Charles, Anthony. 2012. “People, Oceans and Scale: Governance, Livelihoods and Climate Change Adaptation in Marine Social–Ecological Systems.” *Current Opinion in Environmental Sustainability*, Aquatic and marine systems, 4 (3): 351–57.
<https://doi.org/10.1016/j.cosust.2012.05.011>.
- Chuenpagdee, Ratana, and Svein Jentoft. 2007. “Step Zero for Fisheries Co-Management: What Precedes Implementation.” *Marine Policy* 31 (6): 657–68.
<https://doi.org/10.1016/j.marpol.2007.03.013>.

- Cinner, J. E. 2007. “Designing Marine Reserves to Reflect Local Socioeconomic Conditions: Lessons from Long-Enduring Customary Management Systems.” *Coral Reefs* 26 (4): 1035–45. <https://doi.org/10.1007/s00338-007-0213-2>.
- Clifton, Julian. 2003. “Prospects for Co-Management in Indonesia’s Marine Protected Areas.” *Marine Policy* 27 (5): 389–95. [https://doi.org/10.1016/S0308-597X\(03\)00026-5](https://doi.org/10.1016/S0308-597X(03)00026-5).
- . 2009. “Science, Funding and Participation: Key Issues for Marine Protected Area Networks and the Coral Triangle Initiative.” *Environmental Conservation* 36 (2): 91–96.
- . 2013a. “Compensation, Conservation and Communities: An Analysis of Direct Payments Initiatives within an Indonesian Marine Protected Area.” *Environmental Conservation* 40 (3): 287–95.
- . 2013b. “Refocusing Conservation through a Cultural Lens: Improving Governance in the Wakatobi National Park, Indonesia.” *Marine Policy*, Governing marine protected areas: towards social-ecological resilience through institutional diversity, 41 (September): 80–86. <https://doi.org/10.1016/j.marpol.2012.12.015>.
- Clifton, Julian, and Simon Foale. 2017. “Extracting Ideology from Policy: Analysing the Social Construction of Conservation Priorities in the Coral Triangle Region.” *Marine Policy* 82 (August): 189–96. <https://doi.org/10.1016/j.marpol.2017.03.018>.
- Clifton, Julian, and Chris Majors. 2012. “Culture, Conservation, and Conflict: Perspectives on Marine Protection Among the Bajau of Southeast Asia.” *Society & Natural Resources* 25 (7): 716–25. <https://doi.org/10.1080/08941920.2011.618487>.
- “Co-Management Approaches | Reef Resilience.” 2023. 2023. <https://reefresilience.org/management-strategies/marine-protected-areas-2/co-management-approaches/>.
- “Coral Triangle Center | Nusa Penida MPA.” n.d. Accessed September 15, 2023. <https://www.coraltrianglecenter.org/nusa-penida-mpa/>.
- Crabbe, M. James, Sarah Karaviotis, and David J. Smith. 2004. “Monitoring Growth of Hard Corals as Performance Indicators for Coral Reefs.” *Journal of Biological Education* 38 (3): 113–17. <https://doi.org/10.1080/00219266.2004.9655917>.
- Dhiaulhaq, Ahmad, Toon De Bruyn, and David Gritten. 2015. “The Use and Effectiveness of Mediation in Forest and Land Conflict Transformation in Southeast Asia: Case Studies from Cambodia, Indonesia and Thailand.” *Environmental Science & Policy* 45 (January): 132–45. <https://doi.org/10.1016/j.envsci.2014.10.009>.
- Dirhamsyah, D. 2006. “Indonesian Legislative Framework for Coastal Resources Management: A Critical Review and Recommendation.” *Ocean & Coastal Management* 49 (1): 68–92. <https://doi.org/10.1016/j.ocecoaman.2005.09.001>.
- Elliott, Gina, Bruce Mitchell, Bonnie Wiltshire, IR. Abdul Manan, and Susan Wismer. 2001. “Community Participation in Marine Protected Area Management: Wakatobi National Park, Sulawesi, Indonesia.” *Coastal Management* 29 (4): 295–316. <https://doi.org/10.1080/089207501750475118>.
- Estradivari, Dominic A. Andradi-Brown, Amkieltiela, Christian N. Handayani, Fikri F. Sjahrudin, Muh. Firdaus Agung, Stuart J. Campbell, et al. 2022. “Marine Conservation in the Sunda Banda Seascape, Indonesia.” *Marine Policy* 138 (April): 104994. <https://doi.org/10.1016/j.marpol.2022.104994>.
- Evans, Kevin, and Marlene Millott. 2020. “Briefing Note: Indonesia’s Five Levels of Government.” *AustraliaIndonesia.Com* (blog). May 13, 2020. <https://australiaindonesia.com/politics/the-five-levels-of-government-in-indonesia/>.

- Exton, Dan. 2013. "Nearshore Fisheries of the Wakatobi." *Marine Research and Conservation in the Coral Triangle*, January, 193–208.
- Foucault, M., Arnold I. Davidson, and Graham Burchell. (1978) 2008. *The Birth of Biopolitics: Lectures at the Collège de France, 1978-1979*. Springer.
- Frid, Alejandro, Kyle L. Wilson, Jennifer Walkus, Robyn E. Forrest, and Mike Reid. 2023. "Re-Imagining the Precautionary Approach to Make Collaborative Fisheries Management Inclusive of Indigenous Knowledge Systems." *Fish and Fisheries* n/a (n/a). <https://doi.org/10.1111/faf.12778>.
- Gavin, Michael C., Joe McCarter, Fikret Berkes, Aroha Te Pareake Mead, Eleanor J. Sterling, Ruifei Tang, and Nancy J. Turner. 2018. "Effective Biodiversity Conservation Requires Dynamic, Pluralistic, Partnership-Based Approaches." *Sustainability* 10 (6): 1846. <https://doi.org/10.3390/su10061846>.
- Gill, David A., Samantha H. Cheng, Louise Glew, Ernest Aigner, Nathan J. Bennett, and Michael B. Mascia. 2019. "Social Synergies, Tradeoffs, and Equity in Marine Conservation Impacts." *Annual Review of Environment and Resources* 44 (1): 347–72. <https://doi.org/10.1146/annurev-environ-110718-032344>.
- Gotama, Rinaldi, Serena J. Stean, Lauren D. Sparks, Rahmadi Prasetijo, and Pascal Sebastian. 2023. "Citizen Science Approach for Monitoring Fish and Megafauna Assemblages in a Remote Marine Protected Area." *Regional Studies in Marine Science* 64 (December): 103058. <https://doi.org/10.1016/j.rsma.2023.103058>.
- Hadi, Tri, Abrar Muhammad, Giyanto Giyanto, Bayu Prayudha, Ofri Johan, Agus Budiyanto, Ahmad Rezza, La Alifatri, Siti Sulha, and Suharsono Shar. 2020. *The Status of Indonesian Coral Reefs 2019*.
- Hendrik, Hendrik, Muhammad Fauzi, Tomi Ramadana, Andri Hendrizal, and Irwan Effendi. 2021. "Local Wisdom and Conservation Status of Tor Thai Mahseer Fish (*Tor tambroides* Blkr) in the Batang Haluan River, West Sumatra, Indonesia." *International Journal of Conservation Science* 12 (4): 1547–56.
- "History of CTI-CFF." 2010. June 4, 2010. <https://www.coraltriangleinitiative.org/about>.
- "Indonesia." 2023. UrbanShift. September 25, 2023. <https://www.shiftcities.org/projects/indonesia>.
- "Indonesia Fisheries." n.d. The Nature Conservancy. Accessed October 4, 2023. <https://www.nature.org/en-us/about-us/where-we-work/asia-pacific/indonesia/stories-in-indonesia/indonesia-fisheries/>.
- "Indonesia Ranks Among the World's Best Countries." 2023. U.S. News & World Report. 2023. <https://www.usnews.com/news/best-countries/indonesia>.
- Jones, Benjamin, Leanne Cullen-Unsworth, Maricela de la Torre-Castro, Lina Nordlund, Richard Unsworth, and Johan Eklöf. 2022. "Unintended Consequences of Sustainable Development Initiatives: Risks and Opportunities in Seagrass Social-Ecological Systems." *Ecology and Society* 27 (2). <https://doi.org/10.5751/ES-13063-270210>.
- Leonardo, Adam, and Nowar Deeb. 2022. "Illegal, Unreported and Unregulated (IUU) Fishing in Indonesia: Problems and Solutions." *IOP Conference Series: Earth and Environmental Science* 1081 (1): 012013. <https://doi.org/10.1088/1755-1315/1081/1/012013>.
- Lynch, Melody. 2017. "Bajo Ethnic Minority Livelihoods, Mobility, and Resistance in the Wakatobi National Park, Southeast Sulawesi, Indonesia." M.A., Canada -- Quebec, CA: McGill University (Canada). <https://www.proquest.com/docview/2504516740/abstract/4742A33DE9404EC8PQ/1>.

- Mace, Georgina M. 2014. “Whose Conservation?” *Science* 345 (6204): 1558–60. <https://doi.org/10.1126/science.1254704>.
- Marlow, Joseph, Abdul Haris, Jamal Jompa, Shinta Werorilangi, Tracey Bates, Holly Bennett, and James J. Bell. 2020. “Spatial Variation in the Benthic Community Composition of Coral Reefs in the Wakatobi Marine National Park, Indonesia: Updated Baselines and Limited Benthic Community Shifts.” *Journal of the Marine Biological Association of the United Kingdom* 100 (1): 37–44. <https://doi.org/10.1017/S0025315419001012>.
- Measey, Mariah. n.d. “Indonesia: A Vulnerable Country in the Face of Climate Change.”
- Mordhorst, Katya. 2021. “In Indonesia, Illegal Fishing Hurts More Than Just Fish.” USGLC. March 3, 2021. <https://www.usglc.org/blog/in-indonesia-illegal-fishing-hurts-more-than-just-fish/>.
- Neilson, Jeffrey, and Beria Leimona. 2010. “Payments for Ecosystem Services and Environmental Governance in Indonesia.” *Law, Tropical Forests and Carbon the Case of REDD+*, January, 207–29. <https://doi.org/10.1017/CBO9781139236904.014>.
- “Ridge to Reef Approach.” 2017. October 13, 2017. <https://panorama.solutions/fr/building-block/ridge-reef-approach>.
- Rizal, A., and Z. Anna. 2019. “Climate Change and Its Possible Food Security Implications toward Indonesian Marine and Fisheries.” *World News of Natural Sciences* 22. <http://agro.icm.edu.pl/agro/element/bwmeta1.element.agro-e303250f-f51b-47b0-b935-b8917d2aa8dc>.
- Saha, Dipjyoti, and Suwendu Bhattacharya. 2010. “Hydrocolloids as Thickening and Gelling Agents in Food: A Critical Review.” *Journal of Food Science and Technology* 47 (6): 587–97. <https://doi.org/10.1007/s13197-010-0162-6>.
- Satria, Arif, Nur Hannah Muthohharoh, Rinto Andhi Suncoko, and Istiqlaliyah Muflikhati. 2017. “Seaweed Farming, Property Rights, and Inclusive Development in Coastal Areas.” *Ocean & Coastal Management*, Inclusive development and coastal adaptiveness: a global assessment, 150 (December): 12–23. <https://doi.org/10.1016/j.ocecoaman.2017.09.009>.
- SROCC-IPCC. 2019. “Chapter 5: Changing Ocean, Marine Ecosystems, and Dependent Communities — Special Report on the Ocean and Cryosphere in a Changing Climate.” 2019. <https://www.ipcc.ch/srocc/chapter/chapter-5/>.
- Steenbergen, Dirk J., Cliff Marlessy, and Elisabeth Holle. 2017. “Effects of Rapid Livelihood Transitions: Examining Local Co-Developed Change Following a Seaweed Farming Boom.” *Marine Policy* 82 (August): 216–23. <https://doi.org/10.1016/j.marpol.2017.03.026>.
- Tam, Chui-Ling. 2019. “Branding Wakatobi: Marine Development and Legitimation by Science.” *Ecology and Society* 24 (3). <https://doi.org/10.5751/ES-11095-240323>.
- “The State of World Fisheries and Aquaculture 2020.” 2020. 2020. <https://doi.org/10.4060/ca9229en>.
- Thornton, Sara A., Erna Setiana, Kris Yoyo, Dudin, Yulintine, Mark E. Harrison, Susan E. Page, and Caroline Upton. 2020. “Towards Biocultural Approaches to Peatland Conservation: The Case for Fish and Livelihoods in Indonesia.” *Environmental Science & Policy* 114 (December): 341–51. <https://doi.org/10.1016/j.envsci.2020.08.018>.
- Tranter, Sylvie N., Estradivari, Gabby N. Ahmadi, Dominic A. Andradi-Brown, Dominic Muenzel, Firdaus Agung, Amkieltiela, et al. 2022. “The Inclusion of Fisheries and Tourism in Marine Protected Areas to Support Conservation in Indonesia.” *Marine Policy* 146 (December): 105301. <https://doi.org/10.1016/j.marpol.2022.105301>.

- UN Environment Programme. n.d. “Convention in Biological Diversity.” Secretariat of the Convention on Biological Diversity. Accessed October 3, 2023. <https://www.cbd.int/countries/profile/?country=id>.
- UNESCO World Heritage Centre. 2006. “Wakatobi National Park.” UNESCO World Heritage Centre. 2006. <https://whc.unesco.org/en/tentativelists/2006/>.
- Vasilakopoulos, Paraskevas, Finbarr G. O’Neill, and C. Tara Marshall. 2011. “Misspent Youth: Does Catching Immature Fish Affect Fisheries Sustainability?” *ICES Journal of Marine Science* 68 (7): 1525–34. <https://doi.org/10.1093/icesjms/fsr075>.
- Von Heland, Franciska, and Julian Clifton. 2015. “Whose Threat Counts? Conservation Narratives in the Wakatobi National Park, Indonesia.” *Conservation and Society* 13 (2): 154. <https://doi.org/10.4103/0972-4923.164194>.
- Wahyudin, Yudi, Tridoyo Kusumastanto, Luky Adrianto, and Yusli Wardiatno. 2018. “A Social Ecological System of Recreational Fishing in the Seagrass Meadow Conservation Area on the East Coast of Bintan Island, Indonesia.” *Ecological Economics* 148 (June): 22–35. <https://doi.org/10.1016/j.ecolecon.2018.01.013>.
- “Wakatobi Biosphere Reserve, Indonesia.” 2019. March 2019. <https://en.unesco.org/biosphere/aspac/wakatobi>.
- “Wakatobi: Marine Life.” n.d. Wakatobi. Accessed September 16, 2023. <https://www.wakatobi.com/the-diving-experience/marine-life/>.
- “Wakatobi National Marine Park - Indonesia Travel.” n.d. Wonderful Indonesia. Accessed September 5, 2023. <https://www.indonesia.travel/gb/en/destinations/sulawesi/wakatobi/wakatobi-national-marine-park>.
- Walpole, Matthew J., and Harold J. Goodwin. 2001. “Local Attitudes towards Conservation and Tourism around Komodo National Park, Indonesia.” *Environmental Conservation* 28 (2): 160–66. <https://doi.org/10.1017/S0376892901000169>.
- “What Is Ecotourism.” n.d. *The International Ecotourism Society* (blog). Accessed September 17, 2023. <https://ecotourism.org/what-is-ecotourism/>.
- “World Bank Climate Change Knowledge Portal.” 2021. Climate Change Knowledge Portal. 2021. <https://climateknowledgeportal.worldbank.org/>.
- “World Heritage - Grid.” n.d. UNESCO World Heritage Centre. Accessed October 5, 2023. <https://www.unesco.org/en/world-heritage/grid>.
- Worm, Boris, Edward B. Barbier, Nicola Beaumont, J. Emmett Duffy, Carl Folke, Benjamin S. Halpern, Jeremy B. C. Jackson, et al. 2006. “Impacts of Biodiversity Loss on Ocean Ecosystem Services.” *Science* 314 (5800): 787–90. <https://doi.org/10.1126/science.1132294>.
- “WRI Indonesia.” n.d. World Resources Institute. Accessed October 23, 2023. <https://www.wri.org/asia/wri-indonesia>.
- Yuliana, Ernik, Adi Winata, Hasan Eldin Adimu, Yuni Tri Hewindati, and Wibowo A. Djatmiko. 2022. “Reef Fish in the Mudflats of Kaledupa Island in Wakatobi National Park, Indonesia.” *HAYATI Journal of Biosciences* 29 (2): 245–54. <https://doi.org/10.4308/hjb.29.2.245-254>.
- Yuniarni, Sarah. 2016. “Unity in Diversity: Indonesia’s Six Largest Ethnic Groups.” Jakarta Globe. July 16, 2016. <https://jakartaglobe.id/culture/unity-diversity-indonesias-six-largest-ethnic-groups>.

Zamroni, A. 2021. "Sustainable Seaweed Farming and Its Contribution to Livelihoods in Eastern Indonesia." *IOP Conference Series: Earth and Environmental Science* 718 (1): 012099. <https://doi.org/10.1088/1755-1315/718/1/012099>.

APPENDIX: LIST OF ABBREVIATIONS

CI-I	Conservation International Indonesia
CT	Coral Triangle
CTC	Coral Triangle Center
CTI	Coral Triangle Initiative
EMPA	Entrepreneurial Marine Protected Area
IKS	Indigenous Knowledge Systems
KNP	Komodo National Park
MPA	Marine Protected Area
MSY	Maximum Sustainable Yield
NTZ	No-Take Zone
PES	Payments for Ecosystem Services
PTZ	Partial-Take Zone
SBS	Sunda Banda Seascape
TAC	Total Allowable Catch
WNP	Wakatobi National Park
WRI	World Resource Institute