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MONTEREY, CALIFORNIA

THESIS

**THE ROLE OF FISHERIES MANAGEMENT IN
MITIGATING CONFLICT RESULTING FROM
FISHERIES DEPLETION**

by

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March 2019

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RESULTING FROM FISHERIES DEPLETION**

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ABSTRACT

This thesis examines the effects of management style on conflict between fisheries users, looking at Tanzania and South Africa as case studies. Research indicates that management programs that incorporate local communities while retaining a level of national support are more likely to be successful in enforcing rules and regulations, promoting sustainability, and reducing incidents of conflict between users. Nationally based programs that exclude local communities from management roles risk alienating local fisheries users and increasing violations and conflict. In a world of drastically expanding fisheries exploitation, management style will become increasingly important in ensuring that competition between users remains peaceful and fisheries resources are available for continued use.

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LIST OF ACRONYMS AND ABBREVIATIONS

EEZ	Exclusive Economic Zone
HDI	Historically Disadvantaged Individual
MALF	Ministry of Agriculture, Livestock, and Fisheries
MPA	Maritime Protected Area
TAC	Total Allowable Catch

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I. THE ROLE OF MANAGEMENT IN MITIGATING CONFLICT RESULTING FROM FISHERIES DEPLETION

The purpose of this thesis is to examine the impact of fisheries management programs on conflict between fisheries users. It examines the role of fisheries degradation and how it may lead to conflict in Africa and whether a particular type of fishery management is more effective in preventing these conflicts. Rural, coastal communities in Africa share fisheries with an ever-increasing worldwide demand on this limited but critical resource. I am interested in exploring what security concerns may arise as a result of this dependence on over-stressed fisheries as the resource continues to diminish. Assuming that the type of management program employed in a given area can influence the level of conflict among fisheries users, I am interested in what implications this may have for fisheries management on a global scale and how this could potentially impact international security.

A. SIGNIFICANCE

The world's human population continues to grow at an alarming rate. Currently at over 7 billion, the UN estimates that it will reach over 9 billion by 2050.¹ As the population continues to grow, the need for food increases and so, too, do the demands placed on already strained ecosystems. In the more developed parts of the world, food is more readily available as a result of more advanced agricultural techniques and people are better able to compensate for nutritional shortages that may occur as a result of environmental decline. In less developed parts of the world, subsistence farming and natural resources still provide a significant portion of daily food sources. Many underdeveloped regions, including throughout southern Africa, rely heavily on fisheries as a primary source for protein and livelihood, and approximately 2.9 billion people worldwide rely on fish as a primary food source.² However, developed nations demands on fisheries continue to grow and impact

¹ "The World Population Prospects: 2015 Revision," UN, July 29, 2015, <http://www.un.org/en/development/desa/publications/world-population-prospects-2015-revision.html>.

² USAID, *Fishing for Food Security: The Importance of Wild Fisheries for Food Security and Nutrition* (Washington, DC: USAID, 2016), 9.

regions where fisheries provide critical sustenance and income. As these two worlds and their increasing demands clash over dwindling worldwide fish stocks, food and income shortages may drive desperate populations to the brink of their own survival mechanisms, potentially creating ever more security risks within fragile states.

In Africa specifically, many coastal communities are particularly vulnerable as a result of their poor economic status and lack of alternative sources of income.³ The consequences of this clash in resource demands may range from famine to domestic insecurity as starving and unemployed populations seek alternative means of survival. Fragile states, lacking financial, political, and security resources face increased domestic strain from displaced and starving populations unless effective management techniques can be implemented in the near future. Understanding the root causes of conflict, such as degradation of a key natural resource, will enable local governments and the international community to identify at risk regions and sources of conflict and to implement effective policy responses.

The nature of commercial fishing and global trade makes regional fisheries degradation a potential source of international conflict, as well. The worldwide impacts of resource constraints have already been seen in the piracy epidemic that started in Somalia and impacted global trade. Numerous scholars have observed that Somali pirates were originally fishermen trying to defend their livelihoods and primary food source against illegal commercial fishers who were taking advantage of uncontrolled waters and marine stocks after the fall of the Somali government.⁴ While this conflict started as a resource and livelihood competition between artisanal fishers and large, foreign commercial entities, it ballooned into a security crisis on a global scale. This case provides an illustration of resource constraints leading to security crises on an international scale.

³ Vicky W.Y. Lam, William W.L. Cheung, W Swartz, and UR Sumaila, "Climate Change Impacts on Fisheries in West Africa: Implications for Economic, Food and Nutritional Security," *African Journal of Marine Science* 34, no. 1 (2012): 104.

⁴ U. Rashid Sumaila, and Mahamudu Bawumia, "Fisheries, Ecosystem Justice, and Piracy: A Case Study of Somalia," *Fisheries Research* 157 (2014): 154.

B. LITERATURE REVIEW

There is very little literature looking at the link between national security and fisheries degradation. Most research focuses on topics around the periphery of this issue, looking at the changing definition of security itself, links between other types of environmental degradation and insecurity, how climate change is affecting fisheries and livelihoods in Africa and across the globe, and fisheries management techniques as implemented by various countries across the continent. Some literature does look at the link between food security and human security, occasionally mentioning fisheries as a key food source, but even this falls short of taking the next step in tying this to national security, let alone security on a global scale. The one exception I have found to this dearth of information is a collection of articles that look at Somali piracy arising from local fishermen attempting to thwart illegal commercial fishermen taking advantage of uncontrolled waters.⁵ As such, any research into this topic will have to use what literature exists and examine whether there is a connection between the various peripheral topics that have been studied. It is worth noting that all of the above factors are highly relevant to African studies and literature about the challenges that Africa faces as a result of food shortages, climate change, and the abundant variety of security problems that the region faces. Rather than a shortage of information, it is the specific connection between them and the resulting link to national and international security that is missing.

1. Environmental Degradation as a Security Issue

One key issue surrounding this question is the classification of environmental security itself. The notion of what constitutes a security threat has grown and evolved as technology and warfare have expanded, becoming more nuanced. From computer hackers to nuclear weapons, the world of security is more complicated now than at any time in the past, but one perspective holds that security is still generally accepted to be “concerned only with military threats or those related to an ‘enemy.’”⁶ From this viewpoint,

⁵ Ghassan Schbley and William Rosenau, “Piracy, Illegal Fishing, and Maritime Insecurity in Somalia, Kenya, and Tanzania” CNA Analysis & Solutions paper, Sept 2013.

⁶ Gareth Porter, “Environmental Security as a National Security Issue,” *Current History* (1995): 218.

environmental concerns constitute neither a direct military threat nor deal with any specific enemy. On the other side of the argument, however, Mathews maintains that environmental issues are a global threat to all mankind.⁷ From her perspective, security need not utilize military might in order to pose an existential threat. Arguments in favor of both sides of the debate exist, but the question of how to qualify environmental security remains undecided.⁸

The classification of environmental security sparked another debate as to whether environmental degradation could pose a specific national security threat. This debate takes a similar form to the larger classification of environmental security as a security issue and is one that spans back several decades. Numerous academics delve in depth into human security, food security, environmental stability, and climate change vulnerability individually. However, research on the relationship between national security and the specific environmental security issue of fisheries, is limited. Porter does contemplate how and why environmental security issues could become national security threats, but his article is a much broader piece that does not look into specifics or outline in detail the impacts or implications of failing to consider environmental degradation. Levy maintains that further research into the causes of regional conflict is needed in order to fully understand environment-national security connections.⁹ He further questions whether environmental degradations could pose any true threat to the U.S. However, this may not be the case with less developed countries whose populations depend more closely on limited environmental resources.

Several articles pointing to potential mass migrations as people relocate in search of alternative food sources, thus putting pressure on other fragile systems, offer another

⁷ Jessica Mathews, "Redefining Security," *Foreign Affairs* 68 (1989): 162.

⁸ Daniel Deudney, "The Case Against Linking Environmental Degradation and National Security," *Journal of International Studies* (1990): 461. Terry Terriff, "The 'Earth Summit': Are There Any Security Implications?" *Arms Control* 13 (1992): 163.

⁹ Marc A. Levy, "Is the Environment a National Security Issue?" *International Security* 20 (1995): 36.

perspective on how environmental degradation could lead to internal conflict.¹⁰ As populations and environmental changes lead to environmental degradation and resource depletion in one region, the only recourse for survival becomes relocating in an attempt to seek out new resources.¹¹ As Lam et al. observe, depleted maritime fisheries, which account for a significant portion of dietary protein, could force coastal populations inland to seek new means of survival. However, inland populations whose agricultural subsistence has been depleted as a result of topsoil erosion or changes in weather patterns may also attempt to relocate in order to seek out alternatives for themselves.¹² These newly uprooted populations become internally displaced, creating domestic social unrest as migrant populations clash over limited space and resources. To some extent, this has already been seen in areas of drought and famine, where environmental migrants are unwelcome in regions already struggling to support local populations. Some argue that this pattern was visible in the Syrian refugee crisis that swept across Europe as a result of severe water shortages that contributed to the still on-going war.

Migration is only one of several factors that could lead to conflict. Several articles point to economic pressures resulting from environmental degradation as a potential cause of conflict. Myers describes the path to regional conflict as a result of environmental degradation leading to economic decline and destabilization.¹³ As environmental scarcity becomes increasingly problematic, countries whose economies rely on natural resources face a more strained economic outlook and potential economic instability.¹⁴ Throughout Africa, fisheries serve as a critical food source for artisanal fishers, but they are also a

¹⁰ Vicky W.Y. Lam, William W.L. Cheung, W Swartz, and UR Sumaila, "Climate Change Impacts on Fisheries in West Africa: Implications for Economic, Food and Nutritional Security," *African Journal of Marine Science* 34(1) 2012: 104.

¹¹ Thomas Homer Dixon, "Environmental Scarcities and Violent Conflict: Evidence from Cases" *International Security*, 19(1): 20.

¹² Vicky W.Y. Lam, William W.L. Cheung, W Swartz, and UR Sumaila, "Climate Change Impacts on Fisheries in West Africa: Implications for Economic, Food and Nutritional Security," *African Journal of Marine Science* 34(1) 2012: 104.

¹³ Norman Myers, "The Environmental Dimension to Security Issues," *The Environmentalist*, Vol 6., Number 4 (1986): 251.

¹⁴ Gareth Porter, "Environmental Security as a National Security Issue," *Current History* (1995): 220.

source of income for commercial fishers. This dual use of a diminishing resource creates a conflict of interests.

The violence seen in Senegal between commercial and artisanal fishers fits that described by Homer-Dixon in his 1994 article examining the connection between environmental scarcity and conflict.¹⁵ He argues that scarcity will lead to an increase in violence, but that it “will usually be sub-national,” like that seen in Senegal.¹⁶ However, while he does specify that this conflict will be limited in scope, he also theorizes that conflict may rise to the level that it will affect state institutions and that the state will be unable to effectively respond. This article introduces the possibility of environmental degradation posing a direct threat to national security.

2. African Fisheries

Articles about the current state of African fisheries point to both human stress and climate change as primary factors in fisheries degradation and that measures to mitigate both factors are critical to the survival of fisheries as a resource.¹⁷ However, most articles about the effects of climate change on African fisheries stress the detrimental lack of information and climate modeling for the continent as a whole. What data is available has been largely derived from research programs in South Africa or is based off of satellite observations.¹⁸ Available articles discuss the specific effects of climate change on various fish species and types of fisheries: e.g., migratory and resident fish species. Works also examine the effects on fisheries conditions: namely food sources and habitat for native fishes as a result of warming temperatures. Several articles detail how certain species will

¹⁵ Thomas Homer Dixon, “Environmental Scarcities and Violent Conflict: Evidence from Cases” *International Security*, 19 (1994): 5–40.

¹⁶ *Ibid.*, 6.

¹⁷ Allison, Edward H., Allison L. Perry, Marie-Caroline Badjeck, W. Neil Adger, Katrina Brown, Declan Conway, Ashley S. Halls, et al, “Vulnerability of National Economies to the Impacts of Climate Change on Fisheries,” *Fish and Fisheries* 10, no. 2 (06, 2009): 187. Dyhia Belhabib, Vicky W.Y. Lam, William W.L. Cheung, “Overview of West African Fisheries Under Climate Change: Impacts, Vulnerabilities and Adaptive Responses of the Artisanal and Industrial Sectors,” *Marine Policy* 71 (2016): 15.

¹⁸ W. M. Potts, A. Gotz, N. James, “Review of the Projected Impacts of Climate Change on Coastal Fishes in Southern Africa,” *Rev Fish Biol Fisheries* 25 (2015): 609.

migrate further south, to more temperate climates, as tropical waters warm.¹⁹ This shift south could leave tropical fishers, such as those in Tanzania and Mozambique, devoid of once plentiful fish stocks, directly impacting the over 200,000 individuals in Tanzania who rely on fisheries for either food or income.²⁰ However, the effects on fisheries are not identical on each side of the continent, as climate driven changes are predicted to vary based on location.²¹

Several articles focus on more specific regions, such as South Africa or specific fishing villages in Tanzania, but still have bearing on a larger region. One such article discusses the same species shifts toward cooler waters and the resulting population depletion in tropical zones. This study also mentions the potential for otherwise unrelated species coming into contact, thereby altering the food chain and introducing new predators into areas where species are already stressed.²² Similar to other literature, the importance of fisheries to African communities is emphasized, as is the fact that climate driven changes will affect every population dependent on these fisheries, from artisanal fishers to large, commercial companies.²³ One article examines the economic and socioeconomic consequences of fisheries depletion as a result of climate change, noting that West African fisheries in particular are incapable of ensuring future food security or ecological sustainability.²⁴ The consequences of such changes impact both food security and national level economics.

While literature discussing the effects of climate change on Africa is abundant, it largely focuses on the factors that make the continent as a whole more vulnerable than

¹⁹ Dyhia Belhabib, Vicky W.Y. Lam, and William W.L. Cheung, "Overview of West African Fisheries Under Climate Change: Impacts, Vulnerabilities and Adaptive Responses of the Artisanal and Industrial Sectors," *Marine Policy* 71 (2016): 15.

²⁰ Ibid., 604.

²¹ Barry M. Clark, "Climate change: A looming challenge for fisheries management in southern Africa," *Marine Policy* 30 (2006): 87.

²² Ibid., 86.

²³ Ibid., 90.

²⁴ Vicky W.Y. Lam, William W.L. Cheung, W Swartz, and UR Sumaila, "Climate Change Impacts on Fisheries in West Africa: Implications for Economic, Food and Nutritional Security," *African Journal of Marine Science* 34(1) (2012): 104.

other parts of the world. As the majority of the population in Africa live well below the poverty line and exist off of subsistence farming and artisanal fishing, they stand to suffer far more from the effects of fisheries depletion or changes in soil and rainfall patterns that could degrade their crops. Subsistence farmers and fishers lack the capacity to compensate for these changes in their primary source of food.²⁵ Some studies do delve into the impact that degraded fisheries have on vulnerable populations and look at how this vulnerability can be measured, as well as what strategies may be adopted to mitigate vulnerability.²⁶

Fisheries have already begun to feel the effects of climate change and what little data exists on the current state of African fisheries indicates that shortages are already posing problems. Local artisanal fishermen already report smaller fish catches, the need to pursue juveniles in the absence of fully grown fish, and changes in species distribution.²⁷ This strain has become visible in the span of a single lifetime, with older fishermen reporting significant decreases in overall quantity and size of catch from the time they began fishing decades earlier.

DuBois and Zografos identify cases of violence between artisanal and commercial fishers in Senegal.²⁸ This article connects observed violence with the depletion of fish stocks, noting that violent encounters are taking place with increasing frequency and are widespread across Africa, Asia, and Latin America. While this piece does state that various options exist to resolve the conflicts, it also explains that few of these options have been successful and that conflict is taking place with increasing frequency. Limitations of this article are that it looks specifically at interactions at sea and only those between commercial

²⁵ Ibid., 103.

²⁶ Sara Huges, Annie Yai, Lisa Max, Nada Petrovic, Frank Davenport, Michael Marshall, Timothy R. McClanahan, Edward H. Allison, Joshua E. Cinner, "A Framework to Assess National Level Vulnerability from the Perspective of Food Security: The Case of Coral Reef Fisheries," *Environmental Science & Policy* 23 (2012): 95–108

²⁷ Dyhia Belhabib, Vicky W.Y. Lam, William W.L. Cheung, "Overview of West African fisheries Under Climate Change: Impacts, Vulnerabilities and Adaptive Responses of the Artisanal and Industrial Sectors," *Marine Policy* 71 (2016): 15.

²⁸ Caroly DuBois, and Christos Zografos, "Conflicts at Sea Between Artisanal and Industrial Fishers: Inter-sectoral Interactions and Dispute Resolution in Senegal," *Marine Policy* 36 (2012): 1211.

and artisanal fishers. The article does not look at conflict among artisanal fishers or at the effects that these disputes may have on national security.

3. African Fisheries Management

Effective management of African fisheries may offer a means to mitigate the potential security threats posed by degradation. Local and national level management may reduce some threats to fisheries, such as illegal fishing, inappropriate fishing gear, and overfishing.²⁹ Across Africa, illegal fishing accounts for a difference of approximately 40 percent more catch than is reported, making accurate evaluation of fisheries health significantly more difficult.³⁰ Some countries already employ management programs. As with other areas of interest, information on fisheries management throughout Africa is limited but information on some countries is more readily available than others. For example, South African fisheries are relatively widely discussed and a larger collection of information is more readily available on management programs and research. Similarly, several articles and reports are available on management programs for Tanzanian fisheries. Findings suggest that tying specific management programs to the individual needs of the community, the development level of the country and the vulnerability to fisheries depletion, are critical to establishing effective management and mitigating the risk of food insecurity.³¹ Programs must take into consideration both artisanal fishing and factors at the national level that local fishers cannot influence.³²

Many of the articles on this topic stress the importance of fisheries to the populations and economies across Africa. Even articles that focus on much smaller regions,

²⁹ USAID, *The Importance of Wild Fisheries For Local Food Security: Tanzania*, Washington, DC.: 2.

³⁰ David J. Agnew, John Pearce, Ganapathiraju Pramo, Tom Peatman, Reg Watson, John R. Beddington, Tony J. Pitcher, "Estimating the Worldwide Extent of Illegal Fishing," *PloS ONE* 4(2) (2009): 1.

³¹ Sara Hughes, Annie Yau, Lisa Max, Nada Petrovic, Frank Davenport, Michael Marshall, Timothy R. McClanahan, Edward H. Allison, Joshua E. Cinner, "A Framework to Assess National Level Vulnerability from the Perspective of Food Security: The Case of Coral Reef Fisheries," *Environmental Science & Policy* 23 (2012): 95.

³² Catherine M. Marquette Kwame A. Koranteng, Ragnhil Overa, Ellen Bortei-Doku Aryeetey, "Small scale fisheries, population dynamics, and resource use in Africa: The Case of Moree, Ghana," *Ambio* 31(4) Jun, 2002: 324.

such as individual towns or fishing communities, identify the already visibly reduced fish stocks as having an effect on local incomes and food supply.³³ In these localities, issues with management include lack of regulations knowledge and enforcement.³⁴ Various management strategies are also discussed, as are options for how to cope with present and anticipated fisheries depletion.³⁵ Another common thread through the literature is the lack of research and data that exists in the region. The overall theme appears to be that further information is needed in order to develop effective management strategies, which could be critical in mitigating fisheries depletion. If effective management strategies can be identified and employed, this could preserve fish as a food and economic resources, reducing the potential for regional conflict.

C. CONFLICT MECHANISMS AND MANAGEMENT STRATEGIES

Due to the limited information on the proposed topic, any connection between fisheries degradation and security is currently highly speculative. In order to understand how security may be influenced by fisheries depletion, any link will have to be built off the limited available research and literature. Based on existing literature, it is clear that fisheries are key to food and economic security in coastal communities throughout Africa. The literature also suggests that threats to local security resulting from fisheries depletion may provide a link to the larger umbrella of national security as local communities vie for limited resources. The case of Somalia's pirates is often cited as the worst case scenario for competition over food resources escalating to a national and international security crisis. Another potential catalyst, observable in the literature, is the dramatic increase in local and global demand, driving resource depletion, which pushes resource users beyond legal and traditional territories and into neighboring states. From there, a connection may be found to security on both a domestic and an international scale through increasingly hostile user interactions, illegal fishing, and forced migrations. However, the insecurities

³³ Nathaniel Colbert-Sangree, Jordan F. Suter, "Community Based Fishery Management within Menai Bay Conservation Area: A Survey of the Resource User," *Marine Policy* 60 (2015): 174.

³⁴ *Ibid.*, 175.

³⁵ USAID, *Fishing for Food Security: The Importance of Wild Fisheries for Food Security and Nutrition* (Washington, DC, April 2016), 20.

that currently appear in the literature are not exhaustive. To be more inclusive, this thesis identifies additional factors, including poor management strategies, which lead from fishery degradation to conflict in Africa.

Currently, there are two primary management styles employed in Africa: national and co-management. National management approaches are less likely to be effective due to the lack of local buy-in and unwillingness of affected communities to participate in measures that they feel are exclusive and impinge on their livelihoods. Between the two management programs, co-management is most likely to be effective because it considers local input in both the development of the management strategy and implementation of regulations.

D. RESEARCH DESIGN

Researching the question of how management styles affect conflict among fisheries users necessitates looking at a broad spectrum of literature covering related topics and attempting to identify connections and themes that may exist. Given the common trend that research and data on the topic and in the region are extremely limited, this thesis draws on a wide variety of subjects over a number of years to gather sufficient information. I use this existing literature to identify causal factors that lead from fisheries depletion to conflict and insecurity. By identifying these factors, I demonstrate how this issue plays out in Africa and on a larger international stage. Because information on South Africa and Tanzania is more prevalent than other parts of southern Africa, I focus on these two countries in order to identify sufficient information from which to draw conclusions. Information about both Tanzania and South Africa is derived from academic articles and from studies conducted by several non-governmental organizations. In the case of Tanzania, some state-funded data has helped provide further insight into the current status of fisheries and the fishing sector. Information about South Africa is primarily derived from academic articles and some investigative reports.

Fisheries in both Tanzania and South Africa are already showing signs of degradation that are visible to local populations, but conflict among these communities manifest differently. Especially in the case of South Africa, management strategies have

been put into place to mitigate these changes, and the effects of these programs on fisheries dependent peoples have been examined.³⁶ Limiting access to fisheries for artisanal and traditional fishers in favor of commercial fishers has caused significant internal security challenges in South Africa that have had dramatic effects on fisheries resources.³⁷ This dynamic demonstrates conflicting interests between dependent populations and national economic motivations.

In Tanzania, mitigating fisheries degradation has taken the form of designated maritime protected areas (MPAs). Some authors have examined the effects of these areas on dependent, local populations, finding that management programs often conflict with traditional fisheries use.³⁸ Fisheries degradation in coastal Tanzania has been found to have negative effects on social structure and interactions, resulting in low-level social discord that falls below the level of conflict and remains at the local level.³⁹ These two cases provide sufficient evidence of fisheries dependence and degradation. Both countries also face pressures at regional and national levels as a result of fisheries degradation.

E. THESIS OVERVIEW

The first chapter within this thesis introduces the topic at hand. This chapter fleshes out the thesis question and the significance of the issue. Accordingly, it discusses why this topic was chosen, and introduces the related case studies. The literature review examines existing primary and secondary sources surrounding the topic. This chapter provides insight into what has already been studied specifically in regards to fisheries and security, but also to issues related to the various mechanisms already discussed.

³⁶ George M. Branch and Barry M. Clark, "Fish Stocks and Their Management: The Changing Face of Fisheries in South Africa," *Marine Policy* 30 (2006): 3.

³⁷ L. van Sittert, G. Branch, M. Hauck, M. Sowman, "Benchmarking the First Decade of Post-Apartheid Fisheries Reform in South Africa," *Marine Policy* 30 (2006): 96.

³⁸ James Tobey, and Elin Torell, "Coastal Poverty and MPA Management in Mainland Tanzania and Zanzibar," *Ocean & Coastal Management* 49, no. 11 (0, 2006): 834.

³⁹ Robert Katikiro, Ashoka Deepananda, and Edison Macusi, "Interplay Between Perceived Changes in Fishery and Social Structures in Tanzanian Coastal Fishing Communities," *Fisheries Research* 164 (2015): 249.

Chapter two outlines the past and current status of African fisheries and resource use. This chapter looks at the issues that African fisheries are facing, including problems with overfishing, pollution, and climate change.

The third chapter is broken into two sections. The first section explores existing cases of conflict within fisheries sectors throughout Africa. The second section of this chapter looks at current strategies for managing fisheries and the effects that they have on fisheries users. The management strategies identified are the most prevalent in countries throughout African and consist of national management and co-management.

Finally, the case studies in chapters four and five evaluate the application of different management styles in both Tanzania and South Africa. These chapters demonstrate the effects that each management style has on the local community and their interactions with other resource users. Both case studies look in depth at how management style affects security and the communities that are directly involved in the struggle to sustain viable resources. Tanzania and South Africa have adopted different strategies for coping with fisheries depletion and each of their styles illustrates the importance of choosing an effective management program.

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II. TRADITIONAL STATUS OF AFRICAN FISHERIES

African fisheries face a unique set of challenges resulting from a combination of overuse and changing climate that threatens their ability to continue to sustain the communities that subsist off of them. Traditional fishing communities have long relied on near-shore fish stocks for economic and food security, which have thus far effectively provided for local populations. The combination of underdeveloped African states and widely dispersed communities has allowed highly productive off-shore fisheries to remain largely under-exploited until recent years, as the situation changes in the face of rapid population growth and increased global demand for seafood. No longer under-utilized, Africa's fisheries are straining to feed higher demand and communities that historically had little to no contact are now in competition for limited resources. Increased demand has brought with it habitat destruction, human and fish migration, and fisheries depletion, creating new challenges for the entire fishing sector as well as the fisheries themselves. As a critical source of animal protein and employment across the continent, the health of Africa's fisheries sector is vital to security and prosperity.⁴⁰

This chapter sets up the thesis' analysis of fishery insecurities, conflict and management by describing the various actors who rely on Africa's fisheries. It explains their roles and interactions with the fisheries and discusses how they interact with one another. Finally, this chapter delves into some of the current challenges facing Africa's fisheries and how they affect the individual actors.

A. MAIN ACTORS

1. Artisanal Fishers

1.1. Activities: Artisanal fishers rely on fishing as a source of both food and income. They are typically individual men who fish to provide food for themselves and their families, selling some portion of their catch locally. Artisanal fishers often employ

⁴⁰ Vicky W.Y. Lam, William W.L. Cheung, W. Swartz, and U. R. Sumaila. "Climate Change Impacts on Fisheries in West Africa: Implications for Economic, Food and Nutritional Security," *African Journal of Marine Science* 34, no. 1 (Mar 01, 2012): 103.

traditional fishing methods and gear, such as canoes, fishing nets, and lines distinguishing them from the more technologically advanced commercial sector.⁴¹ Traditional artisanal fishing vessels hold only a few people and most fishers take to the water individually or in small groups.⁴² Many artisanal fishers live in small, rural communities, where fishing is a primary occupation, which the community as a whole relies on for both work and food. Gear and equipment limitations mean that artisanal fishers generally operate in shallower waters, relying on habitats such as coral reefs and mangrove forests in near-shore, local waters.⁴³ The smaller and less advanced technology employed by artisanal fishers means that they catch far less than commercial vessels and are more limited in their range.⁴⁴ Some subsistence fishers have adopted more modern gear and technology that enables them to participate in migratory fishing, following fish migrations or traveling away from their community to fish in more distant waters, but the majority remain local to their communities, plying traditional fishing grounds.⁴⁵ Few artisanal fishers have the financial resources to acquire larger vessels or the means to find alternative employment, which is seldom available in their rural communities and in Africa's poor economic conditions. Despite the increasing numbers of larger commercial vessels, artisanal fishers still make up the majority of fisheries users.

1.2. Economic Contributions: Inadequate local infrastructure prevents artisanal fishers from transporting fish beyond their community, preventing fishers from selling their catch outside local markets.⁴⁶ Lack of viable infrastructure and limited market

⁴¹ Carolyn DuBois, and Christos Zografos, "Conflicts at Sea between Artisanal and Industrial Fishers: Inter-Sectoral Interactions and Dispute Resolution in Senegal," *Marine Policy* 36, no. 6 (11, 2012): 1211.

⁴² Ibid., 1213.

⁴³ Desiderius C. P. Masalu, "Coastal and Marine Resource use Conflicts and Sustainable Development in Tanzania," *Ocean and Coastal Management* 43, no. 6 (0, 2000). 489.

⁴⁴ C. M. Marquette, K. A. Koranteng, R. Overaa, and E. B. Aryeetey, "Small-Scale Fisheries, Population Dynamics, and Resource use in Africa: The Case of Moree, Ghana," *Ambio* 31, no. 4 (06, 2002): 324.

⁴⁵ Innocent Ngao Wanyonyi, Andrew Wamukota, Simeon Mesaki, Almeida Tomas Guissamulo, and Jacob Ochiewo. "Artisanal Fisher Migration Patterns in Coastal East Africa," *Ocean & Coastal Management* 119, (01, 2016): 94.

⁴⁶ James Tobey, and Elin Torell. "Coastal Poverty and MPA Management in Mainland Tanzania and Zanzibar," *Ocean & Coastal Management* 49, no. 11 (0, 2006): 845.

opportunities present challenges in transporting commercially caught fish to rural regions, making local communities reliant on artisanal fishers for their supply of seafood. This dynamic limits artisanal fishers from contributing directly to the national economy while simultaneously making them critical to local economies and local food security. Although unable to compete directly on the national level, artisanal fishers' contributions to their local economies have a significant impact on the overall national economy, largely through employment.⁴⁷ Artisanal and small-scale fishing provides income and employment for more than just fishers themselves, accounting for over 180,000 jobs in Tanzania alone when fisheries related work such as fish mongers are taken into consideration.⁴⁸ Small-scale fishing provides the majority of fisheries jobs in Africa and is also attributed with making up the majority of fish caught.⁴⁹

1.3. Limitations: The limited range of artisanal fishers historically translates into more heavily exploited near-shore than deep-water fisheries.⁵⁰ The small vessels employed by artisanal fishers are less adapted for deep water fishing and are better equipped for catching smaller, shallow water fish than larger commercial species, such as tuna, found further out in the exclusive economic zone (EEZ) and pursued by many commercial vessels.⁵¹ Historically, fishing in near-shore and coastal areas, such as coral reefs, have been sufficient to meet the majority of artisanal fishers' needs, leaving the more distant off-shore and deep water fisheries for growing commercial fleets.⁵² The result of this pattern of exploitation is that Africa's offshore resources historically remained largely under-utilized

⁴⁷ W. M. Potts, A. Gotz, and N. James. "Review of the Projected Impacts of Climate Change on Coastal Fishes in Southern Africa," *Reviews in Fish Biology and Fisheries* 25, no. 4 (12, 2015): 604.

⁴⁸ Ibid., 604.

⁴⁹ C. M. Marquette, K. A. Koranteng, R. Overaa, and E. B. Aryeetey. "Small-Scale Fisheries, Population Dynamics, and Resource use in Africa: The Case of Moree, Ghana," *Ambio* 31, no. 4 (06, 2002): 324.

⁵⁰ S. Diop and P. A. Scheren. "Sustainable Oceans and Coasts: Lessons Learnt from Eastern and Western Africa," *Estuarine, Coastal and Shelf Science* 183, (Dec 20, 2016): 331.

⁵¹ A. I. Payne. "The Exploitation of African Fisheries," *Oikos* 27, no. 3 (0, 1976): 362.

⁵² Ibid., 362.

2. Commercial Fishers

2.1. Activities: Africa's commercial fishing industry has grown rapidly in recent years and now includes both domestic commercial fleets and increasing numbers of international vessels. The commercial industry employs more modern technology than traditional, artisanal fishers, including larger vessels capable of deeper water fishing, modern gear, such as longlines and purse seine nets, radars, larger hold capacity, and the ability to refrigerate catch for transport to distant markets. Africa's growing commercial industry targets commercially viable fish stocks, such as tuna, abalone, lobster, and swordfish, most of which are destined for international markets. The export market in some countries is a significant part of the economy, accounting for up to 10% of Tanzania's total national economy between 2009 and 2013.⁵³

Commercial fishing off of Africa's coasts has grown quickly, facilitated by the rapid increase in international fishing vessels obtaining licenses to fish in African waters as their own domestic stocks are depleted. Along with the expanding fishing fleets, the ashore fishing industry has also grown, to include fish processing facilities, all of which fall under the commercial fishing sector. The financial reach of the commercial fishing sector has made it an increasingly important industry for African economies.

2.2.1. Domestic Commercial Fishers: Fishing activities across all sectors throughout Africa are expanding, despite numerous early challenges with establishing deep-water, commercial fleets.⁵⁴ In many countries across the continent, high costs associated with creating and operating deep water fishing fleets, combined with poor economies, impeded the growth of a domestic commercial industry. Purchasing vessels and acquiring training for professional crews only accounts for a portion of the high costs associated with establishing a deep-water fleet. Land based infrastructure is an essential aspect to commercial fishing and states must invest heavily in costly infrastructure to

⁵³ Yohana L. Budeba, *The Tanzanian Fisheries Sector: Challenges and Opportunities*, Ministry of Agriculture, Livestock and Fisheries, September 2016. 20.

⁵⁴ A. I. Payne, "The Exploitation of African Fisheries," *Oikos* 27, no. 3 (0, 1976): 356.

ensure a successful commercial sector.⁵⁵ Despite the slow start, the commercial sector is increasing and multiple states now boast their own domestic, commercial fishing fleets that serve both international and domestic markets. Commercial fleets pursue deep-water fish, such as tuna and billfish, but also ply near-shore waters for commercially viable shallow waters stocks, such as lobster and abalone.⁵⁶ Domestic commercial fleets are still small enough and lacking in supporting land-based infrastructure that they are not thoroughly exploiting offshore fisheries, despite widespread interest in expanding existing fleets.⁵⁷

2.2.2. International Commercial Fishers: Africa's growing commercial industry is augmented by a growing number of international fishing vessels seeking to supplement their own diminishing domestic fisheries. In an effort to capitalize on their fisheries and in response to growing international demand, African states have begun authorizing increasing numbers of international commercial fishing vessels within their EEZs by selling fishing licenses to foreign fishers. International fleets are a growing presence in many African states' EEZs, bringing in licensing fees to the host nation and boosting Africa's economy, but are not as profitable for individual countries as a larger domestic commercial fleet could be. Most foreign commercial vessels remain offshore and target large fish, such as tuna, for export overseas.⁵⁸ Driven by diminished domestic fisheries, most international fishers receive significant subsidies from their home state to compensate fishing companies for the high costs of operating distant waters fleets.⁵⁹ Most international vessels hail from Asia or Europe, the same importer of the majority of Africa's internationally sold fish products. Both of these regions also suffer extensive domestic fisheries degradation. In Asia, disputes over maritime resources are ongoing involving

⁵⁵ Ibid., 363.

⁵⁶ André Standing, "Criminality in Africa's Fishing Industry: A Threat to Human Security," *Africa Security Briefs* no. 33 (06, 2017): 3.

⁵⁷ Yohana L. Budeba, *The Tanzanian Fisheries Sector: Challenges and Opportunities*, Ministry of Agriculture, Livestock and Fisheries, September 2016: 4.

⁵⁸ S. Diop, and P. A. Scheren, "Sustainable Oceans and Coasts: Lessons Learnt from Eastern and Western Africa," *Estuarine, Coastal and Shelf Science* 183, (Dec 20, 2016): 331.

⁵⁹ André Standing, "Criminality in Africa's Fishing Industry: A Threat to Human Security," *Africa Security Briefs* no. 33 (06, 2017): 3.

multiple countries. Africa's international licensing and relatively plentiful waters offer alternatives for many countries seeking new fishing grounds.

2.2.3. Tourism: Tourism is a relatively new addition to the fisheries sector. Increasingly, tourists visit Africa's coasts, bringing much needed revenue and expanding the economic significance of the still small sector. This industry incorporates a variety of interests, ranging from recreational fishing and snorkeling, to consuming freshly caught seafood and sport fishing. Hotels seek out pristine beaches and coral reefs for guests to enjoy, while fishing expedition companies offer fishing boats and guides. Annual revenues from the tourist industry have nearly doubled within the span of a decade, growing from \$824 million in 2005 to \$1.4 billion in 2013.⁶⁰ The continued growth of the tourist industry has earned the attention of national governments around the continent, and has become a top employer in Tanzania.⁶¹ Although a relatively new player in the fisheries sector, tourism is growing in importance and plays an increasingly prominent role. National governments, eager to encourage further growth, cater to its interests and formulate new laws and regulations that benefit the industry.

B. CURRENT CHALLENGES

In line with global trends, Africa's fisheries are becoming increasingly crowded as numbers of fisheries users grow. Growing populations, migration, and increased domestic and international demand for seafood place tremendous pressure on limited resources. Increasing demand, decreasing demand and low state capacity are some of the problems that Africa's fisheries currently face.

1. Increased Demand

1.1. Increased Local Artisanal Use: Widespread population growth has significantly increased coastal and deep-water fisheries exploitation across the continent. Not only has a larger global population created higher worldwide demand for commercial

⁶⁰ World Bank, "Tanzania Economic Update: The Elephant in the Room. Unlocking the Potential of the Tourism Industry for Tanzanians," (6 January 2015): 21. <http://www.worldbank.org/tanzania/economicupdate>.

⁶¹ Ibid., V.

fish, but Africa's rapidly expanding population has created similarly rapid growth in the number of artisanal fishers relying on their local fish stocks. Demanding more and more resources to feed growing families, today's artisanal fishers are not only more numerous; they require more fish than their predecessors.⁶² Improved healthcare has led to lower infant mortality rates producing larger families than in the past. The result of this population growth is that more fishers are now relying on the same resource and demanding more from it. Local fishermen already see the effects in their daily catches. Older fishermen report both smaller total catches and that fish caught are physically smaller.⁶³ Increased demand on fisheries prevents existing fish from reaching physical maturity, resulting in physically smaller fish and less capacity for fisheries to recover.

1.2. Increased In-migration: Population growth in fishing communities is also the result of increased migration to coastal areas. Unable to sustain themselves and their families, residents from inland communities contending with unemployment, drought, poor land conditions, or food insecurity have sought out alternative livelihoods in coastal communities.⁶⁴ While such migration is not a recent phenomenon, the increasing numbers of migrants adds further stress to already overpopulated fishing grounds by taking up fishing themselves or by increasing the number of individuals relying on fish as a critical food source. Existing climate models indicate that environmental stresses on existing agricultural land will continue to increase, even as the population continues to grow. The combination of increased population and reduced farming capacity will force more migrants to the coast, placing even more pressure on over-extended fisheries.⁶⁵ Coastal migration compounds the already expanding local fishing population to create increasingly

⁶² Dyhia Belhabib, Vicky W. Y. Lam, and William W. L. Cheung, "Overview of West African Fisheries Under Climate Change: Impacts, Vulnerabilities and Adaptive Responses of the Artisanal and Industrial Sectors," *Marine Policy* 71, (09, 2016): 20.

⁶³ Allison, Edward H., Allison L. Perry, Marie-Caroline Badjeck, W. Neil Adger, Katrina Brown, Declan Conway, Ashley S. Halls, et al, "Vulnerability of National Economies to the Impacts of Climate Change on Fisheries," *Fish and Fisheries* 10, no. 2 (06, 2009): 187

⁶⁴ Vicky W.Y. Lam, William W.L. Cheung, W. Swartz, and U. R. Sumaila, "Climate Change Impacts on Fisheries in West Africa: Implications for Economic, Food and Nutritional Security," *African Journal of Marine Science* 34, no. 1 (Mar 01, 2012): 104.

⁶⁵ Carolyn DuBois, and Christos Zografos, "Conflicts at Sea between Artisanal and Industrial Fishers: Inter-Sectoral Interactions and Dispute Resolution in Senegal," *Marine Policy* 36, no. 6 (11, 2012): 1213.

crowded fishing grounds and coastal communities. Continued over-use of fisheries will further diminish their capacity to recover and can ultimately result in fisheries collapse.

1.3. Dual Use of Near-shore Fisheries: Artisanal fishers' limited vessel range helps mitigate competition with commercial fishers over deep sea fish, but does not prevent the artisanal and commercial sectors from competing over commercially viable near-shore fish stocks. Consistently high demand on near shore fish stocks has stressed the stocks into over-exploitation. Unlike deep-water fisheries that only feed commercial fleets, near-shore fisheries supply both commercial and artisanal needs. Coastal fisheries' over-exploitation was apparent in the 1950's and has only become more problematic.⁶⁶ Local governments have identified this as an issue, noting that many coastal fisheries are already severely over-exploited indicating potential fisheries collapse.⁶⁷

Growing commercial fleets increasingly fishing near-shore waters mirror the same trend among domestic artisanal fishers. In addition to local artisanal fishers, the numbers of international and domestic migratory fishers are also increasing, sharing the same waters with artisanal fishers and commercial fleets targeting near-shore, commercially viable species. The overall trend is that Africa's historically under utilized deep sea fishing grounds as well as its more heavily exploited near-shore fisheries are seeing significant increases across all fishing sectors. Since the 1960's African fisheries have seen roughly a tenfold increase in fishing, now harvesting approximately 8 million tons of fish from Africa's maritime waters per year.⁶⁸ This tremendous growth is a reflection of the explosion in commercial fishing as well as a booming demand among the artisanal populations, attributed in part to an influx of migrants to the coast.

1.4. Increased Cross-boundary Artisanal Use: Along national borders, artisanal fishers face the same pressures from dwindling fisheries and lack of alternative employments that plague other fishing communities. Unable to find alternatives or to

⁶⁶ A. I. Payne, "The Exploitation of African Fisheries," *Oikos* 27, no. 3 (0, 1976): 363.

⁶⁷ Yohana L. Budeba, *The Tanzanian Fisheries Sector: Challenges and Opportunities*, Ministry of Agriculture, Livestock and Fisheries, September 2016: 4.

⁶⁸ André Standing, "Criminality in Africa's Fishing Industry: A Threat to Human Security," *Africa Security Briefs* no. 33 (06, 2017): 2.

subsist off of overfished waters, artisanal fishermen take to crossing international borders to fish in neighboring states' fishing grounds.⁶⁹ Already under pressure to enforce domestic fisheries regulations with insufficient resources, pursuing and prosecuting poaching international artisanal fishers is beyond the capacity of local or national enforcement agencies. International subsistence fishers' intrusion into neighboring EEZs adds yet another element of pressure on fisheries that local artisanal fishers must combat for their livelihood. Competition for resources is not limited to artisanal fishers, however, as dwindling resources also affect commercial sectors vying for access to fishing grounds.

1.5.1 Increased Legal International Use: With population growth and fisheries over-exploitation trends occurring throughout the world, Africa's relatively under-utilized waters are increasingly attractive to commercial fishing fleets. As Africa's economy has grown and worldwide fish stocks continue to plummet, the potential benefits of Africa's governments authorizing foreign vessels for commercially viable deep water and near-shore fish stocks attract ever growing numbers of foreign fleets and international fishing companies. Rapidly growing international fleets have contributed to the present over-fishing of Africa's once plentiful stocks.⁷⁰ National assessments of deep-water fisheries identifies that they are currently fully exploited, potentially overly exploited in some areas.⁷¹ Further research is necessary to determine the condition of deep-water fisheries.⁷²

1.5.2 Increased Illegal International Use: Poorly patrolled EEZ's are highly vulnerable to illegal fishing vessels that take advantage of the lack of patrols and enforcement off of Africa's coasts. In the current global climate of diminishing domestic fish stocks, illegal international fishing vessels are increasingly exploiting Africa's vulnerable resources beyond the reach of minimal maritime enforcement capabilities. The

⁶⁹ Dyhia Belhabib, Vicky W. Y. Lam, and William W. L. Cheung, "Overview of West African Fisheries Under Climate Change: Impacts, Vulnerabilities and Adaptive Responses of the Artisanal and Industrial Sectors," *Marine Policy* 71, (09, 2016): 22.

⁷⁰ Ibid., 15.

⁷¹ Yohana L. Budeba, *The Tanzanian Fisheries Sector: Challenges and Opportunities*, Ministry of Agriculture, Livestock and Fisheries, September 2016: 4.

⁷² André Standing, "Criminality in Africa's Fishing Industry: A Threat to Human Security," *Africa Security Briefs* no. 33 (06, 2017): 7.

effect of these illegal activities is both economically and environmentally detrimental, accounting for as much as 40% more than the annual reported catch.⁷³ Unregulated fishing allows illegal fishers to exploit resources without constraint, ignoring local licensing and gear regulations to meet high international demand for seafood. Illegal foreign fishers have little vested interest in the condition of fisheries that might encourage them to fish responsibly to allow stocks to recover. The economic impact of lost fish and revenue is particularly poignant for states with poor economies and whose populations rely heavily on fish for subsistence.

Available data on illegal and commercial fishing indicates the dramatic increase in recent years off Africa's coasts and the pressures that the industry now faces. Illegal fishing is particularly problematic, and estimates for actual global fishing take are 50% higher than reported catches.⁷⁴ In Africa, this translates to roughly 25% of all fishing being conducted illegally as of 2005.⁷⁵ This number can safely be considered much higher given the rate of expansion in the fisheries industry over the last decade. Illegal fishing does not consist exclusively of unlicensed vessels and can include licensed fishers who misrepresent their vessel or catch size. Chinese fishers, responsible for approximately 2.9 million tons (\$7.15 billion) of catch off of West African coasts and 181 thousand tons (\$50.5 million) off of East Africa's coast per year between 2005-2011, are estimated to misrepresent their total catch size by up to 60% in order to reduce the cost of fishing licenses and maximize their profits.⁷⁶ These numbers, combined with the absence of research into fisheries' health and use, point to staggering discrepancies and dramatic over-exploitation of rapidly dwindling resources that approximately 5.9 million African's rely on.⁷⁷

⁷³ Vicky W.Y. Lam, William W.L. Cheung, W. Swartz, and U. R. Sumaila, "Climate Change Impacts on Fisheries in West Africa: Implications for Economic, Food and Nutritional Security," *African Journal of Marine Science* 34, no. 1 (Mar 01, 2012): 106.

⁷⁴ USAID, *Fishing for Food Security: The Importance of Wild Fisheries for Food Security and Nutrition* (Washington, DC: USAID, 2016), 10.

⁷⁵ André Standing, "Criminality in Africa's Fishing Industry: A Threat to Human Security," *Africa Security Briefs* no. 33 (06, 2017): 5.

⁷⁶ *Ibid.*, 6.

⁷⁷ USAID, *Fishing for Food Security: The Importance of Wild Fisheries for Food Security and Nutrition* (Washington, DC: USAID, 2016), 19.

1.6. Expanding Tourism: Tourism brings economic prosperity, but also presents a simultaneous threat to fisheries and fishing livelihoods. The demands from the tourist industry on the fisheries sector are manifold and illustrate the growing trend of increasing pressure on Africa's maritime fisheries. Tourism requires significant infrastructure, specifically in desirable areas, such as beaches and shorelines. Developments along the coast to accommodate growing numbers of tourists threaten to push out artisanal fishers, while tourists' desires for pristine waters pose similar threats to commercial fishing.⁷⁸ Construction along the water damages near-shore habitats with pollution and incursion from sand. Tourists also bring large appetites for seafood, demanding a constant supply to feed dinner plates and buffet bars. Additional strain comes from growing numbers of recreational fishers whose activities may not be curbed by local authorities in order to promote increased revenue.⁷⁹ Even scuba and snorkel traffic from numerous tourists can physically damage corals and stress fish if not conducted responsibly. Tourists' interests in fisheries cover a wide spectrum and bring new dimensions to the pressures that Africa's fisheries already face. The currently growing tourism sector promises to bring vital dollars to local economies, but it also presents an additional player on the fisheries stage in an era of diminishing supply and increased demand.

2. Decreased Supply

Overuse and high demand are only one side of the challenges that African fisheries face. Environmental changes, brought on by climate change, destructive fishing practices, and pollution present additional pressures on Africa's fisheries. Factors unrelated to the fisheries industry, such as mining and resource extraction, contribute to pollution and environmental stress that reduce fishery health. As environmental degradation increases, habitats and fisheries' ability to recover from stresses and overuse decrease. This collection of destructive factors has severely diminished Africa's once plentiful coastal and offshore

⁷⁸ Jackie Sunde, and Moenieba Isaacs, *Marine Conservation and Coastal Communities: Who Carries the Costs? A Study of Marine Protected Areas and Their Impact on Traditional Small-scale Fishing Communities in South Africa* (Chennai, India: International Collective in Support of Fishworkers, 2008), 21 www.icsf.net

⁷⁹ *Ibid.*, 22.

maritime fisheries. In an era of increasing global demand, Africa's supply of maritime resources is decreasing.

2.1. Environmental Degradation and Habitat loss: Coastal and deep-water fishery habitats suffer extensive degradation as a result of human activity, ranging from construction to mining and resource extraction. Healthy habitats are critical to maintaining fisheries' health, and their degradation can adversely affect fisheries and impede their ability to recover from over-fishing. Highly polluting industries, such as agriculture and resource extraction, are critical to national economies and seldom employ environmentally responsible business practices.⁸⁰ Near and offshore oil extraction is particularly destructive, involving dredging and drilling that disrupt sea floors, destroying coral reefs, seagrass beds, and other seafloor habitats and breeding grounds.⁸¹ Resulting pollution from mining and drilling operations has similar effects, killing local wildlife and reducing critical biodiversity. On-shore activities, such as construction and agriculture, also damage fisheries habitat by changing coastlines and causing polluting runoff. Agricultural runoff adds pollutants to fresh and marine waters that affect both habitat and wildlife.⁸² Pollutants also include sewage, especially in urban areas and cities. In urban areas with high levels of poverty, sewage infrastructure may be insufficient to cope with population pressures. The resulting pollution from sewage, agricultural and industrial runoff, and resource extraction degrades water conditions, killing off corals, mangrove forests, and seaweed and kelp beds that provide habitat for local fisheries. Habitat loss reduces available spawning areas, limiting the number of juvenile fish diminishing the capacity of fisheries to recover from heavy fishing.

2.2. Increasing Effectiveness of Fishing Gear: Advances in technology have vastly improved the effectiveness of modern fishing methods, making fishing equipment more efficient and allowing greater catches with less effort. The results of this improved

⁸⁰ WWF, "Mozambique strategic plan," March, (2016): 12.

⁸¹ S. Diop, and P. A. Scheren, "Sustainable Oceans and Coasts: Lessons Learnt from Eastern and Western Africa," *Estuarine, Coastal and Shelf Science* 183, (Dec 20, 2016): 331.

⁸² DCP Masalu, "Coastal and Marine Resource use Conflicts and Sustainable Development in Tanzania," *Ocean & Coastal Management* 43, no. 6 (2000): 481.

efficiency is that fishers dramatically increased their fishing capacity and have exceeded the ability of the fishery to replenish. Fewer modern fishers can now extract more fish with less effort than traditional methods would allow. Such improvements have benefitted artisanal fishers by allowing them to fish shorter hours, but have also resulted in fishing capacity that exceeds the ability of fisheries to recover, devastating fish populations. Aiming at increased efficiency, some types of nets do not distinguish between adult and juvenile fish, catching everything in their path and wiping out entire generations of maturing and breeding fish.⁸³ Other types of gear, including nets equipped with weights to drag along the ocean floor, are destructive to fish habitats and breeding grounds, such as coral reefs. Dynamite, while less technologically advanced but frequently employed, significantly reduces fishing effort while simultaneously wiping out large sections of habitat inhabited by multiple species, killing off all life in the vicinity. Such indiscriminate gear and fishing techniques result in high numbers of captured and killed non-target species, called by-catch, that go unused and reduce the biodiversity and health of fisheries. The overall impact of such destructive and indiscriminate gear is to reduce the total fish population, resulting in smaller future spawns and longer fishery recovery times, frequently also destroying habitat for future generations and other species.

3. Climate Change

Africa's maritime waters are particularly vulnerable to global climate change. Warm waters, such as those surrounding the majority of the continent, are expected to undergo significant changes as ocean temperatures continue to rise.⁸⁴ These fragile waters are already experiencing significant changes, evident to researchers and the fisheries users who interact daily with the fragile environment.

3.1. Coral Bleaching: Economic and environmental conditions throughout Africa place considerable strain on domestic fisheries and contribute to changing ocean climates

⁸³ James Tobey, and Elin Torell, "Coastal Poverty and MPA Management in Mainland Tanzania and Zanzibar," *Ocean & Coastal Management* 49, no. 11 (0, 2006): 844.

⁸⁴ Vicky W.Y. Lam, William W.L. Cheung, W. Swartz, and U. R. Sumaila, "Climate Change Impacts on Fisheries in West Africa: Implications for Economic, Food and Nutritional Security," *African Journal of Marine Science* 34, no. 1 (Mar 01, 2012): 103.

that also affect maritime fisheries. Rising ocean temperatures and ocean acidification caused by global climate change further contribute to drastic changes and degradation of Africa's fisheries. Warming waters are known to cause coral bleaching, resulting in widespread coral death throughout the oceans, depriving fish of habitat and spawning grounds, and reducing local biodiversity. Because corals are home to numerous species, they are attractive fishing grounds for artisanal fishers who have relied on them for generations. While some corals can tolerate limited temperature variations, their ability to adapt to changing temperatures and water conditions remains largely unknown. To date, coral bleaching has been observed on several occasions and locations off the coast, but it is only one result of warming waters.⁸⁵

3.2. Fish Migrations: In addition to affecting fish habitats, warming waters alter fish migrations and habitable zones as fish seek out the water temperatures for which they have evolved and on which they rely for spawning and early development.⁸⁶ Adapted for specific temperature ranges, fish that require cooler waters have been found in regions outside their normal distribution as they seek appropriate climates. As waters warm, these fish migrate to cooler, southern waters, encroaching into the territories of other species. Similarly, tropical fish that thrive in warmer temperatures are now being found in wider distributions, showing up in areas that have traditionally been home to cooler temperatures outside of tropical ranges. These migrations create problems for both migrating fish and indigenous species that have remained in their traditional zones. In some cases, this behavior has brought species in contact with one another that have seldom or never interacted, creating new predator-prey relationships and competition for food and habitat. Several instances of such interactions in African waters have been detrimental to native species, which have been heavily predated or driven out of their traditional habitat by recent influxes of non-native species, changing predator-prey interactions in a given region.⁸⁷ As

⁸⁵ W. M. Potts, A. Gotz, and N. James, "Review of the Projected Impacts of Climate Change on Coastal Fishes in Southern Africa," *Reviews in Fish Biology and Fisheries* 25, no. 4 (12, 2015): 614.

⁸⁶ *Ibid.*, 614.

⁸⁷ George M. Branch and Barry M. Clark, "Fish Stocks and their Management: The Changing Face of Fisheries in South Africa," *Marine Policy* 30, no. 2 (03, 2006): 13.

ocean waters continue to warm, climate migrations are likely to continue changing the ecology of traditional fishing grounds in unknown ways. Warming waters may also experience significant decreases in fish numbers as they become uninhabitable. Similarly, cooler, southern waters may experience significant changes in the types, diversity, numbers, and interactions of fauna.

Changes brought about by species migration affect fishermen in a variety of ways. Invasive species may reduce the numbers of local species that fishermen target, requiring local fishermen to pursue new and unfamiliar alternatives. Invasive, non-native species may not serve as an acceptable replacement, leaving fishermen with no viable alternatives. In some cases, artisanal fishermen have taken to migrating in pursuit of their traditional species. Alternatively, fishermen may see biodiversity diminish as local species migrate out of their traditional range in search of cooler temperatures, reducing the total available fish stocks on which fishers rely. In cases of extremely unsuitable waters, species may migrate out of the region without an influx of migrating new, non-native species, depleting local marine life⁸⁸ and leaving fishers with no viable fishing options.

As fisheries change with warming waters, fishers must find ways to adapt so they can continue to subsist. Efforts to adapt to the changing fisheries landscapes include changing target species and adopting migratory fishing, enabling local fishermen to continue exploiting the increasingly fragile ecosystem. States and local communities must be prepared to contend with the possibility of conflict over diminished resources in light of the changing physical landscape and drastically increased demands placed on its limited maritime resources.

4. Low State Capacity

The over-exploited condition of Africa's fisheries is compounded by lack of state capacity. This critical factor facilitates illegal fisher's activities and prevents effective regulations enforcement. Low state capacity also prevents thorough fisheries' assessments, leaving significant gaps in knowledge that hinders effective management. Many African

⁸⁸ W. M. Potts, A. Gotz, and N. James, "Review of the Projected Impacts of Climate Change on Coastal Fishes in Southern Africa," *Reviews in Fish Biology and Fisheries* 25, no. 4 (12, 2015): 615.

states, which often lack sizable or sufficiently competent navies, find countering illegal fishing to be a significant financial burden. Some states simply lack the capacity to project any law enforcement so far from their own shores and are unable to curtail the increasing numbers of illegal fishers. As global fish stocks decline, the likelihood of illegal fishing in vulnerable waters like those off the coasts of many African states will only increase, adding yet more strain to fisheries and the relationships between fisheries users.

4.1. Missing Data: Specific numbers indicating the decline in Africa's fisheries are difficult to locate as there is very little data and few countries effectively track the spectrum of maritime fisheries. Fisheries data is critical to determining fisheries health and can be used to drive management programs, set catch limits, determine fishing seasons and zones. Continuing to fish without an understanding of the health of the fishery can lead to over-fishing and fisheries collapse. Due to limited resources, most research focuses on those fisheries with the most potential for profit. Artisanal fishers undertake the majority of fishing for non-commercial, low value fish, but most research is conducted on high-value, commercial fisheries, leaving a significant information gap in a critically over-exploited sector.⁸⁹ Tanzania is one example of the gap in data, specifically for marine statistics. Catch per vessel is recorded for inland waters as falling from 11 tons per vessel per year down to 6-7 tons per vessel over the period of 14 years.⁹⁰ However, data on maritime resources is far less precise, with total vessel numbers provided as an estimation of 7,664 and no data provided regarding annual catch per vessel. There is some data on total annual catch during the same 14 year period tracked earlier, indicating that total catch has fluctuated between 43-55k tons of fish, despite an increase in total fishing vessels.⁹¹ This relatively stable amount in light of a growing fleet suggests that total catch per vessel has fallen in the maritime sector as well. Despite the absent information on artisanal fishing sectors, illegal fishing is more closely tracked.

⁸⁹ André Standing, "Criminality in Africa's Fishing Industry: A Threat to Human Security," *Africa Security Briefs* no. 33 (06, 2017): 7.

⁹⁰ Yohana L. Budeba, *The Tanzanian Fisheries Sector: Challenges and Opportunities*. Ministry of Agriculture, Livestock and Fisheries, September 2016. 6.

⁹¹ *Ibid.*, 13.

4.2 Limited Enforcement Capabilities: The rural nature of many of Africa’s fishing communities puts them outside the reach of enforcement agencies operating on limited budgets and with minimal personnel. In many of these rural communities, educating fishermen about illegal practices presents a challenge to understaffed and underfunded enforcement programs. As a result of their inaccessibility and insufficient enforcement officers, many fishermen are simply unaware of regulatory laws or the justification behind their instatement. In some states, over 40% of fishermen unaware of any fishing regulations, while others who knew of the regulations had little if any knowledge of what they consisted or of how it would be applicable to them.⁹² Areas where regulations are known and reported suffer from insufficient enforcement officials and patrols.⁹³ Infrequent patrols enable regulations violators, even on occasions when such violations are reported. Damage caused to fisheries and habitats by illegal and destructive gear compounds the growing problem of fisheries overuse.

C. CONCLUSION

Across the continent, Africa’s fisheries are facing increasing stresses as growing demand and changing environment affect their health and sustainability. Increasing global demand is motivating foreign countries to turn to Africa’s waters in search of new fishing grounds at the same time that population growth and migration are adding to local demands. Lacking sufficient enforcement capabilities to monitor vast coastlines and waters, many African states are unable to prevent illegal fishing from depleting once-plentiful resources. This combination of factors has pushed many coastal and deep-water fisheries into over-use. Without effective monitoring and management programs, fisheries run the risk of proceeding from over-use into fisheries collapse.

⁹² Nathaniel Colbert-Sangree, and Jordan F. Suter, “Community Based Fishery Management within the Menai Bay Conservation Area: A Survey of the Resource User,” *Marine Policy* 60, (10, 2015): 175.

⁹³ *Ibid.*, 173.

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III. INSECURITIES, CONFLICT AND MANAGEMENT

This chapter will explore the effects of increasing pressure and diminishing supply within Africa's fisheries sector, examining how this dynamic can lead to conflict. It will also evaluate means of managing fisheries resources to mitigate depletion and conflict.

The previous chapter revealed the strains within Africa's fisheries sector and the high demands that have reduced fisheries from abundant to over-utilized. Increasing users have depleted once plentiful fisheries and place users in competition with one another. The roots of this competition are based on both economics and food security. Africa's fisheries are a critical source of food, providing roughly 25% of Africa's animal protein consumption, and their vulnerability causes insecurity that poses a direct threat to local communities.⁹⁴ Users, both commercial and artisanal, resort to conflict to protect critical resources and defend their livelihoods. Because rural fishing communities are particularly dependent on fisheries, when those fisheries become depleted, they are at particularly high risk of experiencing low-level conflict.⁹⁵ This chapter will outline the various types of conflict seen among fisheries users. It will look at conflict as seen between the individual participants, describing how conflict most often manifests.

However, although users may be driven to conflict as they seek resolution and a means of subsistence, this does not have to be their only option.⁹⁶ Fisheries management programs support sustainable fishing practices and can help mitigate or reduce existing conflict over dwindling resources. Effective management is critical to fisheries' sustainability and this chapter will examine what role specific management strategies play in both promoting sustainable fishing practices and reducing conflict. This chapter will look specifically at two types of management programs: national management, run by the

⁹⁴ C. M. Marquette, K. A. Koranteng, R. Overaa, and E. B. Aryeetey, "Small-Scale Fisheries, Population Dynamics, and Resource use in Africa: The Case of Moree, Ghana," *Ambio* 31, no. 4 (06, 2002): 324.

⁹⁵ Cullen S. Hendrix, and Sarah M. Glaser, "Civil Conflict and World Fisheries, 1952–2004," *Journal of Peace Research* 48, no. 4 (07, 2011): 492.

⁹⁶ "Coastal Fisheries in West Africa. for a General Mobilization Against the Conflicts. Typology and Causes of Conflicts," *IDAF newsletter/Lettre Du DIPA.Cotonou* no. 21 (0, 1994): 16.

national government, and co-management programs that incorporate local level input and enforcement. It will examine each in turn, looking at advantages and disadvantages for each.

A. TYPES OF CONFLICT

Somalian piracy is the most famous example of fisheries conflict, in which local fishermen took extreme measures to protect their livelihoods and source of food. One estimate places the cost of the illegal fishing at approximately \$450 million and that over 800 illegal vessels were identified in Somali waters in 2005.⁹⁷ Somali fishers' response in defense of their livelihoods ballooned into a thriving piracy industry that affected global trade. In response, the international community formed a multinational military force to combat the pirates that caused numerous civilian casualties and cost the world economy approximately \$18 billion annually.⁹⁸ Although Somalia's pirates may represent the most extreme example of conflict evolving from poorly managed fisheries, they are not representative of the majority of Africa's fisheries.

Most conflict manifests at a low-level, staying well below the attention of the state. In cases where law enforcement is involved, it consists of the community or local level and does not involve military intervention. Conflict itself consists most frequently of sabotage to boats, gear, or property, boat ramming, bribery, threats, or intentional exclusion from fishing zones. There are few reports of assault or murder, though some more violent cases are documented. For example, Senegal identified twelve deaths and seven casualties blamed on conflict between fisheries users in two regions during the four-year period between 1988 and 1992.⁹⁹ While no details are available to shed light on these incidents, they are an indication of higher-level conflict surrounding fisheries competition, but still fall well short of qualifying as armed conflicts. For the sake of this paper, conflict will

⁹⁷ U. Rashid Sumaila, and Mahamudu Bawumia, "Fisheries, Ecosystem Justice and Piracy: A Case Study of Somalia," *Fisheries Research (Amsterdam)* 157, (09, 2014): 160.

⁹⁸ "Ending Somali Piracy: Go After the System, Not Just the Pirates," The World Bank, April 11, 2013, <http://www.worldbank.org/en/news/feature/2013/04/11/ending-somali-piracy-go-after-the-system-not-just-the-pirates>.

⁹⁹ "Coastal Fisheries in West Africa. for a General Mobilization Against the Conflicts. Typology and Causes of Conflicts," *IDAF newsletter/Lettre Du DIPA.Cotonou* no. 21 (0, 1994): 14.

include acts of sabotage, bribery, threats, intentional exclusion, and destruction of physical property. The following sections identify the varying types of competition and conflict, among African fishers.

1. Commercial Fishers Competing with Artisanal Fishers

Competition between commercial and artisanal sectors over traditionally artisanal species can occur in states that have both a large artisanal fishing sector and commercially viable near-shore fisheries, such as lobster, abalone, or sea urchins. It can lead to depleted fisheries and low-level conflict, illustrating the importance of the clash between commercial interests and artisanal livelihoods. Subsistence fishers, threatened by the incursion of significantly larger and more efficient commercial fishers, complain to local authorities when commercial vessels make incursions into reserved areas or damage artisanal fishers' gear.¹⁰⁰ Local fishermen are unable to compete with the technology available on commercial vessels that artisanal fishermen complain depletes local fish leaving nothing behind.¹⁰¹ Commercial vessels engaging in conflict may be licensed by the state to legally operate in the same waters as artisanal fishers. However, competition reduces their own catch and reduces profits. Low-level conflict between commercial and artisanal vessels often manifests as sabotage, bribery, and poaching.

The majority of conflicts appear to originate from commercial vessels targeting artisanal vessels and gear in an effort to reduce competition and maximize catch. Despite the same pressures facing artisanal fishers, very little data points to conflict from them toward commercial vessels. Many artisanal fishermen report that commercial fishers resort to aggressive measures to mitigate competition and maximize their catch in crowded waters, going so far as to destroy artisanal fishers' boats and gear.¹⁰² To avoid fishing outside their prescribed areas, commercial fishers may bribe artisanal fishers to fish in

¹⁰⁰ DCP Masalu, "Coastal and Marine Resource use Conflicts and Sustainable Development in Tanzania," *Ocean & Coastal Management* 43, no. 6 (2000): 490.

¹⁰¹ Carolyn DuBois and Christos Zografos, "Conflicts at Sea between Artisanal and Industrial Fishers: Inter-Sectoral Interactions and Dispute Resolution in Senegal," *Marine Policy* 36, no. 6 (11, 2012): 1211.

¹⁰² C. M. Marquette, K. A. Koranteng, R. Overaa, and E. B. Aryeetey, "Small-Scale Fisheries, Population Dynamics, and Resource use in Africa: The Case of Moree, Ghana," *Ambio* 31, no. 4 (06, 2002): 328.

restricted zones, or stay away from areas where commercial vessels operate.¹⁰³ This eases competition for commercial fishers and prevents potential legal disputes between commercial vessels and law enforcement. However, insufficient enforcement or politically vested interest in commercial activities prevents authorities from enforcing zoning on commercial vessels or otherwise taking action against them.¹⁰⁴

2. Migrant Fishers vs. Local Artisanal

Population growth in fishing communities and the resulting increased demand on fisheries has strained the critical resource to the point where competing users resort to destruction and conflict to protect their livelihood. In many communities, competition for fishing access spreads to migratory fishers. This influx places local fishermen in opposition to perceived outsiders in competition for limited resources. The rapid expansion in resource users as migration grows has coincided with “a rapid increase in fishing effort...as well as low or non-compliance to management regulations, destructive fishing practices, and resource use conflicts.”¹⁰⁵ While the majority of interactions are peaceful, conflict arises when migrants come in contact with local fishers already struggling with declining stocks. Local fishermen object to the presence of migrant fishermen who are perceived as more aggressive fishers and who use more efficient gear.¹⁰⁶ The response on the part of local fishers consists of intentional exclusion or low-level violence.¹⁰⁷ Some communities refuse to allow migrants access to local fisheries due to severely diminished numbers of

¹⁰³ James Tobey and Elin Torell, “Coastal Poverty and MPA Management in Mainland Tanzania and Zanzibar,” *Ocean & Coastal Management* 49, no. 11 (0, 2006): 845.

¹⁰⁴ DCP Masalu, “Coastal and Marine Resource use Conflicts and Sustainable Development in Tanzania,” *Ocean & Coastal Management* 43, no. 6 (2000): 490.

¹⁰⁵ Esther Japhet Mulyila, Tatsuro Matsuoka, and Kazuhiko Anraku, “Sustainability of Fishers’ Communities in Tropical Island Fisheries from the Perspectives of Resource use and Management: A Comparative Study of Pohnpei (Micronesia), Mafia (Tanzania), and Guimaras (Philippines),” *Fisheries Science* 78, no. 4 (07, 2012): 952.

¹⁰⁶ Sergio Rosendo, Katrina Brown, Alison Joubert, Narriman Jiddawi, and Micas Mechisso, “A Clash of Values and Approaches: A Case Study of Marine Protected Area Planning in Mozambique,” *Ocean & Coastal Management* 54, no. 1 (01, 2011): 60.

¹⁰⁷ B. Crona and S. Rosendo, “Outside the Law? Analyzing Policy Gaps in Addressing Fishers’ Migration in East Africa,” *Marine Policy* 35, no. 3 (05, 2011): 386.

fish.¹⁰⁸ Communities with high levels of new migrants have documented higher rates of civil unrest and communal discord.¹⁰⁹ Despite reports of growing conflict and unrest between the groups, there are few specifics as to the types or numbers of conflict taking place. In spite of insufficient data, it is clear that encroaching migrants fishers threaten local fishermen and hostilities between local and migrant fishers have been documented with increasing frequency.¹¹⁰

3. Tourism vs. Artisanal

Tourist industry and infrastructure poses a direct threat to artisanal fishers' access to traditional fishing grounds. As tourism expands and lays claim to ever increasing stretches of waterfront, tourist demands for pristine beaches, reefs, and sport fishing push artisanal fishers out and threaten food security. Artisanal fishers feel that the increasing tourism sector is pushing them out of traditional and critical fishing areas.¹¹¹ African states with poor economies offer little relief for artisanal fishers looking for alternative employment, making competition over potential new tourist areas critical. In response to the tourism threat, some artisanal fishers' have taken to acts of vandalism. Trespassing against hotels and tourist properties to access fishing grounds is another common tactic. In response, tourist facilities have attempted to ban artisanal fishers or report them to local authorities. Conflict between these two groups remains at a low level, limited to minor vandalism, trespassing, and involving local level enforcement without escalating higher.

¹⁰⁸ Innocent Ngao Wanyonyi, Andrew Wamukota, Simeon Mesaki, Almeida Tomas Guissamulo, and Jacob Ochiewo, "Artisanal Fisher Migration Patterns in Coastal East Africa," *Ocean & Coastal Management* 119, (01, 2016): 103.

¹⁰⁹ Robert Katikiro, KHM Ashoka Deepananda, and Edison Macusi, "Interplay between Perceived Changes in Fishery and Social Structures in Tanzanian Coastal Fishing Communities," *Fisheries Research (Amsterdam)* 164, (04, 2015): 252.

¹¹⁰ Carolyn DuBois and Christos Zografos, "Conflicts at Sea between Artisanal and Industrial Fishers: Inter-Sectoral Interactions and Dispute Resolution in Senegal," *Marine Policy* 36, no. 6 (11, 2012): 1211.

¹¹¹ Jackie Sunde and Moenieba Isaacs, *Marine Conservation and Coastal Communities: Who Carries the Costs? A Study of Marine Protected Areas and Their Impact on Traditional Small-scale Fishing Communities in South Africa* (Chennai, India: International Collective in Support of Fishworkers, 2008), 21 www.icsf.net.

However, as the tourist industry grows, the frequency of conflict between these two sectors also increases.¹¹²

4. Illegal vs. Legal Fishers

Illegal fishers are difficult to classify and identify as they are often legal fishers participating in illegal activities such as deliberately exceeding their authorized catch, fishing outside of designated fishing zones, or allowing their licenses to lapse. For this reason, identifying conflict between legal and illegal fishers is difficult. Incidents of conflict may also fall within other categories, such as commercial versus artisanal conflict, due to the fact that they often fall within more than one category and the challenges with identifying illegal vessels. Illegal fishers may fall within any category, to include commercial or artisanal, domestic or foreign. In South Africa, illegal fishers are often artisanal fishers who conflict with state enforcement authorities. Many illegal fishers in Somali waters are international commercial vessels operating unlicensed and unregulated within Somalia's EEZ. Regardless of which group they fall under, illegal fishers' activities affect all groups and are highly detrimental to the sustainability of Africa's fisheries and fishing sector.

Illegal fishing constitutes 25% of fishing in Africa and conflicts indirectly with other sectors by depriving them of their share of fisheries resources.¹¹³ Preventing illegal fishing poses significant challenges, as many states cannot provide the tools necessary to patrol distant offshore waters, which are left open to exploitation. Similar problems with insufficient enforcement allow illegal fishers to operate closer to shore, conflicting with both legal commercial and artisanal fishers. Conflict with the illegal fishing sector is complicated by the variety of forms that it takes. Many instances of illegal commercial vessels participating in conflict are described in the commercial versus artisanal section, when otherwise legal commercial vessels participate in illegal activities, such as fishing outside of authorized regions. Frequently, illegal commercial vessels go undetected as they

¹¹² Ibid., 22.

¹¹³ André Standing, "Criminality in Africa's Fishing Industry: A Threat to Human Security," *Africa Security Briefs* no. 33 (06, 2017): 5.

operate in unpatrolled waters, or go unidentified because they carry legitimate licenses, but for the wrong class of vessel, different fishing zones, or expired licenses.

Illegal vessels may only be identified as such if they are caught, either by port authorities or occasional enforcement patrols. Many illegal fishers go unnoticed, failing to report total catch or fishing in unauthorized waters without being caught. One significant factor characterizing illegal fishers that affects all other users is the extent to which they degrade conditions for legal fishers across all sectors. Illegal fishing accounts for significant financial loss per year and is responsible for extensive ecological damage through unsustainable or destructive practices. Nonetheless, while the effects of illegal fishing are relatively well documented, few accounts of conflict with identified illegal fishers exist.

Conflict between fisheries users is predominantly low-level, with a few notable exceptions. Apparent among all fisheries users, conflict takes various forms ranging from equipment and vessel sabotage, to territorial incursions. Considering current heavy and expanding use, incidents of conflict are likely to increase in both frequency and severity. While still low-level, conflict may escalate as fisheries degradation worsens and dependent fishers face lost revenues, unemployment, and food shortages. Poor enforcement while incidents of conflict are still low level will allow conflict to continue and possibly escalate until state involvement becomes essential. Effective fisheries management will become increasingly important to ensure that growing numbers of users retain peaceful access to this critical resource.

Africa's maritime fisheries host a diverse assortment of commercial and non-commercial, legal and illegal users. Conflict between groups manifests in areas where interaction and competition between users is frequent and enforcement capabilities are limited. However, despite the number of users and their varying degrees of legality, conflict is seldom occurs above the local level. Even in areas of high competition, conflict is most often limited to bribery, boat ramming, or destruction of property. In very few cases have higher-level conflict, such as murder, been reported. Despite the expectation that artisanal fishers would most often instigate conflict due to their higher numbers and reliance on fishing as both a food and income source, most cases of conflict are initiated by commercial

fishers. Moreover, fisheries management has proven to be a means through which fisheries conflict may be reduced.

B. FISHERIES MANAGEMENT

Effective state management can help mitigate fisheries conflict between users through a variety of measures. Management is critical to ensure that fisheries users retain access and that fisheries themselves maintain sustainable levels. This section will present two primary forms of management, national and co-management, that are widely employed across Africa. Both types attempt to control legal and illegal fishing through laws, regulations, and enforcement, with varying degrees of success. Although effective fisheries management reduces competition and conflict when employed, all types are not equally effective. Each management style has advantages and disadvantages for both communities and the state that are more clearly apparent with an in depth look at how each has been employed. However, as the case studies demonstrate, co-management has proven more effective in incorporating local level involvement and reducing conflict between communities and the state.

Fisheries management programs are intended to enforce fisheries regulations to ensure sustainable use, conserve fisheries for continued production, and protect maritime resources. These goals are met through a variety of measures implemented either by state authorities through national management or local communities through co-management, depending on which program is active in a given area. Management goals and enforcement measures play a significant role in controlling conflict among users and can reduce conflict when effectively employed. Licensing commercial and artisanal fishers, creating protected or restricted areas, fishing seasons, catch limits, and fines are all measures that both types of management employ to ensure compliance among fisheries users. These methods meet with varying degrees of success depending on the type of management in place and the role of local communities within the program.

1. National Management

The first approach to fisheries management occurs on the national level. This type of management centralizes responsibility for imposing and enforcing regulations, as well

as all domestic and international licensing, fisheries data collection, and maritime patrol activities, within the central state under one or several departments.¹¹⁴ This top-down management strategy places costs of enforcing maritime laws within the state's responsibility and leads small communities to expect government resources to provide management and protection for fisheries.¹¹⁵ Centralized management is employed by states around the world and by many within Africa. However, this approach has not been very successful in Africa, for three reasons.

First, many African states find the costs of enforcing maritime laws within their EEZs to be a severe financial burden, exacerbated by poor governance and corruption.¹¹⁶ In a continent as vast as Africa, which boasts vast remote and sparsely populated areas, states simply lack the financial and personnel resources to ensure that effective patrols and regulations enforcement take place. Unable to afford the costs of purchasing, equipping, manning, and maintaining patrol vessels or port authorities, much of their maritime domain remains unmonitored and vulnerable to illegal fishing activities.

A second drawback of national management is that the remoteness and inaccessibility of many fishing communities cause additional personnel challenges. Similar to the cost of maintaining maritime patrol vessels, employing sufficient enforcement officers to cover extensive and remote territory is not financially feasible. As a result, states that utilize centralized management have vast maritime areas that are vulnerable to illegal or overfishing.¹¹⁷ On shore, lack of regulation translates into unreported and underreported catch, frequently seen among licensed commercial vessels, as well as unauthorized gear

¹¹⁴ B. Trouillet, T. Guineberteau, M. Bernardon, and S. Le Roux, "Key Challenges for Maritime Governance in West Africa: Fishery-Based Lessons from Guinea and Mauritania," *Marine Policy* 35, no. 2 (03, 2011): 157.

¹¹⁵ Sergio Rosendo, Katrina Brown, Alison Joubert, Narriman Jiddawi, and Micas Mechisso, "A Clash of Values and Approaches: A Case Study of Marine Protected Area Planning in Mozambique," *Ocean & Coastal Management* 54, no. 1 (01, 2011): 63.

¹¹⁶ B. Trouillet, T. Guineberteau, M. Bernardon, and S. Le Roux, "Key Challenges for Maritime Governance in West Africa: Fishery-Based Lessons from Guinea and Mauritania," *Marine Policy* 35, no. 2 (03, 2011): 156.

¹¹⁷ Sergio Rosendo, Katrina Brown, Alison Joubert, Narriman Jiddawi, and Micas Mechisso, "A Clash of Values and Approaches: A Case Study of Marine Protected Area Planning in Mozambique," *Ocean & Coastal Management* 54, no. 1 (01, 2011): 61.

use.¹¹⁸ Current estimates place the actual total catch in fisheries around the world are 50% higher than reported catch.¹¹⁹ In Africa, the disparity between actual and reported catch is the result of a combination of corruption and ineffective or unenforced fisheries regulations, which undermines current management efforts and costs approximately \$1 billion in lost revenue, as of 2005.¹²⁰ Programs intended to mitigate overfishing and protect habitat cannot be effectively enforced in areas where enforcement officers are not present.

Third, state-based management also runs the risk of implementing programs that fail to consider local needs and expectations. Subsistence fishing communities rely on a readily available source of fish, which may conflict with the state's attempts to limit or manage fishing activities.¹²¹ Communities are more likely to comply with regulations when they feel that their needs are being represented and who have a better understanding of the justification for state management.¹²² Programs designed to help fisheries recover from overuse may limit local fishers' access by creating non-fishing zones, restricting seasonal access, establishing marine parks, or banning certain types of fishing gear. Protected areas where fishing is banned encourage local fishers to relocate and overstress nearby non-protected areas.¹²³ Communities may perceive these actions as the state cutting locals off from traditional fishing grounds or imposing unrealistic regulations in an effort

¹¹⁸ André Standing, "Criminality in Africa's Fishing Industry: A Threat to Human Security," *Africa Security Briefs* no. 33 (06, 2017): 1.

¹¹⁹ USAID, *Fishing for Food Security: The Importance of Wild Fisheries for Food Security and Nutrition* (Washington, DC: USAID, 2016), 10.

¹²⁰ André Standing, "Criminality in Africa's Fishing Industry: A Threat to Human Security," *Africa Security Briefs* no. 33 (06, 2017): 5.

¹²¹ T. R. McClanahan, J. Cinner, A. T. Kamukuru, C. Abunge, and J. Ndagala, "Management Preferences, Perceived Benefits and Conflicts among Resource Users and Managers in the Mafia Island Marine Park, Tanzania," *Environmental Conservation* 35, no. 4 (12, 2008): 346.

¹²² Milali Ernest Machumu and Amararatne Yakupitiyage, "Effectiveness of Marine Protected Areas in Managing the Drivers of Ecosystem Change: A Case of Mnazi Bay Marine Park, Tanzania," *Ambio* 42, no. 3 (04, 2013): 377.

¹²³ B. Crona and S. Rosendo, "Outside the Law? Analyzing Policy Gaps in Addressing Fishers' Migration in East Africa," *Marine Policy* 35, no. 3 (05, 2011): 379.

to dispossess artisanal fishers of their livelihoods, creating conflict between fishers and administrative authorities.¹²⁴

Despite widespread use throughout Africa, national management has largely failed to create the desired results and poses significant challenges to both governments and resource users that make it ineffective. Recognizing this, many African countries are beginning to implement decentralization, granting more authority to local communities and allowing them to participate more fully in fisheries management.¹²⁵ These countries, including Tanzania, Mozambique, and South Africa are adopting an alternative approach to fisheries management: co-management.

2. Co-management

Decentralization and co-management are growing trends that incorporate local level input and enforcement in policy creation and management.¹²⁶ Recently, the World Bank has been active in promoting programs across Africa that incorporate local level participation in management and decision-making in an effort to improve fisheries management and governance and combat illegal fishing.¹²⁷ These programs often consist of co-management strategies whereby the local community enforces regulations but operate with oversight from the national government.¹²⁸ Co-management programs have seen improved adherence to state-mandated regulations and help improve regulations enforcement in remote areas that are difficult for thinly spread enforcement officers to

¹²⁴ “Coastal Fisheries in West Africa. for a General Mobilization Against the Conflicts. Typology and Causes of Conflicts,” *IDAF newsletter/Lettre Du DIPA.Cotonou* no. 21 (0, 1994): 9.

¹²⁵ Sergio Rosendo, Katrina Brown, Alison Joubert, Narriman Jiddawi, and Micas Mechisso, “A Clash of Values and Approaches: A Case Study of Marine Protected Area Planning in Mozambique,” *Ocean & Coastal Management* 54, no. 1 (01, 2011): 63.

¹²⁶ B. Crona and S. Rosendo, “Outside the Law? Analyzing Policy Gaps in Addressing Fishers’ Migration in East Africa,” *Marine Policy* 35, no. 3 (05, 2011): 386.

¹²⁷ André Standing, “Criminality in Africa’s Fishing Industry: A Threat to Human Security,” *Africa Security Briefs* no. 33 (06, 2017): 11.

¹²⁸ Esther Japhet Mulyila, Tatsuro Matsuoka, and Kazuhiko Anraku, “Sustainability of Fishers’ Communities in Tropical Island Fisheries from the Perspectives of Resource use and Management: A Comparative Study of Pohnpei (Micronesia), Mafia (Tanzania), and Guimaras (Philippines),” *Fisheries Science* 78, no. 4 (07, 2012): 957.

access.¹²⁹ These programs have the added benefit of allowing affected communities to participate in the management of the resource on which they rely. By incorporating local interests, the state is able to pass policies that allow continued access while also helping promote sustainable conservation programs that the community can understand and facilitate.

Additionally, local level participation helps ensure that affected communities have a vested interest in the success of the management program. Combining management with local existing reliance on resources encourages communities to become more active participants in both enforcing regulations among other users and following regulations themselves. This is one complaint that local villagers have against migrant fishers, arguing that migrant fishers lack any connection or reliance on local resources, allowing them to disregard conservative fishing methods.¹³⁰

Catch share programs are one means of including local communities in resource management efforts and provide incentives to fish more responsibly and abide by fishery regulations by tying individual catches to fishery population levels. Growing numbers of developing countries and wealthier nations are employing these programs, as are community managed programs. These programs grant fishers a total allowable catch (TAC) that is a set percentage of the local fishery. As the fishery grows and stabilizes, the TAC also increases, improving fishers' catch and return.¹³¹ In Alaska in the 1990s, local fishermen were critical in helping the severely diminished halibut fishery recover after being authorized a TAC in place of the traditional limited season.¹³² Understanding that their own catch would increase as the local stocks grew, fishermen altered their tactics and seasons to encourage fishery growth, choosing to set management regulations that

¹²⁹ Milali Ernest Machumu and Amararatne Yakupitiyage, "Effectiveness of Marine Protected Areas in Managing the Drivers of Ecosystem Change: A Case of Mnazi Bay Marine Park, Tanzania," *Ambio* 42, no. 3 (04, 2013): 377.

¹³⁰ Robert Katikiro, KHM Ashoka Deepananda, and Edison Macusi, "Interplay between Perceived Changes in Fishery and Social Structures in Tanzanian Coastal Fishing Communities," *Fisheries Research (Amsterdam)* 164, (04, 2015): 251.

¹³¹ Sharon Levy, "Catch Shares Management," *Bioscience* 60, no. 10 (11, 2010): 780.

¹³² Donald R. Leal, "Saving fisheries with free markets," *The Milken Institute Review*, (First Quarter, 2006): 61.

exceeded those imposed by the state to ensure more rapid fishery growth. In some areas where catch share has been implemented, fishers have even requested reduced TACs to accommodate fishery recovery.¹³³

Similarly, when local communities in Africa have a role in managing a critical local resource, they take a more active role in promoting and participating in management. Local fishermen encouraged to help with enforcement are instrumental in reporting illegal activities and are more willing to comply with regulations that they feel represent their own interests.¹³⁴ Understanding the purpose behind management programs is critical to local participation and requires local level education on practices and policies.

Many national management programs struggle as a result of lack of education, poor understanding of the purpose for the program, specific rules, and regulations. Artisanal fishermen who either do not know or do not understand regulations are less able or willing to comply. In contrast, local level participation can facilitate education about management practices and their justification, increasing the likelihood of their success. Because enforcement falls to the local community, whose needs and interests help determine aspects of local management, a clearer understanding of the specific laws is both necessary and more widespread.¹³⁵ Fishermen who understand the justification behind prohibited gear and who benefit from improved fishery health are more likely to comply with gear regulations and to report violators. Empowering the local community through education and enforcement further improves program success by expanding capacity into regions the state has difficulty reaching.

In addition, local level participation in co-management facilitates regulation enforcement in remote regions that the state otherwise has difficulty accessing. Through co-management, communities ensure that members of remote areas and migrant fishers adhere to regulations that promote the health of the local fishery and the community itself.

¹³³ Sharon Levy, "Catch Shares Management," *Bioscience* 60, no. 10 (11, 2010): 781.

¹³⁴ Milali Ernest Machumu and Amararatne Yakupitiyage, "Effectiveness of Marine Protected Areas in Managing the Drivers of Ecosystem Change: A Case of Mnazi Bay Marine Park, Tanzania," *Ambio* 42, no. 3 (04, 2013): 377.

¹³⁵ *Ibid.*, 373.

Some communities include local fishermen in patrolling and enforcement, establishing local units to patrol for and report regulations violations.¹³⁶ Hotels have also been instrumental in reporting illegal fishing activities, helping overextended local enforcement officers and local management programs. In Tanzania, local hotels whose business depends on pristine corals, beaches and plentiful fisheries to attract tourists have become active participants in enforcement.¹³⁷ Co-management programs have helped mitigate conflict between sectors by sharing both responsibility and benefits of local fisheries' health.

Despite the benefits of fisheries co-management programs, problems have been identified with their implementation. Mitigating inter-group conflict is one of the driving factors behind promoting co-management. In areas where such conflict exists, local fishermen are often critical players in fisheries dynamics. Granting these individuals and their communities key roles in management can lead to the further exclusion of fisheries users from outside the controlling community, resulting in disproportionate access and increased discontent. The case of migrant fishers is one such example. Local level management in some areas has shown that migratory fishers' interests receive less consideration when the local community plays a larger role in management.¹³⁸ Fishing licenses may be denied, catch limits severely reduced, fishing zones relocated or reduced, denying non-local fishermen access to fisheries. In Mozambique, one community reduced the authorized length of stay for migrant fishers and established non-migrant fishing zones to reduce the group's access.¹³⁹ This dynamic can create conflict between the persecuted group and the local management community, potentially fomenting regional tensions. Migrant fishers have simply stopped visiting some locations, easing pressure in that area but increasing the burden on other communities. While similar actions could be taken against commercial vessels or tourism, state support for the revenue producing industries

¹³⁶ James Tobey and Elin Torell, "Coastal Poverty and MPA Management in Mainland Tanzania and Zanzibar," *Ocean & Coastal Management* 49, no. 11 (0, 2006): 845.

¹³⁷ *Ibid.*, 845.

¹³⁸ B. Crona and S. Rosendo, "Outside the Law? Analyzing Policy Gaps in Addressing Fishers' Migration in East Africa," *Marine Policy* 35, no. 3 (05, 2011): 386.

¹³⁹ Innocent Ngao Wanyonyi, Andrew Wamukota, Simeon Mesaki, Almeida Tomas Guissamulo, and Jacob Ochiewo, "Artisanal Fisher Migration Patterns in Coastal East Africa," *Ocean & Coastal Management* 119, (01, 2016): 102.

may be sufficient to prevent such local level efforts.¹⁴⁰ Continued strain on resources from increasing numbers of users will doubtless cause some conflict even with community participation in management.¹⁴¹ Although co-management offers a promising alternative approach, some communities may view their increased management role as an opportunity to restrict the access of other rightful fisheries users.

C. CONCLUSION

Conflict between groups manifests as competition for dwindling fisheries resources increases. Although various groups are in competition with one another, conflict has remained well below the national level, involving local actors and dealt with at the local level. Overall, conflict is not currently a significant security threat, for locals, African states, or the international community. But, growing pressure on fisheries could quickly escalate the problem. As such, it is critical to thoroughly understand the effects of management programs on fisheries user and potential conflict to prevent future crises over resource use.

States seeking to effectively manage their maritime fisheries resources have employed two types of management programs: national management and co-management. Many states opt for national management as a means of retaining state control over fisheries resources, licensing, and enforcement. However, the economic and enforcement resources necessary to effectively manage are often beyond the capability of impoverished and inefficient governments. Local communities view methods employed in ensuring compliance with management programs with suspicion and contempt, taking advantage of poor infrastructure and capacity to fish illegally. Co-management offers an inexpensive means for state governments to expand their management programs without imposing the staggering costs that can be incurred by attempting to govern lengthy and remote coastlines.

¹⁴⁰ André Standing, “Criminality in Africa’s Fishing Industry: A Threat to Human Security,” *Africa Security Briefs* no. 33 (06, 2017): 1.

¹⁴¹ Kate Barley Kincaid, George Rose, and Humphrey Mahudi, “Fishers’ Perception of a Multiple-use Marine Protected Area: Why Communities and Gear Users Differ at Mafia Island, Tanzania,” *Marine Policy* 43, (01, 2014): 227.

While reducing conflict, effective enforcement can also promote healthy fisheries. One Liberian fishing zone reserved exclusively for small-scale fishers reports that the fishery has been able to recover and produce better quality fish, helping ensure the survival of the local economy and subsistence fishing community, and lending credence to local concerns about commercial fishers.¹⁴² This development came to pass only when the Liberian government employed a co-management program with local communities in an effort to combat illegal fishing and improve fishery health. The program worked in conjunction with government patrols to enforce fishing regulations and bans.¹⁴³ The whole project was carried out as a collaborative effort with funding from several NGOs. The results have shown an increase in fishery productivity, helped the Liberian government increase revenues from commercial fisheries, and reduced the incidents of illegal fishing.¹⁴⁴ However, economically underdeveloped states are less able to field the resources required to effectively manage vast fisheries that can be a tremendous boon to a country's economy. Effective management programs that promote sustainable fisheries could add \$2 billion to Africa's economies per year, making sustainable management an effective tool in improving state and local economies.¹⁴⁵ In this capacity, local communities can be powerful actors in maritime resources management and conflict prevention if the state works with communities to establish effective co-management programs.

The following case studies will look at an example of each type of management program, providing an illustration of how each management type can influence fishery productivity and the resulting competition and conflict. These case studies will demonstrate that co-management programs are more effective in meeting management goals than national management programs.

¹⁴² André Standing, "Criminality in Africa's Fishing Industry: A Threat to Human Security," *Africa Security Briefs* no. 33 (06, 2017): 9.

¹⁴³ Environmental Justice Foundation, *Liberian Fishing Communities: Problems and Solutions*, (London, United Kingdom: 20 February 2012), 5. <https://ejfoundation.org/reports/>.

¹⁴⁴ *Ibid.*, 5.

¹⁴⁵ André Standing, "Criminality in Africa's Fishing Industry: A Threat to Human Security," *Africa Security Briefs* no. 33 (06, 2017): 2.

IV. TANZANIA CASE STUDY

Fisheries are a critical resource in Tanzania, providing 183,800 jobs throughout the country and provide up to 22 percent of animal protein to local diets.¹⁴⁶ Recently, fisheries have seen increasing competition between the artisanal and commercial sectors as global demand for fish continues to rise. Adding to this domestic competition, Tanzania's tourism sector is now growing as the world begins to appreciate what the country has to offer. Fisheries have noticeably decreased over the last 10 years, leading to voiced concerns from traditional fishers, who utilize local, near shore fisheries for critical food resources, as well as from commercial fisheries who contribute significantly to the Tanzanian GDP. In an economy where multiple resource users rely on local fisheries for income, food, and employment, the health of now over-stressed stocks is crucial to countless households and communities, as well as to the health of the national economy.

As multiple competing sectors increasingly interact with one another, competition has occasionally turned to conflict, primarily in the form of sabotage, boat ramming, and destruction of fishing gear. In response to both the diminishing fisheries and increasingly strained interactions between users, the Tanzanian government has enacted a variety of changes in their approach to fisheries management, creating numerous maritime reserves intended to help preserve sustainable fish stocks to meet the needs of all parties involved. Effective resource management strategies are critical to reducing the potential for conflict between increasing numbers of resource users seeking access to diminishing fisheries stocks within Tanzania's coastal waters and EEZ. The Tanzanian government was proactive in recognizing the danger posed by increased pressure on fisheries, implementing management programs before that mitigated the potential for significant conflict.

A. THE STATUS OF TANZANIA'S FISHERIES

Tanzania has moved in recent years to promote its maritime industries, including commercial fisheries. Tanzania's maritime fishing industry makes up only 14 percent of

¹⁴⁶ USAID, *The Importance of Wild Fisheries For Local Food Security*, Tanzania. Washington, DC. 1.

the total fish production for the country, with over 85 percent of production coming from inland sources.¹⁴⁷ However, the maritime sector also employs numerous artisanal fishermen distributed across approximately 7,666 vessels and growing at a rate of roughly 280 vessels per year.¹⁴⁸ The number of large, domestic commercial vessels is significantly smaller and consists of three large longliners and 74 commercial domestic and international vessels.¹⁴⁹ While the percentage of the maritime fisheries' intake is far lower than that of inland fisheries, the sector is still a significant contributor to local employment and diets and is growing steadily each year. The maritime fisheries industry contributes roughly 2 percent per year to the GDP, with a recent drop down to 1.4 percent in 2014, but makes up approximately 10 percent of national exports.¹⁵⁰ This critical sector has become increasingly important as Tanzania's tourism industry grows, attracting visitors from around the world who seek to enjoy the country's fisheries through recreational activities.

Tanzania's fishing industry consists of both domestic commercial and artisanal fishing sectors. The commercial sector primarily fishes further out in the EEZ and targets internationally marketable fish such as tuna, swordfish, skipjack and marlin, but also utilizes fisheries closer to shore in pursuit of crabs, lobster, octopus, shrimp and squid that are also targeted by artisanal fishermen.¹⁵¹ Commercial fishers contribute to the national economy through a variety of means, including employment of fishers out on fishing vessels, and fish processing workers on land, as well as through domestic and international export sales. Domestic commercial fishing vessels share deep-sea resources with international ships that have signed agreements with the government of Tanzania to fish within its EEZ.

¹⁴⁷ Yohana L. Budeba, *The Tanzanian Fisheries Sector: Challenges and Opportunities*, Ministry of Agriculture, Livestock and Fisheries, September 2016: 4.

¹⁴⁸ Ibid., 13.

¹⁴⁹ Ibid., 14.

¹⁵⁰ Hosea Gonza Mbilinyi, *An overview of the fisheries sub sector: Achievements Challenges and Priorities for Financial Year 2014/15*, Ministry of Livestock and Fisheries Development, 16 October, 2014: 2.

¹⁵¹ Yohana L. Budeba, *The Tanzanian Fisheries Sector: Challenges and Opportunities*, Ministry of Agriculture, Livestock and Fisheries, September 2016: 13, 14.

Small scale and subsistence fishers make up a large artisanal fishers sector. The artisanal and small-scale fishers exploit resources much closer to shore due to limitations imposed by their much smaller boats and more primitive equipment.¹⁵² While not contributing as significantly to the national export economy, maritime artisanal fishing does supply fresh fish directly to local markets and accounts for approximately 14 percent of the total national fisheries production.¹⁵³ In addition to individual and household incomes, this sector provides a critical food source to many families and communities who may not have access to commercial catch due to remoteness or low income. Commercial pursuits for the small scale and artisanal fisher sector are limited as a result of difficult and lengthy transportation to markets and limited availability of refrigeration, which is critical to keeping fish fresh during transport through the hot climate found across Tanzania.¹⁵⁴ As a result, these fishers rely on resources close to home, and what commercial opportunities they have are limited to local markets.

Tourism across Tanzania is a relatively new player in the maritime fisheries sector that is actively promoted by the Tanzanian government and has been growing rapidly, nearly doubling in eight years from \$824 million to \$1.4 billion between 2005 and 2013.¹⁵⁵ Marine resources, including beaches, coral reefs and fisheries, are popular attractions for the growing numbers of tourists who visit annually. As this industry expands, it adds more users with diverse interests to the growing list of groups who vie for fisheries and maritime resources. The tourist industry has a vested interest in pristine conditions that appeal to visitors for a variety of activities, including scuba diving, snorkeling, and deep sea sport fishing. The varied interests of the tourist industry put it in close competition with both the artisanal and commercial sectors for resource access near shore as well as further out in the EEZ.

¹⁵² Ibid., 13.

¹⁵³ Ibid., 13.

¹⁵⁴ James Tobey, and Elin Torell. "Coastal Poverty and MPA Management in Mainland Tanzania and Zanzibar," *Ocean & Coastal Management* 49, no. 11 (0, 2006): 845.

¹⁵⁵ The World Bank Group. Tanzania Economic Update. "The Elephant in the Room: Unlocking the potential of the tourism industry for Tanzanians," *Africa Region Macroeconomics and Fiscal Management* 6, January 2015: 21.

Further competition for fishing grounds comes from the international community in the form of foreign commercial fishing fleets. Already competing with the domestic commercial fishing vessels, artisanal fishers now face pressure from international fleets as well. In 2014, 25 international fishing vessels were licensed by the Tanzanian government to fish within its EEZ, per agreements signed with Spain, France, Seychelles, and South Korea, among others.¹⁵⁶ Increasing global demands for seafood and dwindling local fisheries drive many international commercial fishers to Africa's coastlines where resources are abundant in comparison with their own, overfished territorial waters. Typical traditional boats are unable to compete with large, international trawlers and local fishermen "have been pushed out of their traditional fishing grounds by the huge vessels."¹⁵⁷ Given that many local fishermen are subsistence fishers, this competition creates the potential for food insecurity as well as economic strife.

In at least one documented case, commercial fishers have actively encouraged local fishermen to fish illegally in prohibited areas and have even provided them with the equipment to do so.¹⁵⁸ While this is not an illustration of conflict between the two groups, it does demonstrate the severity of diminishing resources. Encouraging local fishers to move into prohibited areas serves the short-term goal of temporarily lessening competition in the immediate authorized vicinity, making it easier for commercial fishers to catch their limit. The commercial fishers take no risk of getting caught violating fishing regulations and manage to reduce competition for resources. This is one illustration of the competition between artisanal and commercial fisheries, but it demonstrates the measures that each is willing to take in order to ensure their own access. Mutual use agreements that enable both industries to utilize these resources will be critical to preventing potential conflicts.

More frequent and intense incursions from illegal fishers, often from unlicensed international vessels, are having an increasingly detrimental effect on Tanzania's fishing

¹⁵⁶ Yohana L. Budeba, *The Tanzanian Fisheries Sector: Challenges and Opportunities*, Ministry of Agriculture, Livestock and Fisheries, September 2016: 14.

¹⁵⁷ Francois Very, "Tapping into Africa's Trillion-Dollar Blue Economy," *Marketplace Africa*, CNN Updated May 30, 2017. <http://www.cnn.com/2017/05/30/africa/africa-blue-economy/index.html>

¹⁵⁸ James Tobey and Elin Torell, "Coastal Poverty and MPA Management in Mainland Tanzania and Zanzibar," *Ocean & Coastal Management* 49, no. 11 (0, 2006): 845.

economy. The incursions from illegal fishing vessels have become so problematic that the Ministry of Agriculture, Livestock and Fisheries (MALF) lists illegal fishing as a top constraint on the fisheries sector.¹⁵⁹ In addition to stealing revenue from Tanzania's own domestic fleets, illegal fishers add another layer of competitive pressure to an already tense race for limited fish stocks. Illegal fishing also places a heavy financial strain on the state itself as law enforcement attempts to rein in the illegal incursions into Tanzania's EEZ. The state is forced to expend valuable and limited resources patrolling waters for illegal fishers that could be directed toward conservation or regulations enforcement within its own domestic fishing sectors.

B. COMPETITION AND CONFLICT

The interplay of these varied actors becomes problematic and strained as they all seek access to the same limited resources. Artisanal fishers feel that their access to near-shore fisheries is a right guaranteed by traditional, historic access that gives them precedence over other users. This perspective puts them in conflict with newer resource users, such as the tourism industry, as it purchases beachfront properties with access to traditional fishing grounds, such as coral reefs and mangrove forests. Artisanal and domestic commercial fisheries come into conflict as commercial fishers target resources that artisanal fishers rely on for subsistence and income. The complex interests of each sector create tensions as the growing groups compete for economic relevance and resource access.

Despite the increasing strains from more users and dwindling stocks, few specific conflicts between resource users have been documented. Those that have been identified remain at low levels and are most often seen in instances where access has been completely denied to historic resource users. A general increase in overall conflict between resource users has been found as more users from different backgrounds, such as tourists and

¹⁵⁹ Hosea Gonza Mbilinyi, *An overview of the fisheries sub sector: Achievements Challenges and Priorities for Financial Year 2014/15*, Ministry of Livestock and Fisheries Development, 16 October, 2014: 6.

artisanal fishers, compete for the same fisheries.¹⁶⁰ One documented instance of conflict between users consists of an island hotel development project in Tanzania that denied local fishermen any access to traditional fishing grounds, including the island and surrounding waters. As a result of this complete denial of access, local fishermen subsequently and consistently vandalized the property to the extent that the project was sold. The purchaser, recognizing the importance of maintaining good relations with the community, was able to reach an agreement with the local fishermen whereby their access to both the island and the fishing grounds was restored and the hotel retained use of the resources for guests.¹⁶¹ Following this mutual use agreement, the vandalism stopped and no further incidents were reported.

This case is significant in suggesting that conflict between groups is more likely to occur when traditional users have been completely denied access to resources. The conflict between the developer and the fishermen was resolved and vandalism ceased even though access would be shared and was more limited to the fishermen than it had been prior to the development of the hotel. So long as some level of access was available, this particular community of local fishermen appears to have been amenable to sharing resources. While the implications of this particular case are pertinent, more documented instances of such conflict are needed to determine causes and potential mitigation.

Other cases of conflict consist of equipment vandalism between commercial and artisanal fishermen as well as among users from the same communities.¹⁶² In these cases, complaints were taken to the local management authority with evidence that fishing had been nearly depleted since the arrival of trawlers onto traditional grounds.¹⁶³ Many

¹⁶⁰ Esther Japhet Mulyila, Tatsuro Matsuoka, and Kazuhiko Anraku, "Sustainability of Fishers' Communities in Tropical Island Fisheries from the Perspectives of Resource use and Management: A Comparative Study of Pohnpei (Micronesia), Mafia (Tanzania), and Guimaras (Philippines)," *Fisheries Science* 78, no. 4 (07, 2012): 952.

¹⁶¹ Desiderius C. P. Masalu, "Coastal and Marine Resource use Conflicts and Sustainable Development in Tanzania," *Ocean and Coastal Management* 43, no. 6 (0, 2000): 485.

¹⁶² Kate B. Kincaid, Geoge Rose, Humphrey Mahudi, "Fishers' perceptions of a multiple-use maritime protected area: Why communities and gear users differ at Mafia Island, Tanzania," *Marine Policy* 43 (2014): 227.

¹⁶³ Desiderius C. P. Masalu, "Coastal and Marine Resource use Conflicts and Sustainable Development in Tanzania," *Ocean and Coastal Management* 43, no. 6 (0, 2000): 490.

disputes appear at the low level and are accompanied by complaints to local officials, who also rely on zoning to mitigate conflicts between users.¹⁶⁴ The use of official channels to register complaints suggests that there is some degree of effective enforcement that locals feel they can rely on. This avenue for conflict resolution is an indicator that management and enforcement mechanisms are both understood by local users and are considered reasonably effective. Beyond complaints and low-level conflict, there is no readily available documentation of conflict escalating to physical violence either among fishers or between sectors.

Tourists, commercial, and traditional fishers are not the only ones competing for valuable maritime resources. The combined pressures from multiple resource users has become readily apparent to all parties involved in the form of severely diminished fisheries stocks. Local fishermen report having to expend much more effort in return for smaller catches and studies confirming significantly reduced abundance in the last decade corroborate their complaints.¹⁶⁵ Communities also report increasing numbers of fishers from both the local area and beyond, resulting in further strain on the fisheries themselves, as well as more competition for dwindling resources.¹⁶⁶ In some areas, the combined factors of diminished fisheries and influx of new fisheries users are found to be eroding social bonds, resulting in tensions and suspicion within previously close-knit communities.¹⁶⁷ These social tensions within small communities point to potential for greater social conflict and insecurity as resource users continue to increase while resources themselves continue to dwindle. Effective management policies will prove critical to

¹⁶⁴ Esther Japhet Mulyila, Tatsuro Matsuoka, and Kazuhiko Anraku, "Sustainability of Fishers' Communities in Tropical Island Fisheries from the Perspectives of Resource use and Management: A Comparative Study of Pohnpei (Micronesia), Mafia (Tanzania), and Guimaras (Philippines)," *Fisheries Science* 78, no. 4 (07, 2012): 957.

¹⁶⁵ James Tobey and Elin Torell, "Coastal Poverty and MPA Management in Mainland Tanzania and Zanzibar," *Ocean & Coastal Management* 49, no. 11 (0, 2006): 843.

¹⁶⁶ *Ibid.*, 843.

¹⁶⁷ Robert Katikiro, KHM Ashoka Deepananda, and Edison Macusi, "Interplay between Perceived Changes in Fishery and Social Structures in Tanzanian Coastal Fishing Communities," *Fisheries Research (Amsterdam)* 164, (04, 2015): 252.

prevent conflict as tensions within and between fisheries users and sectors continue to escalate in the face of declining stocks.

C. MANAGEMENT

Tanzania's government has begun to implement co-management programs in some areas in an effort to conserve its maritime resources and ensure that sufficient resources are available for fisheries users. In recent years, it has dedicated significant portions of its coastline and EEZ to Maritime Protected Areas (MPAs) and has future plans for more. The goal behind establishing these protected areas is to provide habitat in areas critical to indigenous fish, such as spawning areas and coral reefs, to promote sustainable fisheries. This program is intended to ensure continued use of maritime resources for all invested parties without causing fisheries to collapse or to fall into commercial extinction. If sustainable numbers can be maintained, resource competition between users will be eased and potential for tensions and conflict mitigated.

The challenge that the government faces is how to regulate these areas so that sustainability is ensured and regulations are obeyed. Like many African coastal countries, Tanzania has many communities in remote areas that are difficult for national enforcement officers and vessels to reach, making enforcement costly and difficult for nationally managed programs. MALF's attempts to completely close MPAs to all extractive activity resulted in an increase in regulations violations, illegal fishing, and poaching, testing the limits of national enforcement capabilities. Findings suggest that MPAs that allow some fishing activity experience a higher degree of compliance than those that are completely closed off to all fishing or resource extraction, regardless of management type, easing the burden of enforcing regulations and freeing up valuable assets.¹⁶⁸ Regulations are also found to be most effective in areas where the community's needs are incorporated into resource management.¹⁶⁹ Similarly, co-management areas also see the lowest level of

¹⁶⁸ Albogast T. Kamukuru, Yunus D. Mgaya, Marcus C. Ohman, "Evaluating a marine protected area in a developing country: Mafia Island Marine Park, Tanzania," *Ocean & Coastal Management* 47 (2004): 322.

¹⁶⁹ George M. Branch and Barry M. Clark, "Fish Stocks and their Management: The Changing Face of Fisheries in South Africa," *Marine Policy* 30, no. 2 (03, 2006): 11.

hostility toward the state and lower incidents of fishers engaging in acts of sabotage against resource competitors.¹⁷⁰ Conversely, areas managed exclusively by the state and closed to local access are perceived as solely benefitting the state, to the detriment of the local community.¹⁷¹ In accordance with these findings, the government began implementing co-management of MPAs with local communities to allow tightly regulated access within previously denied areas.¹⁷² The number of violations and illegal activities dropped significantly even in nationally managed areas after the government opened the MPA even to limited resource extraction.

Effective co-management is reinforced by an education component for local managers and fishers aimed at informing them of sustainability goals and practices, such as gear restrictions and regulations.¹⁷³ Actively working to incorporate locals into planning and management appears to be an effective means of demonstrating that conservation measures are being employed for everyone's benefit. This concept is evident in the few documented cases of specific conflict, which primarily arose as a result of denial of access. In addition to benefitting the local community in representing their needs and interests, co-management enables the national government to defray some of the costs associated with management and enforcement.¹⁷⁴

While co-management has proven effective in reducing incidents of conflict within and among fishery users, there are only a few areas that implement these programs. Much of Tanzania's coastline is still beyond the reach of national management programs and the government has yet to introduce widespread co-management programs throughout the country. Information regarding conflict in these areas is also limited, but destructive fishing

¹⁷⁰ Desiderius C. P. Masalu, "Coastal and Marine Resource use Conflicts and Sustainable Development in Tanzania," *Ocean and Coastal Management* 43, no. 6 (0, 2000): 490.

¹⁷¹ T. R. McClanahan, J. Cinner, A. T. Kamukuru, C. Abunge, and J. Ndagala, "Management Preferences, Perceived Benefits and Conflicts among Resource Users and Managers in the Mafia Island Marine Park, Tanzania," *Environmental Conservation* 35, no. 4 (12, 2008): 346.

¹⁷² *Ibid.*, 323.

¹⁷³ Hosea Gonza Mbilinyi, *An overview of the fisheries sub sector: Achievements Challenges and Priorities for Financial Year 2014/15*, Ministry of Livestock and Fisheries Development, 16 October, 2014: 9.

¹⁷⁴ *Ibid.*, 7.

practices are considered a widespread problem outside of managed fishing areas. This continued trend of destructive fishing threatens the resource and could lead to increased incidents of conflict if effective management plans are not implemented.¹⁷⁵ Around 2000, the Tanzania government passed laws decentralizing the management of marine resources, providing for increased use of co-management programs throughout the country.¹⁷⁶ Further research will be required to determine the long-term efficacy of these programs at reducing conflict between users.

D. CONCLUSION

While Tanzania's fisheries are facing obvious stresses and have been visibly diminished, specific documented incidents of conflict are extremely rare. Published studies do refer to an increase in generalized conflict in areas of increased competition for resources, but these references seldom include specific details such as types of conflict, specific parties involved, or any means of resolution. In places where multiple groups are competing over shared fisheries, some instances of conflict have been recorded, and typically include bribery, sabotage, or chasing competitors off of fishing grounds. These specifics appear infrequently but do typically include mention of formal complaints being filed with local management authorities. The common thread across fisheries conflict is a noticeable decrease in available fisheries stocks and an equally noticeable increase in resource users.

In places where conflict has arisen, it seems to appear in response to total denial of access to traditional grounds. MALF's response to this has been to implement co-management with local leadership, which is one possible explanation for the lack of documented instances of conflict and reliance on official channels for conflict resolution. Employing local leadership provides a known channel to local fishers who feel they have a justified complaint and may effectively prevent them from feeling the need to resort to conflict. Proactive education in regulations, sustainability, and management at the village

¹⁷⁵ Steve Rocliffe, Shawn Peabody, Melita Samoilys, Julie P. Hawkins, "Towards a Network of Locally Managed Marine Areas (LMMAs) in the Western Indian Ocean," *Plos One* 9, (7, July, 2014): 7.

¹⁷⁶ *Ibid.*, 7.

leader and individual fisher levels have also ensured that all parties are aware of proper avenues and the justifications behind regulations in place. Since strain on fisheries is only likely to increase in response to global demand, effective means of management must be implemented to prevent the possibility of conflict between parties from arising. Tanzania's co-management strategy, ensuring access for all parties, appears to be an effective answer to reducing incidents of conflict and providing users with a mode for formal complaints.

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V. SOUTH AFRICA CASE STUDY

The South African case is shaped by the country's apartheid-era history. The distinctly preferential treatment shown to white South Africans shaped the national economy and was reflected in virtually every industry, including the country's fishing sector. Within South Africa's booming fisheries industry, only whites were permitted to own licenses for commercial businesses and trawlers; non-whites were relegated to non-commercial fishing, which barely allowed them to earn a subsistence living from their efforts. With the fall of apartheid, these policies underwent complete overhaul, to include regulations requiring non-white business ownership and participation in upper levels of existing businesses. However, the ongoing effects of apartheid and the economic conditions that it created have had a lasting effect on both the fishing sector and the fisheries themselves.

One of the main long-term effects of apartheid policies is that non-whites continue to face challenges breaking into the industry. As a result, they often resort to poaching, particularly of high value stocks, hampering state-centered management efforts that frequently overlook artisanal and small-scale commercial fishers in favor of larger commercial entities. These illicit activities are detrimental to fragile fisheries and pose a growing threat to legitimate economic activities and community livelihoods. Poor management of limited resources after apartheid compounded existing inequalities and negated state efforts to effectively manage fishery resources. The failure of the South African state to correct the marginalization established during apartheid, combined with ineffective management of fisheries resources resulted in rampant poaching that collapsed the commercial abalone fishery.

A. THE LEGACY OF APARTHEID

Outside of the fishing industry, apartheid laws placed significant restrictions on employment opportunities, relegating non-whites, or Historically Disadvantaged Individuals (HDIs) to living in low-income, politically and economically marginalized communities with few government services, and poor educational opportunities. If active

government investment is key to economic growth, non-white communities stood virtually no chance of improving their situation.¹⁷⁷ The lack of government presence in these communities fostered an environment of poor government legitimacy that carried on in many communities to the post-apartheid era.¹⁷⁸ In these marginalized communities, the absence of viable employment and educational opportunities during apartheid kept incomes consistently low and widespread poverty continued even after apartheid fell. In this economic and political environment, while the repeal of apartheid laws has opened numerous new doors to opportunity, many individuals and communities lacked the resources, education, experience, or infrastructure necessary to break into the already competitive and white-dominated world of commercial fishing. Since apartheid ended, the state has been unable to rapidly address the lasting effects, due in part to overwhelming demand, understaffing, and poor funding, and many communities continued to be ignored. The fishing sector is one example of apartheid laws continuing to negatively affect communities in the post-apartheid era.

Apartheid laws were apparent in the fishing industry in the allocation of large scale, commercial licenses exclusively to white owned corporations, whereas non-white fishers were permitted only limited use licensing or deemed outright illegal.¹⁷⁹ A well-established and efficient commercial fishing industry can improve both the local and national level economies, making it appealing to national governments that actively promote the activity. The financial advantages of a well-established fishing industry were not lost on the apartheid national government, which actively promoted commercial scale activities over those of small-scale subsistence or artisanal fishers that add little to the national economy. Policies deliberately favored commercial fishing over subsistence or artisanal fishing in an effort to promote economic growth. While these large commercial fishing businesses served as significant sources of employment for non-whites who worked on land at fish

¹⁷⁷ Thandika Mkandawire. "Thinking about Developmental States in Africa." *Cambridge Journal of Economics* 25, no. 3 (05, 2001): 291.

¹⁷⁸ Derica Lambrechts, and Khalil Goga, "Money and Marginalisation: The Lost War Against Abalone Poaching in South Africa," *Politikon; South African Journal of Political Studies*, 231.

¹⁷⁹ Maria Hauck and Marcel Kroese, "Fisheries Compliance in South Africa: A Decade of Challenges and Reform 1994–2004," *Marine Policy* 30, no. 1 (01, 2006): 75.

packing and processing plants, or out on the fishing fleets, they were seldom seen in high level or management positions. Unable to acquire commercial fishing licenses, non-whites were relegated almost exclusively to small-scale and artisanal fishing in their local communities, selling in local markets or fishing exclusively for subsistence, but excluded from the national economy. Small-scale fishing was considered insignificant to the national economy and virtually ignored in both the issuing of licenses as well as law enforcement, opening the door for illegal activities that would later undermine management efforts.

During apartheid, local fishermen at the subsistence and artisanal level, when granted legal status at all, fell under recreational licenses that had very limited allowable catches.¹⁸⁰ Authorized catch size was insufficient for small-scale or artisanal fishers to attempt any commercial pursuits on any scale, let alone on a level sufficient to compete with the large, white-owned trawlers. Due to the extremely low catch volume authorized by recreational licenses, local fishers were restricted to small scale, community based markets, resulting in a number of domestic, community-based fishing markets that operated on a much smaller scale than the commercial fishers that primarily exported their catch.¹⁸¹ Quotas for the commercial sector were significantly higher than for non-white fishers, with as much as 95 per cent of the total allowable catch (TAC) reserved for white-owned companies, leaving the remaining five per cent of licenses available for non-whites. These remaining licenses were ultimately sold to white-owned companies.¹⁸²

The preference for large-scale economic performance over community-based fishing, excluding artisanal fishers from their livelihoods, created an ongoing problem in the immediate post-apartheid years. Newly established official recognition of the artisanal fishing sector and the promise of access to previously denied resources increased demand for artisanal licenses and rapidly overwhelmed state capacity. In the years following apartheid, the South African government began implementing new policies intended to integrate formerly excluded populations into ownership and management positions within

¹⁸⁰ M. Hauck and M. Sowman, "Coastal and Fisheries Co-Management in South Africa: An Overview and Analysis," *Marine Policy* 25, no. 3 (05, 2001): 175.

¹⁸¹ S. Matthew, "Straddling the Colour Barrier," SAMUDRA Rep. no. 18 (1997): 5.

¹⁸² *Ibid.*, 5.

the commercial fishing industry. New policies aimed for 80 per cent of commercial fishing to be non-white owned or managed to match the national ethnic ratio of non-whites to whites, and granted legal recognition to small-scale and artisanal fishers.¹⁸³ Businesses began integrating non-whites into higher levels of management and shareholding, though most upper levels of management and ownership were still reserved for whites.¹⁸⁴

As a result of the new laws enacted in 1998, non-white participation in large-scale commercial fishing boomed from .75 percent to 62 percent in just ten years.¹⁸⁵ The total number of commercial fishing businesses also expanded dramatically from just 300 to 5837 (including individual license owners) in the same timeframe.¹⁸⁶ These numbers illustrate the increase in commercial fishing licenses allocated for non-white business entrepreneurs after decades of exclusion, but they also indicate the sudden expansion of access rights to thousands of new users seeking to utilize the same fisheries. These initiatives opened the fishing industry to entire populations that were previously denied access, but also paved the way for significant future decreases in the total allowable catch for each user if sustainable fisheries populations were to be maintained.

As illustrated, post-apartheid policy changes allowed some non-white fishers to step into the commercial industry. However, few were able to gather the capital required to start their own commercially competitive businesses. Early participation under the new policies for non-whites that caused the dramatic increase of non-white participation consisted primarily of positions granted within white-owned corporations and did not reflect a sudden increase in non-white owned businesses. Decades of economic repression prevented non-whites from gaining sufficient capital to purchase the necessary equipment to modernize their existing vessels or to start new fishing businesses, let alone to compete

¹⁸³ L. Van Sittert, G. Branch, M. Hauck, and M. Sowman, "Benchmarking the First Decade of Post-Apartheid Fisheries Reform in South Africa," *Marine Policy* 30, no. 2 (03, 2006): 96.

¹⁸⁴ George M. Branch and Barry M. Clark, "Fish Stocks and their Management: The Changing Face of Fisheries in South Africa," *Marine Policy* 30, no. 2 (03, 2006): 10.

¹⁸⁵ *Ibid.*, 102.

¹⁸⁶ *Ibid.*, 102.

with existing commercial fishers.¹⁸⁷ Despite new laws and policies, many HDIs were considered too inexperienced to be trusted with the complex management of large, internationally integrated fishing industries, limiting their opportunities within established companies.¹⁸⁸ The legacy of years of repression under government policies was continued economic and political marginalization under new laws.

B. CONFLICT IN THE ABALONE SECTOR

Following apartheid, licenses in the abalone sector were upgraded to limited commercial status and catch limits were increased.¹⁸⁹ In addition to new legal status, abalone resources, which were previously restricted for commercial industry, were opened to small-scale fishers' personal and limited commercial use. The new laws brought previously marginalized fishers and fishing communities under legal regulation, granting artisanal fishers legal status that they had been denied under apartheid laws, and expanded the total number of licenses available in all sectors, including abalone. South Africa's entire post-apartheid fishing industry extended access and recognition of previously excluded and marginalized populations of artisanal fishers to fisheries resources, significantly increasing the number of users and demand on local fisheries as legal status attracted new fishers to the whole industry.

Expanded legal access and more licenses led to a massive increase in license applications as formerly illegal and newly interested artisanal fishers sought access to the industry. Overwhelmed by new regulations and applications and suffering from severe staffing and budget cuts, government offices fell far behind demand in issuing licenses, leaving artisanal fishermen who expected legal and increased access to resources in

¹⁸⁷ Natascha Visser. "The Origins of the Present: Economic Conflicts in the Fisheries of the South African South Coast, Circa 1910 to 1950," *Maritime Studies* 14, no. 1 (12, 2015): 2.

¹⁸⁸ Jesper Raakjær Nielsen and Mafaniso Hara, "Transformation of South African Industrial Fisheries," *Marine Policy* 30, no. 1 (01, 2006): 47.

¹⁸⁹ Serge Raemaekers, Maria Hauck, Markus Buergener, Angus Mackenzie, Genevieve Maharaj, Eva E. Plaganyi, and Peter J. Britz, "Review of the Causes of the Rise of the Illegal South African Abalone Fishery and Consequent Closure of the Rights-Based Fishery," *Ocean & Coastal Management* 54, no. 6 (06, 2011): 437.

limbo.¹⁹⁰ The expanded legal access placed growing pressure on already strained stocks, leading the government to reduce TACs, especially in the abalone fishery, shortly after expanding access.¹⁹¹ On top of the added bureaucracy, and reduction in allowable catch, the cost of licenses increased significantly. This combination of lengthy delays, significant price increases, and suddenly reduced resource access pushed artisanal fishers to the fringes of legality as they pursued what they felt was their legal share of resources. Under these conditions, illegal fishing began to take hold, particularly of highly valuable abalone.

Specifically within abalone fisheries, many small-scale and artisanal fishers took to openly fishing illegally as a form of protest against the state's ineffective resource management and failure to grant legal access.¹⁹² Marginalized communities that had been ignored throughout the apartheid years offered few alternatives to abalone poaching and fishing communities largely accepted the practice owing to their dependence on the food and income that it generated.¹⁹³ Communities and officials that chose to ignore increasing incidents of illegal fishing granted unofficial permission for poachers to continue unfettered. Staffing cuts to law enforcement caused by reduced budgets under the new government, especially in communities at the edges of enforceable domain in which illegal fishing gained traction, left poachers at little risk of persecution. Without effective regulation, abalone poachers had virtually unfettered access to otherwise increasingly regulated and scarce resources.¹⁹⁴ In light of this massive increase in illegal fishing, the government attempted to increase regulation on small scale fishers by granting limited

¹⁹⁰ Maria Hauck and Marcel Kroese. "Fisheries Compliance in South Africa: A Decade of Challenges and Reform 1994–2004," *Marine Policy* 30, no. 2 (03, 2006): 75.

¹⁹¹ Serge Raemaekers, Maria Hauck, Markus Buergener, Angus Mackenzie, Genevieve Maharaj, Eva E. Plaganyi, and Peter J. Britz, "Review of the Causes of the Rise of the Illegal South African Abalone Fishery and Consequent Closure of the Rights-Based Fishery," *Ocean & Coastal Management* 54, no. 6 (06, 2011): 437.

¹⁹² Derica Lambrechts, and Khalil Goga, Money and Marginalisation: The Lost War Against Abalone Poaching in South Africa, Politikon; *South African Journal of Political Studies*. 236.

¹⁹³ Serge Raemaekers, Maria Hauck, Markus Buergener, Angus Mackenzie, Genevieve Maharaj, Eva E. Plaganyi, and Peter J. Britz, "Review of the Causes of the Rise of the Illegal South African Abalone Fishery and Consequent Closure of the Rights-Based Fishery," *Ocean & Coastal Management* 54, no. 6 (06, 2011): 434.

¹⁹⁴ Corinna Schuler, "Seafaring Poachers Fight Ocean Turf War: Abalone Smugglers Place \$10,000 Price on Head of Cape Town Sniffer Dog," *National Post*, Feb 13, 2001.

commercial licenses specifically for abalone, which increased individual TACs and enabled the government to more closely monitor otherwise overlooked fishers. However, the growing number of abalone fishers meant that TACs for the licenses were subsequently and continually reduced, even as demand and value continued rising.¹⁹⁵ The high value and international demand for abalone made this sector particularly vulnerable to poaching and demands for expanded access, making it an extreme example of how supply and demand can spiral into conflict.

Demand in Asia for large quantities of abalone incentivized poaching by creating a thriving black market for the luxury item that spawned highly organized and lucrative Asian crime syndicates operating in South Africa. When the government imposed stringent controls intended to maintain sustainable fisheries populations, the price of poached abalone soared, enabling poachers to provide a viable living for themselves and their families and encouraging even more poaching and further depleting the fragile stocks.¹⁹⁶ Eventually, this livelihood became widely accepted as a means of employment and poachers' numbers increased, decimating struggling abalone populations. It was under these conditions of illegal and unrestricted poaching in marginalized communities that conflict between poachers and law enforcement erupted in the early 2000's, fueling what has become known as the "abalone wars."¹⁹⁷

Conflict between abalone poachers and enforcement officers escalated to a level that exceeded the capacity of maritime law enforcement. Fisheries enforcement officers have been threatened, attacked and chased from poaching grounds in their efforts to enforce abalone restrictions.¹⁹⁸ Hostilities have increased to the point that enforcement dogs are

¹⁹⁵ Serge Raemaekers, Maria Hauck, Markus Buergener, Angus Mackenzie, Genevieve Maharaj, Eva E. Plaganyi, and Peter J. Britz, "Review of the Causes of the Rise of the Illegal South African Abalone Fishery and Consequent Closure of the Rights-Based Fishery," *Ocean & Coastal Management* 54, no. 6 (06, 2011): 437.

¹⁹⁶ L. Van Sittert, G. Branch, M. Hauck, and M. Sowman. "Benchmarking the First Decade of Post-Apartheid Fisheries Reform in South Africa," *Marine Policy* 30, no. 2 (03, 2006): 99.

¹⁹⁷ Corinna Schuler, "Seafaring Poachers Fight Ocean Turf War: Abalone Smugglers Place \$10,000 Price on Head of Cape Town Sniffer Dog," *National Post*, Feb 13, 2001.

¹⁹⁸ Corinna Schuler, "Seafaring Poachers Fight Ocean Turf War: Abalone Smugglers Place \$10,000 Price on Head of Cape Town Sniffer Dog," *National Post*, Feb 13, 2001: 2.

being threatened, with bounties offered by crime syndicates on abalone sniffing police dogs.¹⁹⁹ Neighborhoods where poaching is a primary form of employment are often too dangerous for law enforcement officers to venture in their attempts to curb the illegal activity, run primarily by Asian crime syndicates.²⁰⁰ In areas where state capacity is absent, the numerous crime syndicates have stepped in to provide services that the government is unable or unwilling to.²⁰¹ Syndicates provide employment and security against rival syndicates as well as against federal enforcement agents seeking to curb the illegal abalone trade. This arrangement has directly affected the national economy as abalone stocks have dwindled to the point of commercial extinction. Attempts to rescue the abalone fishery for commercial use forced the government to place severe restrictions on commercial fishers, halting all commercial fishing in late 2007 and authorizing only 150 tons of abalone per year in 2017, down from over 600 tons in the 1990's.²⁰² Despite government attempts to limit abalone fishing, the total illegal catch is estimated to be as much as ten times higher than the legal commercial exports, roughly 2000 tons between 2001-2008.²⁰³

C. MANAGEMENT

Abalone poaching began in response to the state's failure to address local demands for effective management and legal access to diminished stocks, neglecting local needs and cutting communities out of the management process. National management programs failed to grant local fisherman legal status or work with the community to manage abalone populations, encouraging the now rampant illegal trade that has led to lawlessness and decimation of the fragile resource. Abalone has become so scarce that poachers have

¹⁹⁹ Ibid., 2.

²⁰⁰ Ibid., 2.

²⁰¹ Derica Lambrechts and Khalil Goga, "Money and Marginalisation: The Lost War Against Abalone Poaching in South Africa, Politikon," *South African Journal of Political Studies*, 233.

²⁰² Ibid., 235. Serge Raemaekers, Maria Hauck, Markus Buergener, Angus Mackenzie, Genevieve Maharaj, Eva E. Plaganyi, and Peter J. Britz, "Review of the Causes of the Rise of the Illegal South African Abalone Fishery and Consequent Closure of the Rights-Based Fishery," *Ocean & Coastal Management* 54, no. 6 (06, 2011): 434.

²⁰³ Ibid., 439.

expanded their efforts beyond marginalized communities where they originated and spread unhindered along the coast of South Africa.²⁰⁴ Poaching has reduced abalone stocks so significantly that the government sought to manage the problem by severely reducing legal commercial limits before being discontinued completely in many former fishing grounds in 2008, affecting the larger economy and jobs within the commercial fishing industry itself.²⁰⁵ The continuation of this ecological dilemma over several decades is an indication of institutional failure, lack of government legitimacy, and failure to consider local community needs, demonstrating the most extreme examples of failed national management programs.

Perceptions of small scale and artisanal fishers during apartheid were negative and prejudiced, contributing to governmental unwillingness to incorporate fishing communities into management strategies. Non-commercial fishers were “a socio-economic problem both caused by and causing the inshore fishers’ perceived backwardness, illiteracy, improvidence and lack of sobriety.”²⁰⁶ Government investment in the community reflected this attitude and was minimal, at best. Small scale and artisanal fishers and their communities’ interests were sidelined in favor of whites and commercial fishing. Everything from direct resource access to fisheries health and data research, overseen by the national government, favored trawlers and commercial fishing over small scale and artisanal fishers.²⁰⁷ The abalone fishing industry is one example of how thorough the political and economic marginalization of these communities was and how it carried through into post-apartheid.

Many communities in which poachers thrive still lie beyond the boundaries where effective fisheries management and enforcement operates, a common challenge that

²⁰⁴ Serge Raemaekers, Maria Hauck, Markus Buergener, Angus Mackenzie, Genevieve Maharaj, Eva E. Plaganyi, and Peter J. Britz, “Review of the Causes of the Rise of the Illegal South African Abalone Fishery and Consequent Closure of the Rights-Based Fishery,” *Ocean & Coastal Management* 54, no. 6 (06, 2011): 439.

²⁰⁵ Ibid., 434.

²⁰⁶ Natascha Visser, “The Origins of the Present: Economic Conflicts in the Fisheries of the South African South Coast, Circa 1910 to 1950,” *Maritime Studies* 14, no. 1 (12, 2015): 2.

²⁰⁷ Ibid., 2.

national management programs face in states with limited resources. South Africa's expansive coastline makes more remote communities difficult for state agents to access, compounding issues with resource management and the ability to curb illicit activities.²⁰⁸ Efforts on the part of law enforcement officials to crack down on poaching and enforce existing laws in areas with significant poaching problems have been met with violence resulting in the deaths of law enforcement officers. Fisheries enforcement officers have been openly threatened, attacked and chased from poaching grounds.²⁰⁹ The lack of state capacity in these areas has been replaced by organized crime that buys poached abalone to ship overseas to Asia, bypassing national management regulations and enforcement officers. The absent state has been unable to address the deeply embedded syndicates that encourage continued poaching of now commercially extinct abalone. State efforts to enforce management in communities where neglect during apartheid continued well into the post-apartheid years enabled poaching to begin and gain widespread local acceptance. Continued marginalization and failure to address the communities' needs, cutting off access to a critical resource, enabled the illegal fishing industry and organized crime to take firm hold.

The state's failure to adequately respond to local demands for inclusive management and legal access to diminished stocks facilitated the rise of abalone poaching. Based on evidence from previous examples, government efforts to incorporate the community into abalone management would have likely mitigated the now rampant illegal trade that has led to lawlessness and decimation of the fragile resource. Entire communities and the South African abalone species are suffering as a result of poor management. In the face of weak national management, abalone has become so scarce that poachers have expanded their efforts beyond marginalized communities and spread along the coast of South Africa, unhindered by government enforcement officers that lack sufficient resources or communities that have no authority to deter poachers' progress into new

²⁰⁸ M. Hauck, and M. Sowman, "Coastal and Fisheries Co-Management in South Africa: An Overview and Analysis," *Marine Policy* 25, no. 3 (05, 2001): 176.

²⁰⁹ Corinna Schuler, "Seafaring Poachers Fight Ocean Turf War: Abalone Smugglers Place \$10,000 Price on Head of Cape Town Sniffer Dog," *National Post*, Feb 13, 2001: 2.

territory. Severely diminished abalone stocks forced reductions in legal commercial limits, affecting the national economy and jobs within the legal fishing industry itself.²¹⁰ The continuation of this ecological dilemma over the last several decades exemplifies how national management programs that fail to incorporate local communities can promote disregard for regulations and lead to widespread conflict.

Fisheries resource management programs are critical to maintaining and enforcing effective, sustainable policies. In regions where resource management and policy enforcement consider the needs of local populations, resource users are more compliant with laws and regulations, and the managed resources produce larger, more abundant fish.²¹¹ The positive effects of resource management are especially evident in the fishing industry where local fishers and communities have vested interests in the health of the fisheries that provide their food and livelihoods. The case of South Africa's abalone is unique in that the resource in question was used primarily as an economic resource due to its incredibly high value, and less as a critical food resource, limiting the communities' vested interest in the health of the fishery.

In addition to management, community participation in research "has been particularly persuasive in convincing them of the need for controls on catches," a perspective that is seemingly absent in South Africa's abalone industry.²¹² Management policies are better received when local fishers and communities understand the justification behind them, necessitating effective education programs and cooperation between communities and state agencies. When local communities are able to participate in resource management and regulations enforcement, a lower incidence of policy violations are

²¹⁰ Serge Raemaekers, Maria Hauck, Markus Buergener, Angus Mackenzie, Genevieve Maharaj, Eva E. Plaganyi, and Peter J. Britz, "Review of the Causes of the Rise of the Illegal South African Abalone Fishery and Consequent Closure of the Rights-Based Fishery," *Ocean & Coastal Management* 54, no. 6 (06, 2011): 434.

²¹¹ Albogast T. Kamukuru, Yunus D. Mgaya, and Marcus c. Ohman, "Evaluating a marine protected area in a developing country: Mafia Island Marine Park, Tanzania," *Ocean & Coastal Management* 47 (2004): 327.

²¹² *Ibid.*, 12.

documented.²¹³ Fishers are less likely to violate regulations when they understand that such policies are in place to improve the quality of the fishery, ultimately increasing the quality and quantity of each fishers' individual catch.

D. CONCLUSION

South Africa's fisheries have undergone significant changes under the post-apartheid government, but the effects of apartheid era marginalization have carried through to today. Ineffective fisheries management alienated local communities, denying them access to critical resources and creating a situation where local communities are pitted against management enforcement officials. South Africa's existing fisheries management programs have proven unsustainable for abalone fisheries, local communities, the commercial fishing industry, and law enforcement alike. After years of failure, South Africa's national management strategy has demonstrated that it is ineffective at bridging the gap between alienated fishing communities and national fisheries management programs.

South Africa's centralized management denied locals both access to abalone and any role in their management, promoting a high level of policy violations by disaffected fishers and their communities, forcing local fishers to turn to poaching to provide for themselves and their families.²¹⁴ Apartheid era abalone management deliberately benefitted large, commercial, white-owned fishers while local non-white fishermen and communities were ignored. Following apartheid, when local fishermen were finally granted access to dwindling abalone resources, the process of legalization and authorization was so lengthy and expensive that fishermen chose to bypass poorly enforced nationally implemented laws, resorting to illegal fishing. Post-apartheid centralized management imposed restrictions on abalone fishers that excluded local subsistence or

²¹³ George M. Branch and Barry M. Clark, "Fish Stocks and their Management: The Changing Face of Fisheries in South Africa," *Marine Policy* 30, no. 2 (03, 2006): 11.

²¹⁴ Serge Raemaekers, Maria Hauck, Markus Buergener, Angus Mackenzie, Genevieve Maharaj, Eva E. Plaganyi, and Peter J. Britz, "Review of the Causes of the Rise of the Illegal South African Abalone Fishery and Consequent Closure of the Rights-Based Fishery," *Ocean & Coastal Management* 54, no. 6 (06, 2011): 434.

economic needs of commercial fishers in their top-down management efforts.²¹⁵ Communities reliant on abalone for sustenance, and income as it became increasingly valuable, had little motivation to prevent local fishermen from poaching a resource that they were officially restricted from exploiting. Poaching for economic benefits provided a means of income that disaffected communities desperately needed. Restrictive laws and resource mismanagement created an environment in which fishermen and their communities felt their access to critical stocks was being denied, a situation that encourages individuals to fight against regulations that cut them off from their means of economic survival. The response to denial of access was flagrant poaching that escalated into a national level security and economic crisis.

South Africa's abalone is distinct in that it serves as a primarily economic rather than subsistence resource. However, in communities lacking economic alternatives, the income that abalone generates is critical for individuals and the community as a whole. Centralized management programs that denied access to abalone stocks effectively denied local communities their primary, potentially sole, means of income. Inclusive management strategies that grant local communities access to abalone stocks and a role in their management and recovery could mitigate their sense of exclusion. Local management could allow communities to create formal local economic trade that would encourage both communities and individuals to help sustain abalone stocks, in the interest of ensuring future economic survival. Poaching has become a form of protest against centralized management that excludes both communities and individuals, whereas decentralized management could mitigate that sense of alienation and place enforcement responsibility with communities themselves. While the government is largely aware of the significance of community buy-in, centralized management remains the primary means of enforcement.²¹⁶ Adopting co-management would require the South African government to work with local communities it has traditionally shunned and to consider how local

²¹⁵ Paul Steyn, "Poaching for Abalone, Africa's 'White Gold,' Reaches Fever Pitch: A Booming Illegal Trade in Abalone – the World's most Valuable Shellfish – is Fueling a Social and Environmental Crisis in South Africa," *National Geographic*, 14 February, 2017, <https://news.nationalgeographic.com/2017/02/wildlife-watch-abalone-poaching-south-africa/>.

²¹⁶ Derica Lambrechts and Khalil Goga. "Money and Marginalisation: The Lost War Against Abalone Poaching in South Africa, Politikon." *South African Journal of Political Studies*, 238.

economies affect the national commercial industry. Until the South African government is willing to delegate management authority to the local level, communities and individuals will likely continue to employ poaching as a form of protest to the detriment of abalone stocks and long-term economic survival.

VI. CONCLUSION

Fisheries across Africa face increasing strain resulting from growing numbers of resources users, climate change, pollution, and mismanagement. Africa's fisheries are particularly vulnerable to the effects of increased use and climate change. Traditionally used as a local source of income and food, African fisheries have garnered international attention as foreign fisheries decline in the face of growing global demand. International commercial fishers now ply African waters in competition with local artisanal fishermen, often depleting local stocks and fishing illegally. Paralleling the growth of commercial fleets, growing numbers of artisanal fishers are also turning to fishing for their livelihoods. The increased demand from these two sectors, commercial and artisanal, threatens to overwhelm the capacity of fish populations to replenish, endangering both industries. Increasing competition has brought with it violent clashes between groups as they seek to protect their livelihoods from diminishing stocks and growing numbers of users.

Adding to the crowded commercial fishing grounds, increasing demand from recreational fishers compounds existing stress on fisheries and their habitats. Increased tourism and coastal development is adding to threats posed to critical fishery habitats, reducing available spawning and feeding grounds. Fish species are now being targeted heavily for food while simultaneously losing habitat required to replenish fish populations. Pollution contributes to habitat destruction that further degrades fisheries' abilities to sustain themselves, reducing the available fish that commercial, artisanal and recreational fishers compete for. This growing environment of competition has led, in many circumstances, to an increase in conflict within fisheries.

Increases in consumption have coincided with decreases in available fish resources, forcing fisheries users into closer and closer contact with one another, often resulting in conflict. The vast majority of resulting conflict remains at low level, consisting of vandalism, boat ramming, or attempts to restrict access to fishing grounds. However, in some places, like South Africa and Somalia, where management is either non-existent or users have been completely cut off from fisheries access, conflict has been more extreme,

leading to national and international level attention and intervention. In addition, as scarcity increases in the future, incidents of conflict may escalate in frequency and severity.

As pressure on fisheries continues to rise, local populations dependent on near-shore fisheries for food and income must learn to cope with the changing dynamics. Moving forward, the degree of conflict will be influenced by the style and efficacy of fisheries management employed in the region. Management will play an increasingly important role in preserving artisanal and commercial industries while simultaneously preventing widespread conflict.

Both national management and co-management seek to maintain healthy fishery populations and control commercial, artisanal and recreational fishery use, but each approaches these goals differently. National management relies on national laws and enforcement. Local communities and commercial fishing entities are required to adhere to state-based control efforts. Co-management engages with local populations for assistance in enforcement and to help determine regulations to best promote fishery sustainability. Although each form of management works toward the same goals, their ability to mitigate conflict is not equal and depends on the makeup of the fisheries users in a given area.

As illustrated in the Tanzania case study, employing co-management has been more effective in ensuring adherence to fisheries regulations among artisanal fishers and local communities. Those communities that have been included in the regulations process are more likely understand the justification behind such regulations and less likely to feel that their access to their critical resource is being denied. In situations where communities have been allowed to participate in regulations enforcement, fewer instances of conflict and regulations violations are observed.

The support and involvement of the local community are critical to the success of fisheries management programs. National management programs that mandate regulations and enforcement on communities run the risk of alienating the fishing community and increasing the prevalence of regulations violations. In the case of South Africa, this dynamic led to conflict between the artisanal fishers and the state government, resulting in a nationwide crisis that collapsed the commercial abalone fishery. These two cases

demonstrate the significance of an effective management program that incorporates local interests to protect critical fishery resources and mitigate the chances of conflict over dwindling resources.

Despite the advantages of co-management programs, there are risks associated. Allowing communities complete autonomy with local resources may increase the risk of conflict in areas where multiple types of resource users operate. Migrant and commercial fishers may be deliberately denied access to fisheries if the community feels there are insufficient resources for all users or based off of historical hostility between groups. This could lead to a similar dynamic in which communities conflict with state mandated programs that sever their access to fisheries, resulting in an increase in incidents of conflict from the disaffected group. For this reason, even co-management programs require oversight to ensure that fisheries are being responsibly managed so as to reduce conflict.

Effective management programs must also incorporate executable means for settling disagreements between users. In cases where artisanal fishers felt that they had recourse outside of conflict, such as effective regulations enforcers, incidents of conflict were relatively low. State-based programs lacking in sufficient resources to effectively staff programs are often unable to provide viable conflict settlement, leading to an increase in incidents of conflict. This dynamic suggests that in areas where co-management is not a viable option, national management strategies must provide a viable means of dispute resolution for users. For many African countries, this may limit national management programs to areas in close proximity to enforcement authorities and regions where there is a mix of commercial, migrant, and artisanal users in a small area. Regardless of the type of management program employed, effective conflict settlement is critical to mitigating hostilities between groups in resource strained environments.

Both management strategies demonstrate very different results when examined in each case study. National management is employed by the national government and has the effect of alienating local communities from the management process, creating resentment and fostering discord in many areas, often failing to effectively implement management tasks or achieve goals. On the other side of the equation, co-management incorporates local communities into the management process, improving community level

compliance and improving conservation efforts. Based on the information available, co-management offers a more effective management strategy in areas where local communities are active in fisheries and reliant on maritime resources. This management style requires close collaboration between the community and the national government to effectively educate, train and equip communities. However, in areas where local communities have low dependence on fisheries resources, co-management will be less effective. Similarly, issues may arise in areas with large numbers of migrant fishers or commercial fishing, should communities attempt to exclude other users from fishery resources. In these areas, co-management must be combined with some level of oversight to prevent potential conflict. National management may prove a viable option if government resources are sufficient to provide effective enforcement in areas where commercial, migrant, and local fishers are equal users.

Africa is one illustration of a growing global fisheries depletion problem. International fishing vessels ply African waters with increasing frequency as domestic fisheries are reduced to the point that they are unable to meet domestic demand. Numbers of commercial and local fishers are increasing around the world, necessitating increased management on both the domestic and international arenas. Foreign fishing vessels require licenses to fish in international waters, but governance of those waters remains the obligation of the host nation. Management is key to enforcing regulations and to ensuring the health of fisheries in the future, but communities that participate in co-management strategies are unable to extend their reach beyond near-shore waters, negating their ability to enforce regulations with deep sea fishing vessels. Combining co-management and national management is the most likely strategy to maintain compliance in domestic waters. Outside Africa, similar issues with fisheries depletion and illegal fishing are also forcing countries to re-examine their fishing strategies. Countries particularly at risk of fisheries depletion conflict are those dependent on their fisheries, and that have relatively low adaptive capacity.²¹⁷ Many of these countries fall within the tropics and have high rates of

²¹⁷ Edward H. Allison, Allison L. Perry, Marie-Caroline Badjeck, W. Neil Adger, Katrina Brown, Declan Conway, Ashley S. Halls, et al, "Vulnerability of National Economies to the Impacts of Climate Change on Fisheries," *Fish and Fisheries* 10, no. 2 (06, 2009): 187.

poverty. These countries often lack the resources to field effective enforcement throughout their coastline and frequently have remote populations that are reliant on fisheries. These countries are both the most in need of effective management programs and the least able to implement them, putting them at high risk for conflict resulting from fisheries depletion. The findings of this thesis suggest that these countries will be best suited to implementing a combination of national management in readily accessible areas of high commercial activity and co-management in remote areas primarily utilized by artisanal fishers.

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