SIT Graduate Institute/SIT Study Abroad
SIT Digital Collections

Independent Study Project (ISP) Collection | SIT Study Abroad

Spring 2012

The State of Artisanal Fisheries in Southern Unguja: Governance, Conservation and Community

Nathanial Colbert-Sangree
SIT Study Abroad

Follow this and additional works at: https://digitalcollections.sit.edu/isp_collection

 Part of the Entrepreneurial and Small Business Operations Commons, Natural Resources Management and Policy Commons, and the Sustainability Commons

Recommended Citation
Colbert-Sangree, Nathanial, "The State of Artisanal Fisheries in Southern Unguja: Governance, Conservation and Community" (2012). *Independent Study Project (ISP) Collection*. 1279.
https://digitalcollections.sit.edu/isp_collection/1279

This Unpublished Paper is brought to you for free and open access by the SIT Study Abroad at SIT Digital Collections. It has been accepted for inclusion in Independent Study Project (ISP) Collection by an authorized administrator of SIT Digital Collections. For more information, please contact digitalcollections@sit.edu.

The State of Artisanal Fisheries in Southern Unguja:

Governance, Conservation and Community

Nathanial Colbert-Sangree
Oberlin College ‘13
Advisors: Narriman Jiddawi and Simeon Mesaki
SIT Zanzibar: Coastal Ecology and Natural Resource Management
Academic Director: Helen Peeks
Spring 2012

Table of Contents

Acknowledgements:

First of all I would like to thank my advisors, Dr. Narriman Jiddawi (Zanzibar), and Dr. Simeon Mesaki (Dar es Salaam), who were each extremely helpful throughout the process of my research. During my field research I was also in correspondence with Professor Jordan Suter of Oberlin College, and Michelle Zacks, Phd Candidate, who is the Folklorist for the Chesapeake Bay Maritime Museum. Professor Suter and Ms. Zacks offered insightful suggestions for the direction of my research, and along with Dr. Mesaki, aided me in constructing interview questions. I would also like to thank the Academic Director of SIT Helen Peeks and her assistant *Mwalimu* Said for their support and concern for my wellbeing throughout the month I spent on my own in the field conducting interviews. Thank you to my fellow SIT students with whom I collaborated at different stages of the semester and for their help formulating ideas and formatting this report. Thank you to my contact in Kizimkazi, Mr. Pandu, and in Jambiani, Mr. Okala Muhammed, you were both incredibly gracious hosts. Thank you to my excellent and dedicated translators, in Kizimkazi Dimbani, Aboss Juma and in Jambiani, Jafar Hasan; may you both continue to do good work for your communities. Thank you to Mr. Zahor El Kharousy, Mr. Juma Haji Ame and Mr. Halfan Isah from the Fisheries Department for helping me to understand the workings of the Kamati za Wavuvi and the Menai Bay Conservation Area. Finally, I would like to thank all of the fishermen who took time out of their days to sit and talk with me.

Abstract:

Fifty-one fishermen in the coastal villages of Kizimkazi Dimbani and Jambiani were interviewed to discover the current state of fishing in these areas. Each area has its own Village Fishermen Committees and those committees were also a subject of interest, interviewing their members as well as Fishery Department Officials to gain an understanding of how the committees function and their success. Results of fishermen interviews revealed a large number of differences between Kizimkazi Dimbani and Jambiani. Village Fishermen Committees were well attended by participants in both villages and seem to function as strong institutions within the communities studied. Kizimkazi Dimbani and Jambiani are both situated within the Menai Bay Conservation Area, and governed by its rules and regulations. However, enforcement is limited within this area and knowledge of the regulations is as well. The regulations that fishermen were aware of in each village perhaps reveal the most common illegal practices there. The perceived effectiveness of patrols differed largely between the two study sites, which was attributed to the fact that two of the three patrol boats for the Menai Bay Conservation Area dock in Kizimkazi Dimbani. Most fishermen noted that many illegal methods of fishing were still being used, causing damage to fish stocks. Potential policies to alleviate the problems identified through interviews are discussed using a broad definition of policy that includes the social, economic, and biological factors, which influence policy outcomes.

Introduction:

The Nature of Zanzibari Fisheries

Zanzibar's fisheries are vitally important to coastal communities and the fishing industry has a large effect on society as a whole. Fish are not only a key source of protein in the Zanzibari diet, but also provide the livelihood upon which roughly 40,000 fishermen depend. (Jiddawi, 2012) Many other livelihoods exist related to fishing; namely boat building, fish mongering, and the creation and sale of fishing gear. The fishing industry in Zanzibar has seen enormous growth since 1990 when there were only 8,365 fishermen. (Phelan and Stewart, 2008)

Like fleets in other East African coastal areas, Zanzibari fishermen constitute an artisanal fleet. It is comprised of small boats, which use fishing technologies that are not capital intensive, and which remain within a few kilometers from the shoreline. The area of fishing is restricted by the distance boats can travel, and the only permitted gears are ones with low efficiency as a means to keep catch sizes small; in this way fish stocks in Zanzibar have historically been maintained without requiring additional policies. Nearly all fishing activities on the island utilize the following four methods: line fishing (*mshipi*), fish traps (*dema*), nets with holes for small fish to escape through, and nets with smaller holes to catch sardines. (Jiddawi, 2012) Fishermen in Zanzibari waters have recently adopted outboard motors to increase the distance they may travel in response to near shore fishery overexploitation and deterioration. (Khamis Ali Pandu, *Interviews*) As more and more fishermen join the industry, artisanal methods of fishing will need additional attention to keep fish stocks at healthy levels.

Fishing Laws within Zanzibar

Fishing methods currently outlawed in Zanzibari waters include spear-guns, noxious or poisonous substances, explosives, and nets or *dema* traps with smaller than authorized holes (varies by net type and location). Additional methods can be prohibited illegal by the rules governing specific areas. (RGZ, 2010) First time offenders are "wisely talked to" by the local authority and their gear is confiscated. (Juma Haji Ame, Halfan Isah, *Interviews*) Second time offenders receive a fine ranging from 100,000tsh to 10,000,000tsh (62.50USD – 6,250USD) for violations relating to explosives or noxious gasses, while all other violations (spear-gun use, illegal nets or d*ema* traps) receive a fine of 100,000tsh to 5,000,000tsh (62.50USD – 3,125USD). (RGZ, 2010, Juma Haji Ame,

Interviews) Third time offenders are charged and required to appear in court and if found guilty can be sentenced to serve jail time, pay a fine or both. (RGZ, 2010, Juma Haji Ame, *Interviews*) In 2011, five cases appeared before a judge, and as of April 2012, two cases have resulted in court hearings this year. (Juma Haji Ame, *interviews*) According to Juma Haji Ame, an employee of the Menai Bay Conservation Office headquarters in Stone Town, the number of court cases (and fishing law violations generally) is decreasing because knowledge of the law and its enforcement has effectively extended to many fishing communities.

The Exclusive Economic Zone (EEZ) of Zanzibar (part of the Republic of Tanzania) extends 200 miles from the eastern coasts of Pemba and Unguja out to sea, but an industrial fleet capable of traversing such distances does not exist, at least not of Zanzibari origin. Foreign fishing boats are permitted to operate in these areas provided they buy a one time fishing vessel permit, which costs 48,000USD for trawlers and 21,600USD for finfish as of 2003, a foreign boat must also purchase an annual fishermen license, which costs 162USD. (FOA, 2004) In addition, boats from the Tanzania mainland fish in the EEZ of Zanzibar, with trawling permits costing 68USD and finfish permits for 4.8USD. (FOA, 2004) These fees go to the Tanzanian government however, and not directly to Zanzibar. Within the EEZ, there are areas designated for artisanal fishermen's exclusive use, which are referred to as the territorial waters of Zanzibar. (RGZ, 2010) Intrusions by industrial vessels into artisanal zones are a growing problem as the number of industrial ships has increased over the last ten years. (FOA, 2004)

Governance Strategies of Zanzibari Fisheries and Issues

Zanzibar's fisheries are managed by the policies and regulations of the Zanzibar Fisheries Department. Like other agencies within Zanzibar's government, the Fisheries Department is responsible for locating external donors to satisfy its budget requirements, which naturally gives these external donor organizations a large amount of decision-making power. While the Fishery Department of Zanzibar institutes policies, it is important to understand the role these external organizations play, as funders through this process. (Levine, 2004) The donors tend to be foreign NGOs.

The Fisheries Act of 2010 charges the Department to monitoring fish stocks, create policies that encourage sustainable fishing activity, educate fishermen, and

promote higher value addition and improved marketing of Zanzibari fish. (RGZ, 2010) It is also charged to protect and maintain small-scale fishing. (RGZ, 2010) The Fishery Department typically takes a top-down approach, designating Marine Protected Areas (MPA's), limiting methods and requiring licenses for fishermen and their boats, each of which must be renewed annually. (FOA, 2004)

One exception to its customary top down approach is the Department's method for collecting its per kilogram tax on each fisherman's catch. . The Department hires a beach recorder, or in Swahili – *bwana dikos* for each landing site, generally an educated person or leader of the community where they work. Utilizing community structures already in place makes fishery management simpler and more effective. The Department reduces the transaction costs involved with enforcing the per kilogram tax by decreasing time spent traveling from home to the landing site and eliminating the difficulty of familiarizing oneself with a foreign community's fishing activities. (de la Torre-Castro, 2006) While the development of the *bwana dikos* has certainly improved efficiency within the Fisheries Department, these local employees face different difficulties as the channel for information between government bodies and the local resource users themselves. Researcher Torre-Castro (2006), classifies these difficulties as:
The four dilemmas: kinship, loyalty, poverty, and control," concluding that each,
"seriously jeopardizes the flow of the extensive knowledge that the bwana dikos actually have, and reduces the effectiveness of the formal governance systems for coastal fisheries management." (Torre-Castro, 2006)
Because of close community ties, the duties of a *bwana diko* are often overlooked in favor of maintaining their good standing within the community.

To understand Torre-Castro's conclusions in action, an explanation of the Swahili term *muhali* is in order. It translates literally to "impracticability", but author Khalfan explains its true meaning as an influential cultural norm within Swahili society. "[In this context *muhali* means] neglecting to inform others of any pessimistic or negative realities to protect them from disappointment, but eventually creating greater disappointment when the true circumstances are revealed." (Khalfan, 2011) The *bwana dikos* discussed by Torre-Castro (2006), are in the difficult position as the pivot point between the government and their own community. Not wanting to reveal negative realities, these

officials often mask opinions, distort information and adopt entirely "different roles according to the situation," in an attempt to please the two groups to whom they are accountable. (de la Torre-Castro, 2006) M*uhali* limits the effectiveness of *bwana dikos*, as transmitters and enforcers of government policy, but *muhali* permeates Zanzibari culture and effects everyday transactions unrelated to fishing. For example, when one orders a dish from a restaurant if the restaurant is missing a key ingredient their response will be to go out and purchase it to fulfill their guest's request, despite imposing a delay of three hours to your food. (Khalfan, 2011) Traditional policy-making does not incorporate the cultural norms of *muhali*, or other salient cultural norms, which can critically effect management outcomes.

Evidence provided by Tobey (2006), reveals that poverty is another one of the driving forces motivating the breaking of rules designed to conserve resources for future use. As stated by the Mr. Said Ali Mbarouk, Zanzibar Minister of Livestock and Fisheries, "the need for fishermen to catch fish in order to survive is compelling many small-scale fishermen to resort to illegal fishing practices." (Daily News, 2012) Thus, improvements to the institutions governing community fisheries, must work towards outcomes that develop the social, economic, and biological aspects of communities in question. These factors play a significant role in the willingness of communities to accept management strategies and their eventual success. (Cunningham and Boss, 2005) As these features may differ between communities, the communities themselves must be included in the policy-making process or risk overlooking behavior that will affect a policy's outcome. A study conducted in the Chwaka Bay Conservation Area by de la Torre-Castro and Lindstrom (2010), revealed the need for "a broader institutional approach that better considers norms, values and cultural issues." (Simonsen, 2010) Policies must be developed and tailored on a community-by-community basis for them to succeed. Torre-Castro and Lindstrom's study of the Chwaka Bay Conservation Area supports this approach. They conclude that, "gaining knowledge about the wide institutional setting takes time but the investment is worth it in the long run." (Torre-Castro and Lindstrom, 2010)

In 1997 the Menai Bay Conservation Area (MBCA) was created to combat destructive fishing practices and the pressures of uncontrolled fishing, introducing

management plans for the Menai Bay Area. (Torell et al., 2006) The WWF sponsors the Conservation Area while other donors include USAID, MACEMP, Woodshole and the British Government. (Levine, 2004; Torell et al., 2006) The management strategy utilizes community support by creating *Kamati za Wavuvi* or Village Fishermen Committees (VFC) for each *shehia* (village) within the area. Villages in the MBCA elect ten fishermen by ballot to sit on a committee, which in turn selects a chairman. Fishermen are elected for three years and may be reelected indefinitely. (Aboss Juma, Simai, *Interviews*) "The VFC organize fisheries patrols within their areas, and report illegal fishing activities to the government" whose trained patrols are responsible for arresting violators. (El Kharousy and Juma, 2006) Fishermen from their respective VFC engage in "reef monitoring, data collection, and a number of volunteering activities like beach and coral reef cleaning." (El Kharousy and Juma, 2006) Further duties of the VFC involve collecting information to improve conservation, encouraging fishermen to adopt conservation ideas and practices, and acting as liaisons, like *bwana dikos*, between local communities and the Fisheries Department. (El Kharousy and Juma, 2006)

On the community level, problems experienced while fishing are brought to these VFC members who relay them to government officials during quarterly *kamati tendaji* meetings (including all villages). Each village within the MBCA sends their respective VFC chairmen to the quarterly meeting where problems are discussed in a dialogue led by Fisheries Department officials. Solutions are agreed upon and regulations applicable across the Conservation Area are approved and promulgated by the Fisheries Department. (Halfan Isah, *Interviews*) These regulations are then adapted to each village by their respective VFC. (Halfan Isah, *Interviews*) Each VFC holds monthly or bi-monthly meetings with the fishermen they represent, relaying information concerning policies, and creating a space for discussion of issues. (Aboss Juma, Haji Saburi Simai, *Interviews*)

The creation of the VFC committees has had many benefits. As management shifted to a more community level, feelings of ownership of the fisheries have been increased. (El Kharousy and Juma, 2006) Fishermen interacting with the resource on a daily basis can now express the problems they face, and discuss solutions. Fishermen now act as enforcers of the regulations, notifying the patrols when bad practices have been sighted and this in turn reduces the time, effort and petroleum expended by the

MBCA's patrol boats. By including fishermen in the enforcement strategy, patrols have more effectively stopped intrusions by mainland boats as well as the use of illegal gears. (El Kharousy and Juma, 2006, Juma Ame, *Interviews*)

The Menai Bay Conservation Area stretches from Mazizini, less than 5km from the urban center of Zanzibar Town to Bwejuu – see figures 1 and 2, while the seaward boundary extends 61km from shore. (Torell et al., 2006) Three boats patrol this area: two small and one big, each with powerful outboard engines. (Juma Haji Ame, *Interviews*) Back in 2003, the Menai Bay Conservation Area was smaller; only from the Fumba Peninsula to the southern tip of Unguja an area of 470 square kilometers, yet even then difficulties arose with the size of the patrol area. (Torell et al., 2006) Only the two small patrol boats existed then, and like today they were stationed in Kizimkazi Dimbani. (Levine, 2004) The problem in 2003 was that these two patrol boats were assigned a huge area to monitor. Fuel costs for the powerful motors and the long distances patrols had to travel, combined to make enforcement in the vicinity of Kizimkazi Dimbani more effective than the western side of the conservation area near Fumba. (Levine, 2004) This is a contributing reason why dislike of the MBCA varies from village to village. Other differences in geography, infrastructure, and proximity to the Menai Bay Office's capital (patrol boats, and radio headquarters) create divergent responses to the conservation initiatives between Menai Bay villages. (Levine, 2004) Recently however, a Menai Bay Office was created in Fumba and there is a further plan to create another office in Jambiani in the next couple of years. (Halfan Isah, *Interviews*) These locations have been chosen due to the high volume of tourists visiting these villages.

Figure 1: Menai Bay Conservation Area (MBCA) in 2006, which has since been expanded to include the area along the east coast up to Bwejuu.

The territory under conservation has been sizably increased since 2003, to include the areas between Mazizini and Fumba and from Kizimkazi to Bwejuu. Since only one boat has been added to the patrol crew, the inadequacy of enforcement resources documented by Levine (2004) persist today as the territories for patrolling have almost doubled. Currently, the patrols fuel revenue is generated by a tax on tourism of three dollars per person, but 30% of the tax revenue funds the VFCs and the remainder is

insufficient to meet petrol needs of the patrols. As a result, patrols are often incapable of responding to reports due to a lack of petrol. (Levine, 2004, Halfan Isah, *Interviews*) Mr. Shomari, the head of a patrol team, believes "underfunding is the biggest challenge," explaining that additional boats are needed to improve the patrols' success. (Daily News, 2012) The VFCs of the Menai Bay villages use the tax revenue to counteract beach erosion, repair broken vessels, compensate injured fishermen and in other ways provide an additional layer of resilience to fishing communities. (Aboss Juma, *Interviews*) Other sources of income for VFCs are the *dago* regulations, whereby migratory fishermen pay to fish and camp in a given villages' area. (Aboss Juma, *Interviews*) The *dago* is opened and closed at the discretion of the Menai Bay Office leaving the tax as the only constant source of income. Further sources of revenue are needed both for the patrols and for the VFCs.

Although VFCs have generally improved the lives of fishermen, they have created some problems that future management adjustments must keep in mind. Occasionally, VFCs have made decisions out of line with conservation principles, including decisions to continue using destructive methods, which sacrifice future benefits for the present. (El Kharousy and Juma, 2006) Also, "opportunism has been repeatedly observed" as self interested VFC members allow illegal practices to go on, share patrol schedules with wrongdoers or warn them of unscheduled patrols. (El Kharousy and Juma, 2006) One other consideration for community-based management policies is kinship: effectively restricting enforcement to non-community members as friends and family fail to report each other's violations. Potentially the most damaging failure of the VFC management system occurs when the committees fail to act as the intermediary between government and communities of fishermen. (El Kharousy and Juma, 2006) If VFCs stop representing the views of their communities fishermen cooperation within the management system disintegrates. (El Kharousy and Juma, 2006)

Study Area:

Kizimkazi Dimbani and Jambiani were the two villages visited. Both villages are within the Menai Bay Conservation Area. These two villages were chosen for their fishing activities and to reduce the cost of travel as they are nearby. The villages were also selected for their different locations – Kizimkazi Dimbani facing the Menai Bay and Jambiani looking out across the Indian Ocean. Over the years the MBCA has been increased up to its current boundaries, see figure 2., but the size of the area before can be seen in figure 1.

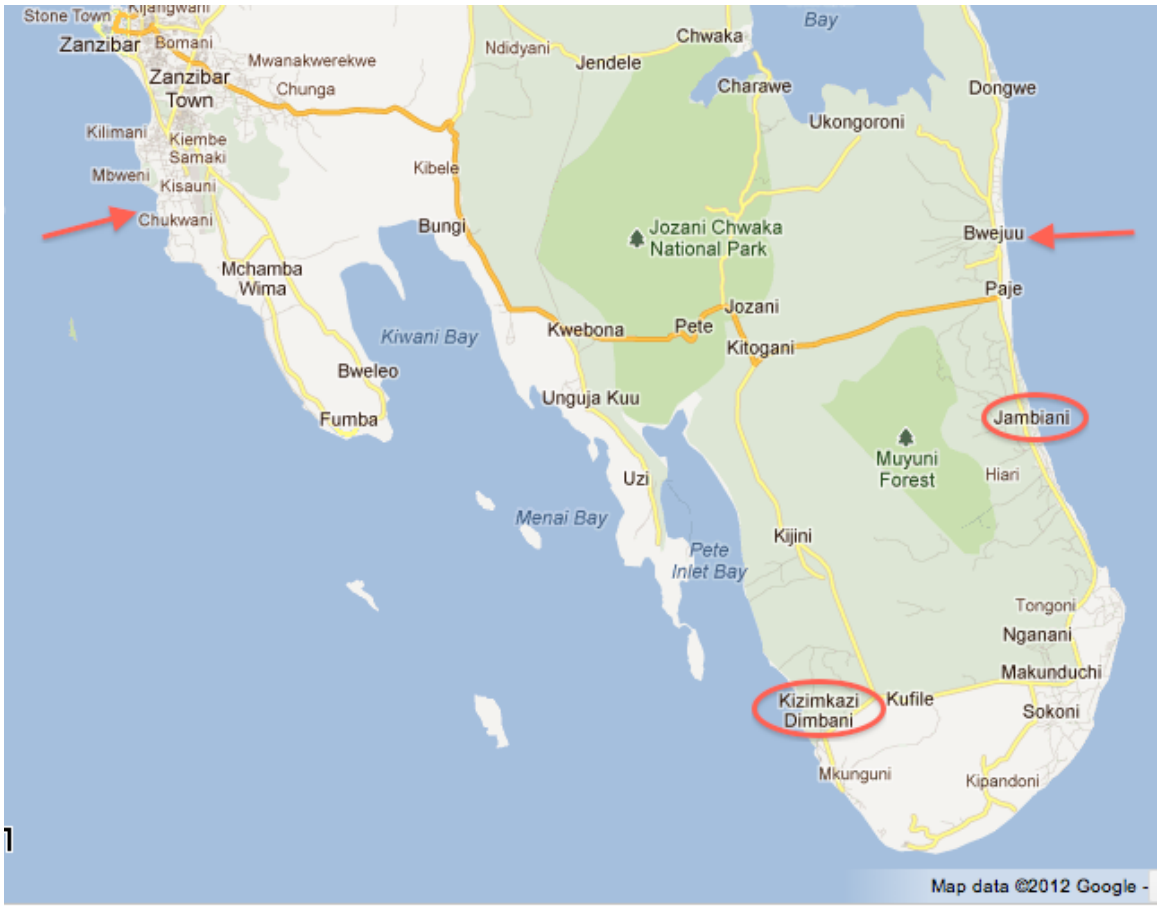

Figure 2: Circled in red are the two study areas, while the two arrows denote the boundaries of the MBCA, and the distance that the three patrol boats must cover.

Both villages have a fair amount of tourist-based activities. Kizimkazi is well known for its dolphin tours, attracting tourists for day trips, while Jambiani has beautiful white sand beaches. Hotels along the beaches are common in both locations, but in

Jambiani there are many more. Jambiani is situated along the east coast of Unguja, where the tourist industry is well established. (Torell et al., 2006)

The two villages have fishing areas that overlap with neighboring communities. Kizimkazi Dimbani's fishing area extends east to Makunduchi and west to Mtende, with fishermen from these villages conversely entering the areas close to Kizimkazi Dimbani. Jambiani's fishing area stretches north to Bwejuu and south to Makunduchi with vessels. Both villages are small: Kizimkazi Dimbani has a total of 280 fishermen and a population of 1360, while Jambiani has 260 fishermen and a population of 8,000. (Kamati Chairmen, *Interviews,* Torell et al 2006, Zanzibar Action Project, 2012) Industrial fishing boats from mainland Tanzania often intrude on these small-scale fishing areas. As you can see in the map below, the Tanzanian mainland is about twenty-five miles from Zanzibar and closer to Kizimkazi Dimbani than Jambiani.

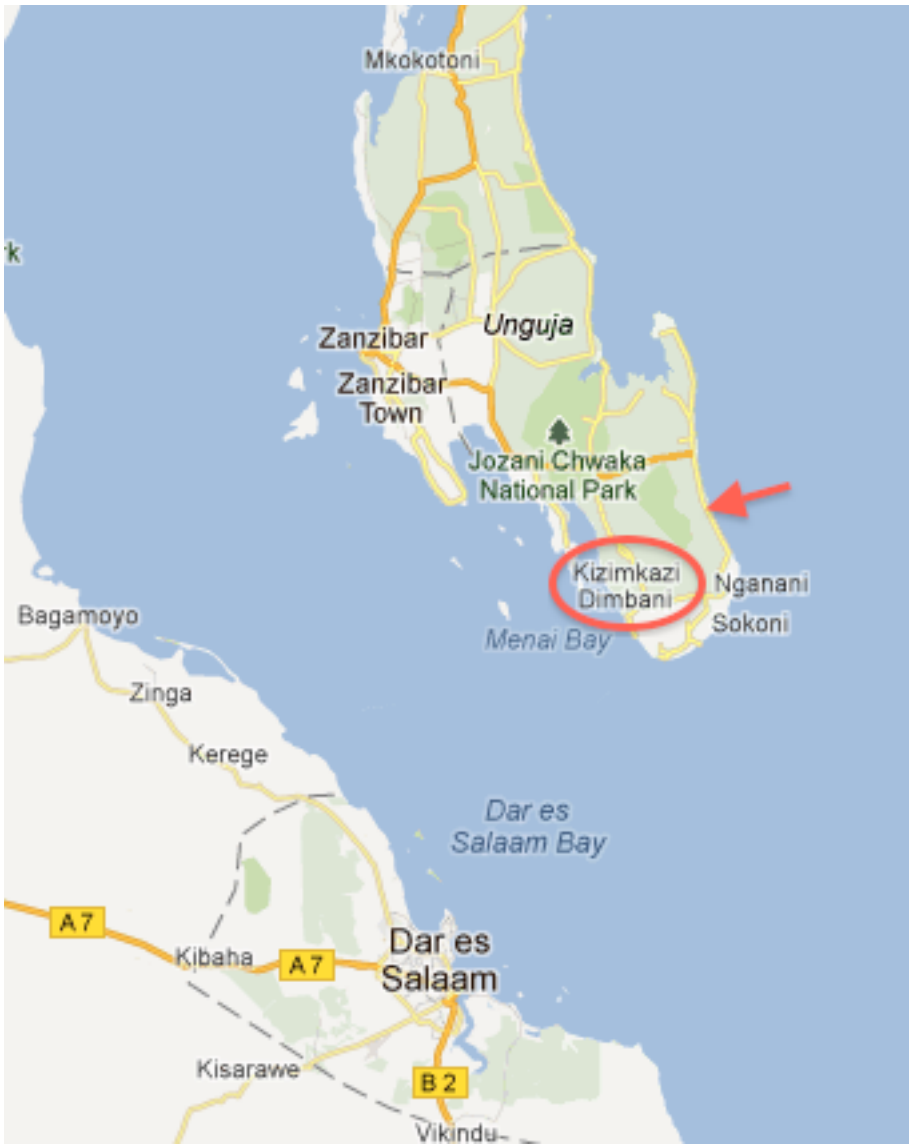

Figure 3: Marked on this map by circle and arrow are the two study areas, also visible is the proximity of the Dar es Salaam urban area.

Aside from fishing, other livelihoods exist in both villages. These alternative livelihoods, generally occupied by women, include harvesting of octopus and other mollusks by combing tidal areas and seaweed farming. (Torell et al., 2006) Through this work women in Kizimkazi Dimbani and Jambiani are able to generate income and provide additional food for their families. Other alternative employment opportunities have been orchestrated by the MBCA, including beekeeping, tree planting, mangrove replanting and protection of existing mangroves. (Torell et al., 2006)

Seasonal variations of ocean currents affect the hotspots for fishing in Zanzibar.

Fishermen in Kizimkazi Dimbani and Jambiani often do not go out to sea when the monsoon switches from NE to SW. The shift in ocean current causes southern seas to become too dangerous for small boats. When fishing is safe however, these two villages see a large number of migratory fishermen, from elsewhere in Unguja and mainland Tanzania.

Methodology:

Six days were spent in Kizimkazi Dimbani, and four days in Jambiani. In Kizimkazi Dimbani 28 fishermen were interviewed and in Jambiani 23 fishermen were interviewed. First-hand experience was gained through accompanying a fisherman on his boat and seeing the practices they use in the areas around Kizimkazi. Additionally, members of the Fisheries Department were interviewed in a less structured way to gain an understanding of the VFC system for village based management. In each village visited, the VFC chairman was interviewed, and in Kizimkazi Dimbani three other members of the VFC were present with the chairmen. Furthermore, local contacts provided by Doctor Narriman Jiddawi, who were knowledgeable about general fishing practices and problems were interviewed.

Interviews of fishermen were carried out on an opportunistic basis using a translator, and sessions were undertaken at different times of day to get a more diverse sample. Fishermen were found by walking through the village, approaching houses of known fishermen or by finding fishermen socializing in different town areas. Fishermen were interviewed sometimes alone and other times in groups, one after another. Translators were of great help finding fishermen to interview, but also likely did not sample randomly, instead choosing fishermen they knew. This is unfortunate, but given that researchers are not always received kindly it is an unavoidable source of error for someone requiring a translator in Zanzibar. The questions asked can be found in appendix I. Responses were relayed by the translator and recorded. Participants were thanked for their time and the next participant was located. Data was then compiled in Microsoft Excel.

Results:

I. Biographic Information

A. Age of Fishermen

Average age of fishermen (both villages): 41.49

Average age Kizimkazi Dimbani: 43.39

Average age Jambiani: 39.17

B. Number of Years Fished

Average years fished (both villages): 20.17.

Average years Kizimkazi Dimbani: 20.77

Average years Jambiani: 19.43

C. Origin of Fishermen

All fishermen were native to the village in which they were fishing.

II. Reasons for Becoming a Fisherman

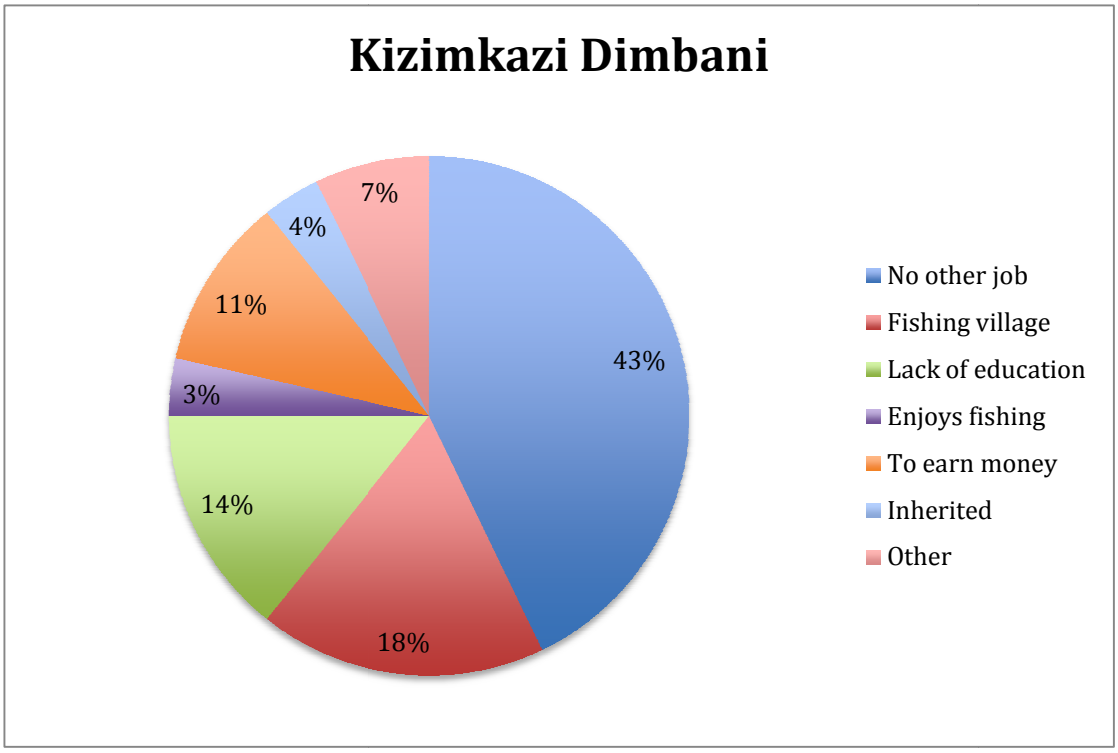

Figure 7: Reasons why fishermen in Kizimkazi Dimbani become fishermen.

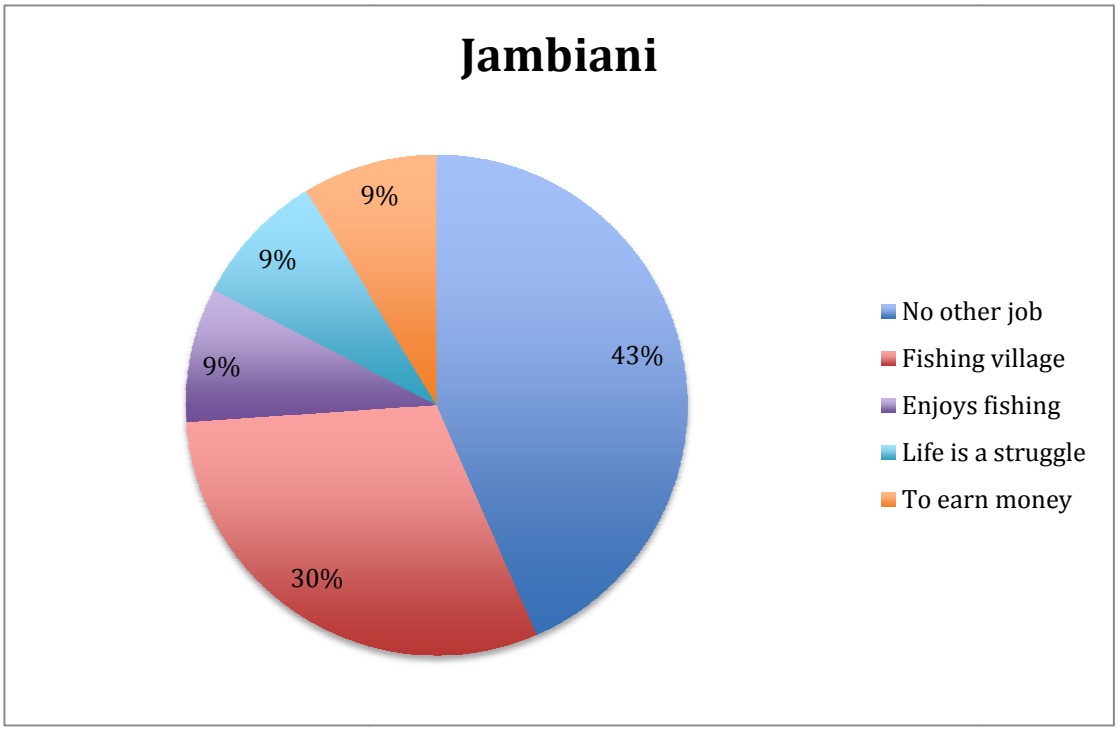

Figure 8: Reasons why fishermen in Jambiani become fishermen.

A plurality of respondents in both villages voiced "no other job" as their reason for fishing. A similar response to this, and the second most common response was my town is a "fishing village". A small percentage in each village responded that they fish because they "enjoy fishing", 3% and 9% for Kizimkazi and Jambiani respectively. Another point of interest is that in Kizimkazi a sizeable portion of respondents (14%) noted that a lack of education was responsible for their decision to become a fisherman while in Jambiani this reason was not voiced by respondents. A few interesting responses, under the other category were: because there were many fish back then, and I chose between the sea or the forest.

III. Tradition of Fishing within Families

Responses were practically identical between Kizimkazi Dimbani and Jambiani with 72.24% and 73.91% of respondents from the respective villages responding "yes" their father had been a fisherman as well.

IV. Equipment Used

A. Breakdown of Boat Type by Village

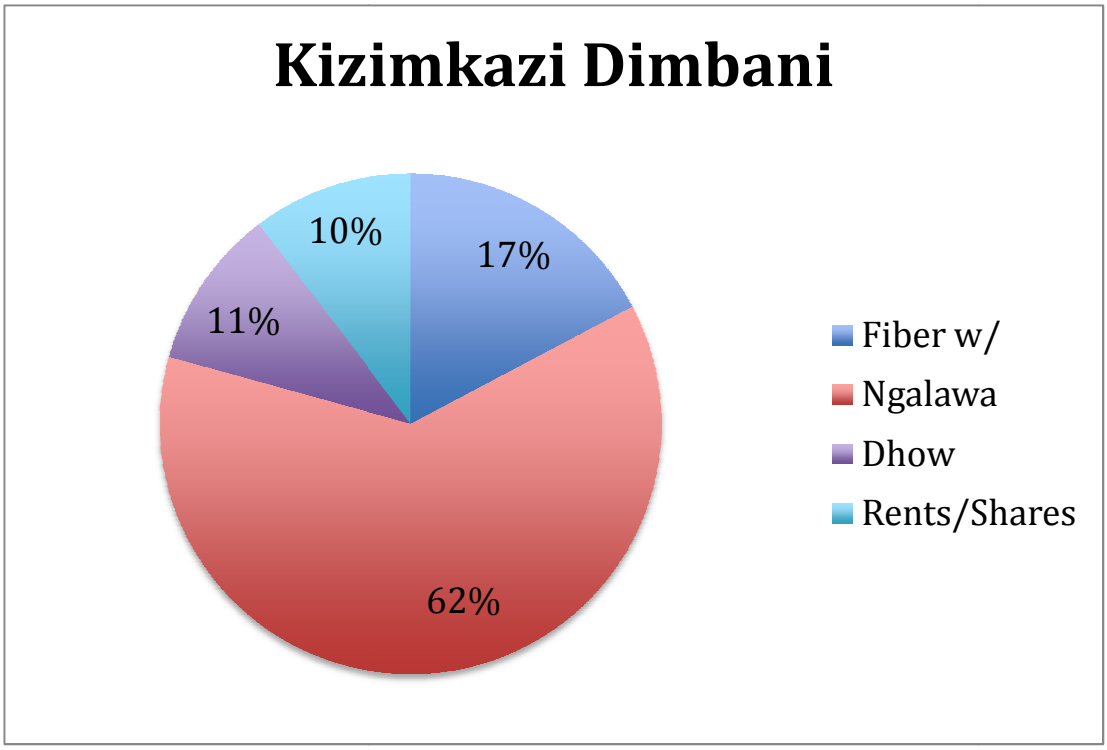

Figure 5: The composition of fishing vessels in Kizimkazi Dimbani.

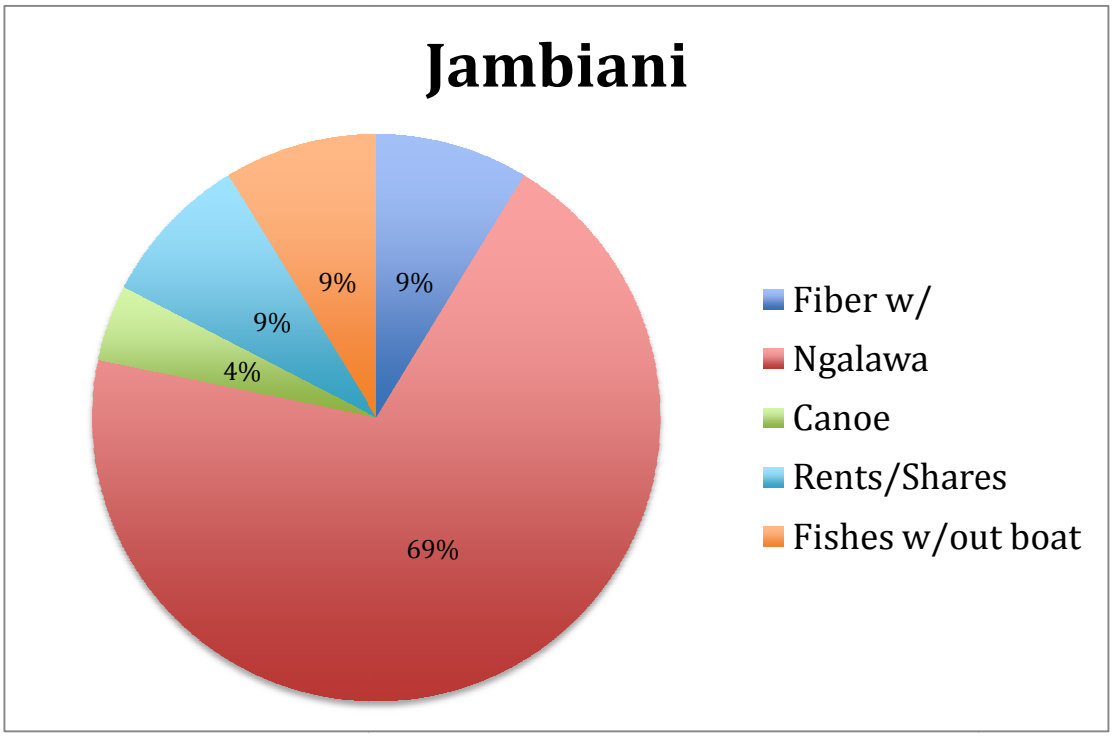

Figure 6: The composition of fishing vessels in Jambiani.

The most common boats in both villages were *ngalawas* – dugout canoes with outriders on both sides that provide balance. *Ngalawas* can be paddled or wind powered with a sail. It should be noted that a higher percentage of fishermen in Kizimkazi Dimbani own fiber boats with motors than in Jambiani. The percentage of *dhows* (sail boats larger than *ngalawas* and without outriders) in both locations was about the same as was the number of people renting or sharing boats of varying types. In Jambiani there are some who fish without a boat, swimming, fishing from shore, or combing the low tides for fish and octopus.

B. Fishing Gears

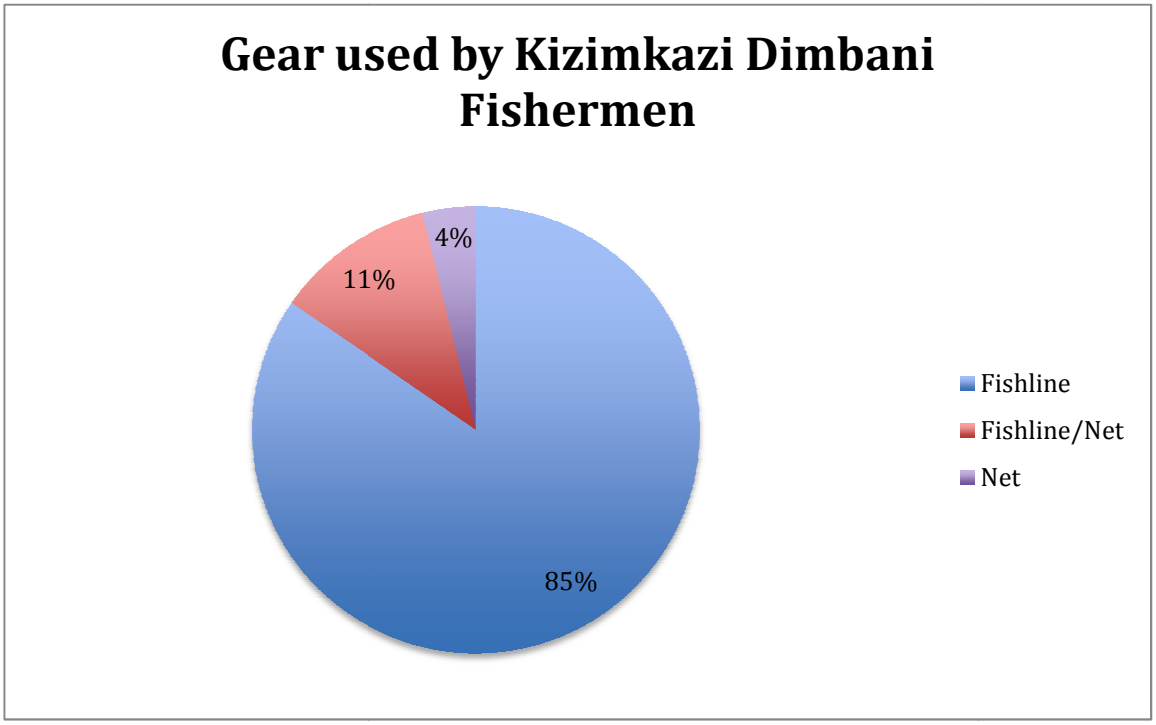

Figure 9: The composition of gear used by Kizimkazi Dimbani fishermen.

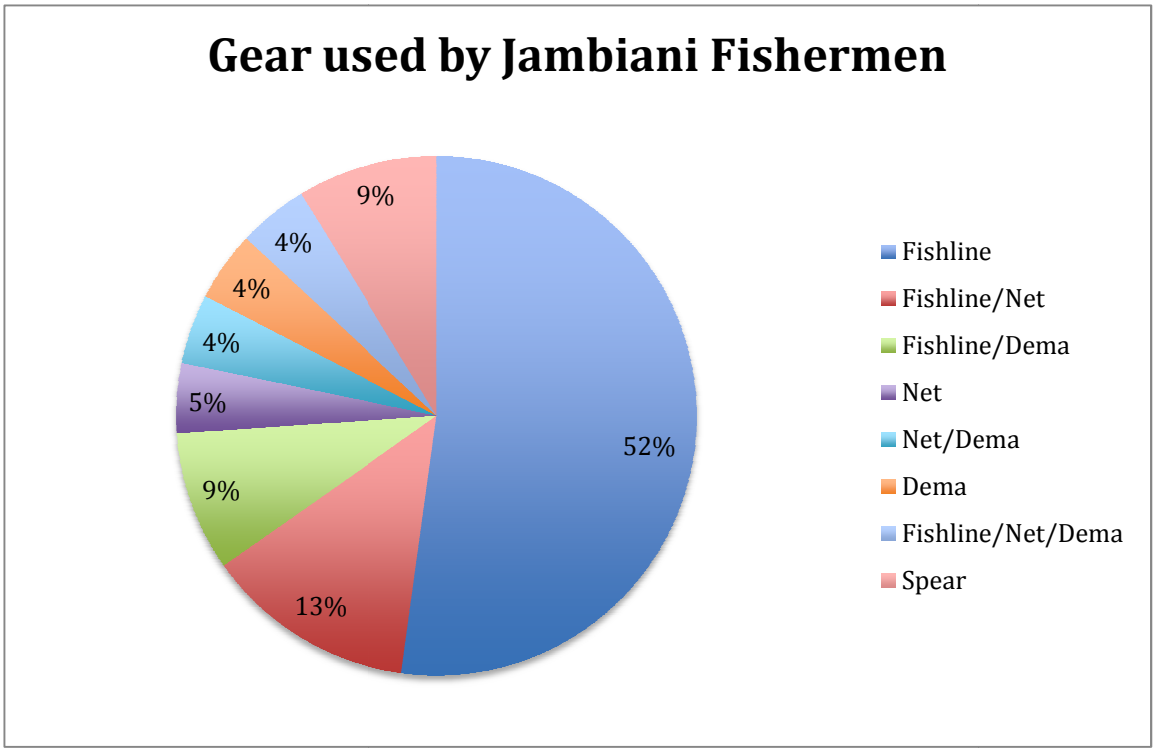

Figure 10: The composition of gear used by Jambiani fishermen.

The most significant difference between the two villages is that in Kizimkazi Dimbani line fishing is almost the exclusive method of fishing, while Jambiani fishermen use a more diverse set of technologies. In Jambiani the use of multiple gears was also much more common and a gear type exclusive to Jambiani, was the use of spears noted by 9% of respondents.

C. Communication or Navigation Equipment

In Kizimkazi Dimbani, 46.42% of respondents bring cell phones with them out to sea, but in Jambiani only 8.69% of fishermen bring cell phones. No other kinds of gear were discussed, although to help respondents answer the question – many of whom did not understand – suggestions of maps, GPS, and cell phone were offered.

V. Perception of Catch Size

A. Average Weekly Catch by Gear Used

When analyzing responses of average catch size over a week, both gear used, and boat type were analyzed for their influence on catch size.

Table 1: A breakdown of catch size based on gear used by fishermen in Kizimkazi Dimbani and Jambiani, 2012.

Gear Used by Kizimkazi Fishermen	# of gear	Avg Weekly Catch	Standard Deviation
Fishline	22	62.70	55.08
Fishline/Net	3	116.67	76.38
Fishline/Dema	0		
Net	1	20	
Net/Dema	0		
Dema	0		
Fishline/Net/Dema	0		
Spear	0		
Gear Used by Jambiani Fishermen			
Fishline	12	30.5	22.25
Fishline/Net	3	28.17	28.06
Fishline/Dema	2	77.5	31.82
Net	1	500	
Net/Dema	1	55	
Dema	1	100	
Fishline/Net/Dema	1	15	
Spear	2	5.75	0.35

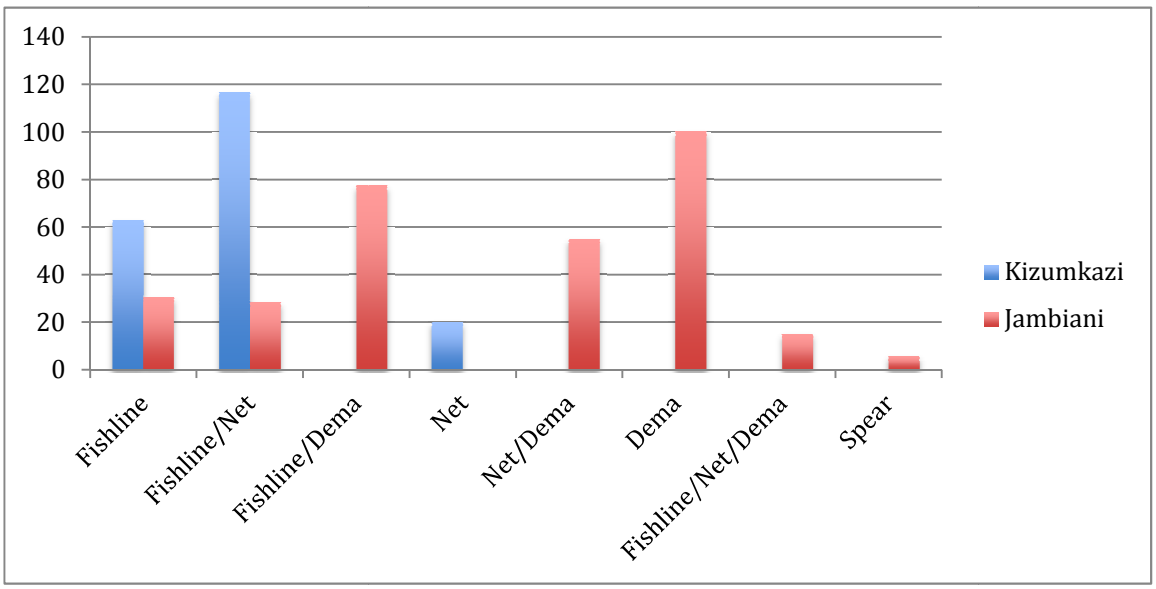

Figure 11: A comparison between both villages of catch size per week based on gear used.

Note: 1 outlier was removed from the above graph, a fishermen from Jambiani who reported to catch 500kg per week. He reported that his crew of 15-20 fishermen would

fish using a large net and multiple boats, so this is the reason for the larger catch, still the number offsets the other data and has been kept out of the above graph.

You can notice that Kizimkazi Dimbani fishermen are more successful with fishing line and that fishing line and the use of a net causes a large increase for Dimbani fishermen. Jambiani's highest catches each include the use of *dema* trap in common. The standard deviations are very high and thus error is also very high for this data.

B. Average Weekly Catch by Boat Type

Table 2. Average catch size by boat for Kizimkazi Dimbani and Jambiani, 2012.

Kizimkazi Dimbani	**# of Boat**	**Weekly Catch (kg)**	**Standard Deviation**
Fiber w/ motor	5	144	81.73
Ngalawa	18	54.08	35.94
Rents/shares	3	44.5	28.65
Dhow	3	86.25	90.16
Fishes w/out boat	0		
Canoe	0		
Overall Average	29	71.41	
Jambiani			
Fiber w/ motor	2	57.5	3.53
Ngalawa	16	39.91	31.04
Rents/shares	2	252.75	349.66
Dhow			
Fishes w/out boat	2	6.5	0.71
Canoe	1	15	
Overall Average	23	55.96	

Average Catch per Week (kg) by Boat Type

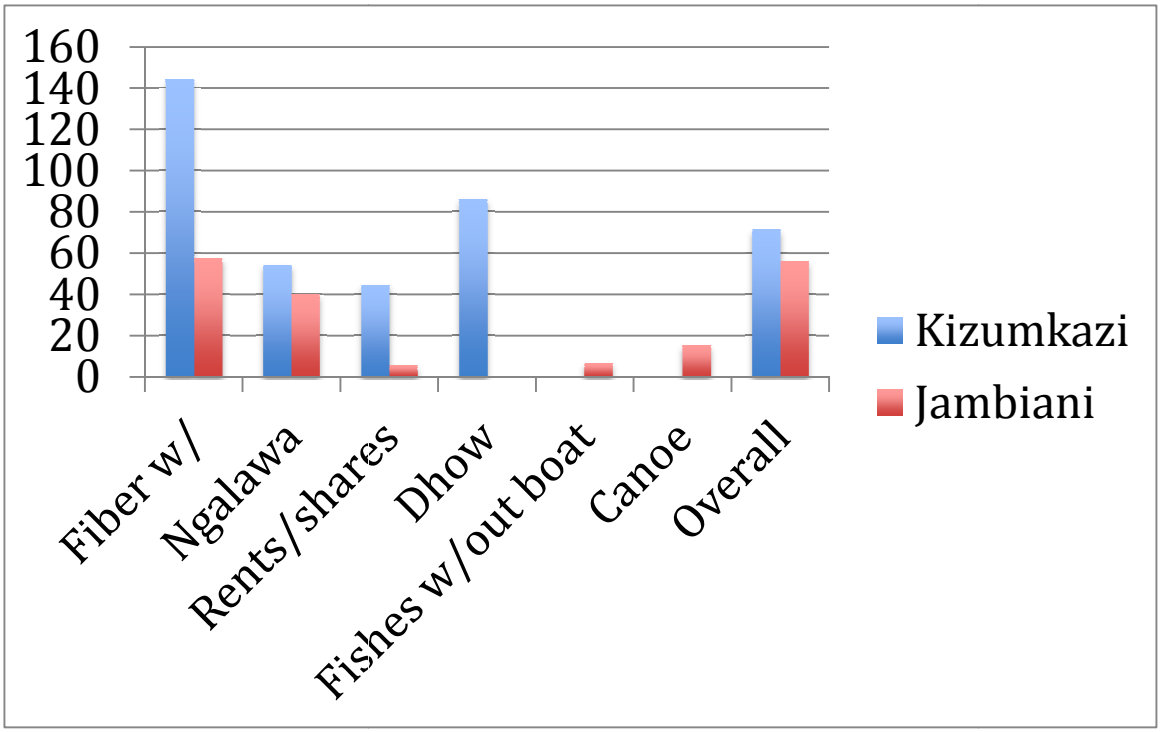

Figure 12: both villages average catches per week based on type of boat used.

Fishermen using fiber boats with motors (fiber w/) are more successful than all other fishermen. Comparing the two villages, Kizimkazi Dimbani fishermen are much more successful than Jambiani fishermen. In boat types used by each village, Kizimkazi fishermen report higher average catches per week.

C. Amount of Catch Consumed

Table 3. Average % of catch kept by fishermen for consumption in Kizimkazi Dimbani and Jambiani, 2012.

Village	All Fishermen	If catch size is 30 kg or below	If catch size is 30kg - 100kg	If catch size is greater than or equal to 100
Kizimkazi Dimbani	29.63%	42.06%	23.33%	23.02%
Jambiani	25.73%	27.20%	30.06%	12.60%

Generally, fishermen keep a large percentage of their catch for personal and family consumption. In Kizimkazi Dimbani fishermen generally keep a slightly higher percentage of their overall catch. Jambiani fishermen keep roughly the same percentage of their catch in most categories, with the exception of average weekly catches above 100kg. Both villages exhibit a smaller percentage of the catch kept for consumption

when the average catch is above 100kg. While it appears that this is a more serious phenomenon in Jambiani, only three responses were recorded in that category there, while there were nine over 100kg from Kizimkazi Dimbani, making the Jambiani data less accurate.

D. Perceptions of Changing Catch Size

Respondents noted, almost uniformly, that an average week's catch was larger when they first started fishing. Excluding two outlandishly large perceived changes in catch size: 4900% and 18,081% (from Kizimkazi and Jambiani respectively), an average week's catch many years ago, for Kizimkazi Dimbani was 188.60% larger than today, and for Jambiani 97.11% larger.

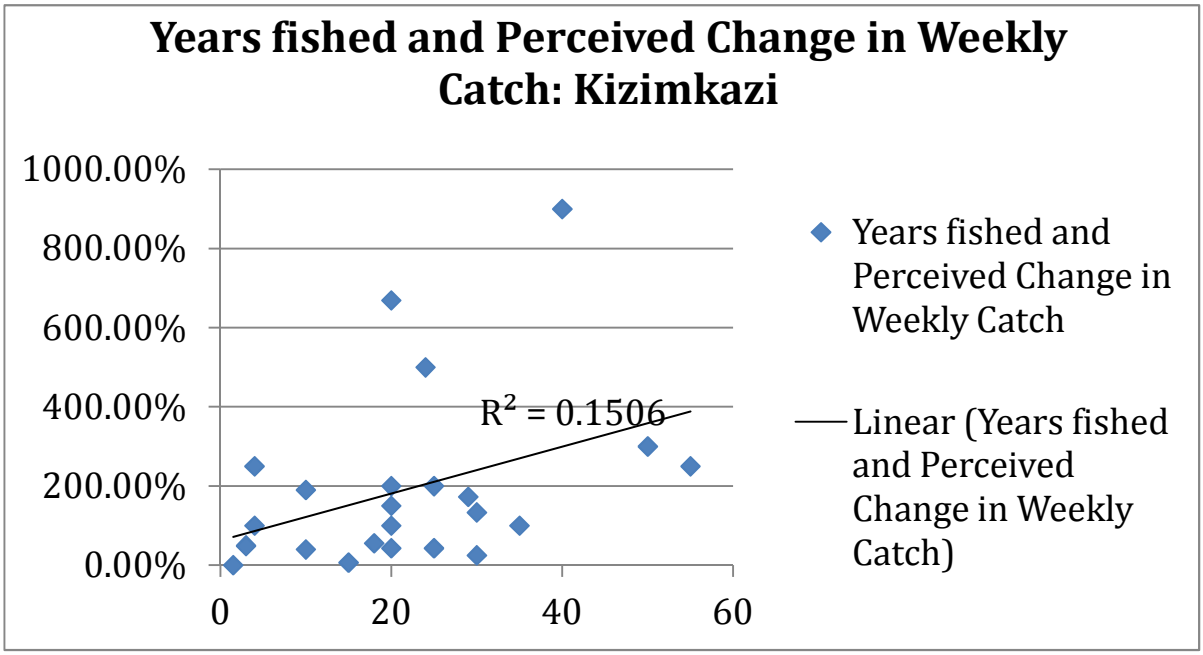

Figure 13: A graph of Years Fished vs. change in weekly catch size for Kizimkazi Dimbani.

The above graph shows Kizimkazi Dimbani fishermen's years fished and their perceived change in the average week's catch. The correlation coefficient R^2 is 0.15 revealing a slight correlation between the variables. For Jambiani fishermen even this slight correlation did not exist. Four fishermen from Jambiani responded that their catch had increased since they started fishing. When asked why, three responses were due to a lack of experience with fishing when they first became fishermen, while one respondent

said there were more fish today. These responses likely affected the overall trend for Jambiani.

VI. Markets for Fish

A. Location of Markets

In Kizimkazi Dimbani fishermen either sold their fish right off the beach, or would transport them – also sometimes paying somebody to transport them – to Stone Town by *dala dala* (bus) where a larger market returned higher profit for their efforts. 63.63% of Kizimkazi Dimbani fishermen sell from the beach, while 22.72% sell both at the beach and in Stone Town. 9.09% sell only in Stone Town and 4.54% of fishermen interviewed sell either in Stone Town or in Dar es Salaam on the Tanzania mainland, about 25 miles from Kizimkazi Dimbani.

Jambiani fishermen, with the exception of three respondents, all sell off the beach. Many respondents noted that they sell to either middlemen, or villagers. Also some noted that they sell directly to hotels and restaurants. One of the respondents who does not sell in Jambiani, sells in Stone Town, while the second sells in both Jambiani and Stone Town and the third sells up the eastern coast from Jambiani: in Paje and Bwejuu as well.

B. Changes in the Price of Fish

Table 4. Perceptions of how the price of fish has changed for fishermen of Kizimkazi Dimbani and Jambiani, 2012.

Village	Increased	Fluctuates	Decreased	Remained the same
Kizimkazi Dimbani	78.57%	14.29%	3.57%	3.57%
Jambiani	73.91%	8.70%	4.35%	8.70%

Responses are similar for both villages: the price of fish is increasing. Many times it was noted that the price fluctuates based on the season, due to fishermen's abilities to get fish or not get fish during the SE monsoons. When the sea gets rough fishermen are more cautious, thus returning to shore with fewer fish. Also discussed regularly was the idea that the actual price has remained the same because cost of living increases have kept pace with fish prices.

C. Perceived Reasons for Price Changes

Many answers were given, but in the interest of simpler results responses were compacted into the following categories: Tourism, Cost of Living (including inflation and cost of equipment increase), Higher Demand/Lower Supply (including more buyers,

more fishermen, less fish and population growth), and Bad Markets (including middlemen setting the price levels and distance from large markets), Seasonal and Unknown. Many respondents voice multiple reasons for the changes in price and these responses were counted as individual responses, thus the percentages add to over 100%.

Table 5. Reasons provided for changes in the price of fish in Kizimkazi Dimbani and Jambiani, 2012.

Village	Tourism	Cost of Living Increase	Higher Demand/Lower Supply
Kizimkazi Dimbani	17.86%	39.28%	46.43%
Jambiani	17.39%	43.48%	13.04%
(cont)	Bad Markets	Seasonal	Unknown
Kizimkazi Dimbani	3.57%	10.71%	0.00%
Jambiani	13.04%	8.69%	4.35%

One additional response of interest was that the use of nets was causing the price to increase.

VII. Effort Spent Fishing

A. Time Spent Fishing Currently

Table 6. Average days fished in a month for Kizimkazi Dimbani and Jambiani, 2012.

Village	Now	Before
Kizimkazi Dimbani	17.91	21.04
Jambiani	18.65	18.41

Eighteen of fifty-one fishermen fished the same amount now as when they started. Thirteen respondents fish more now than before and nineteen fished more before than they do now.

B. Change in the amount of Time Spent Fishing and Reasons for this Change

In Kizimkazi Dimbani, four respondents fish more today than when they first became fishermen due to: inexperience, fewer fish nowadays (x2), and not having a family to provide for in the past. Many of the older fishermen interviewed responded that they fished more before because they were younger and stronger. Many fishermen also noted that they enjoyed fishing more back when they started and went out more days of the month. Two respondents now have another job, which limits the time they spend fishing.

In Jambiani fishermen also noted on multiple occasions that there were fewer fish

now, and that other jobs had been found to help support themselves. One respondent noted that before he did not have a family to support and also a single respondent noted that inexperience was the reason he fished less before. Three respondents noted that they had started fishing while still in school and for this reason had only fished on the weekends when they first became fishermen. One more interesting response was from a fisherman who also makes a living as a witch doctor. He fishes fewer days now, due to there being more work for him as a witch doctor.

C. Pressure Felt by Fishermen

Table 7. Pressure to spend less time fishing broken down by village and by who is pressuring for Kizimkazi Dimbani and Jambiani, 2012.

Village	From fishermen?	From fisheries dept?	From both?
Kizimkazi Dimbani	83.33%	0	0
Jambiani	4%	4%	13%

Shown above, 83.33% of Dimbani fishermen feel pressure from other fishermen to spend less time fishing. Jambiani fishermen however, do not generally feel pressure from other fishermen; 21% responded that they feel pressure of some kind, and of those 21%, 13% experience it from the Department as well as fellow fishermen. While some Jambiani fishermen do feel pressure, it is not nearly as pervasive as in Kizimkazi Dimbani.

VIII. Enforcement of Fishing Regulations

A. Fishermen Participation: Reporting Violations

Table 8. How violations are reported by fishermen, and to whom are fishermen reporting in Kizimkazi Dimbani and Jambiani, 2012.

Village	Call from Boat:		Upon Return to Shore Find:				Do not Report
	Menai Bay Office	Committee	Menai Bay Office	Committee	Either	Shehah	
Kizimkazi Dimbani	28.57%	14.29%	3.57%	14.29%	25.00%	0.00%	14.29%
Jambiani	0.00%	4.35%	21.74%	21.74%	0.00%	4.35%	47.83%

In Kizimkazi Dimbani, 42.86% of fishermen report violators by calling either the Menai Bay Office or a member of the VFC from their boats, while in Jambiani this number is only 4.35% of fishermen. This is due to 46.42% of Kizimkazi Dimbani respondents bringing cell phones with them fishing, but in Jambiani only 8.69% of fishermen bring cell phones. In Kizimkazi Dimbani 42% of fishermen notify an official

upon return to shore, while in Jambiani this number is slightly higher at 48%. One of the largest differences is the numbers of fishermen who do not report, which in Jambiani is almost 50% of respondents.

B. Perceived Effectiveness of Menai Bay Patrols

Table 9. Perceived Effectiveness of MBCA Patrols by fishermen in Kizimkazi Dimbani and Jambiani, 2012.

Village	Yes	No	Sometimes/A little bit
Kizimkazi Dimbani	35.71%	32.14%	32.14%
Jambiani	30.43%	65.22%	4.35%

Responses of "sometimes" or "a little bit", were confusing, because in many ways if a patrol is only effective some of the time, then it is not effective at stopping bad methods of fishing, but at the same time these responses are different from "no's" because the respondents are making clear that the patrols do at times function effectively and therefore are not entirely useless. An interesting finding from interviewing Haji Saburi Simai, the Chairman of the Jambiani VFC, was that patrols are less effective because they fear the reaction of violators who often respond with violence to the seizure of their illegal gears.

IX. Knowledge of Management Strategies

A. Knowledge of Regulations in the MBCA

Of those with knowledge of regulations, two or three regulations were gained from each fisherman. Each of these responses is counted individually and percentages reflect overall awareness of specific policies among all fishermen interviewed. Only responses heard more than once were included in the table below:

Table 10. Percentages of fishermen aware of specific fishing regulations in Kizimkazi Dimbani and Jambiani, 2012.

Fishing Regulations	Kizimkazi Dimbani	Jambiani
No Spear Fishing	45.45%	4.35%
No Stun Poison	0.00%	17.39%
License for Boat and Fisherman	4.55%	4.35%
Don't pull nets - destroys corals	13.64%	13.04%
Avoid Juvenile Fish through:		
No Small-holed Nets	54.55%	56.52%
No Small-holed Dema	9.09%	4.35%
General Avoidance	4.55%	4.35%

Additional responses that appeared only once include: no use of dynamite, no

swimming with your gear, no using big nets deep underwater, no use of spear-guns, and that in Kizimkazi Dimbani there is an area close to the village designated for older fishermen, allowing them to continue fishing despite lower levels of fitness. This last regulation was one created by the VFC of Kizimkazi Dimbani and the respondent who explained its existence to me was a member of the committee.

Another fact of interest is that 13.64% of respondents from Kizimkazi Dimbani and 43.48% of respondents from Jambiani could not recall a single fishing regulation.

B. Knowledge of Traditional Methods of Management

Of the forty-four respondents asked this question, thirty-two had no knowledge of a custom, tradition or taboo. In Kizimkazi Dimbani, four respondents explained traditional gears used, and five others explained that it was dangerous to go fishing when the sea was rough. In Jambiani, two respondents recalled that years ago there had been a no fish area in the channel of the lagoon that was only fished during hard times, and two others recalled that there had been an octopus harvesting season partnered with a season of no octopus harvesting. Neither of these practices is still included in present management.

X. Participation of Fishermen in VFC

Table 11. Percentage of fishermen who attend VFC meetings in Kizimkazi Dimbani and Jambiani, 2012.

Village	Yes	Sometimes	No
Kizimkazi Dimbani	75.00%	10.71%	14.29%
Jambiani	69.57%	4.35%	21.74%

A few responses were further explained: in Jambiani, a fisherman remarked that he goes to meetings when a representative from the Fisheries Department is present (he was counted in sometimes), and also one Jambiani fisherman said “not yet” (he was counted as a no).

XI. Present Difficulties with Fishing

Table 12. Largest issues for fishermen and the number of responses in Kizimkazi Dimbani and Jambiani, 2012

Kizimkazi Dimbani	Responses
Illegal Methods Still Used	12
Small-holed Nets Still Used	5
Illegal Methods Used by Villagers	1
Illegal Methods Used by non-Villagers	1

Illegal Use of Legal Methods (eg, using nets deep)	1
Menai Bay Patrols	8
Communication btwn Kamati and Fish dept.	1
So many methods Legal/Illegal	1
Some want to preserve others don't care	1
None	1
Jambiani	
Small-holed Nets still Used	11
Illegal Methods	5
Gear Interference btwn/among Fishermen	3
Lack Fishing Gear	3
Boats Break/Sink	1
Cannot go far from Shore	1
Harder to get fish	1
Kamati Corrupt	1
Capture of Illegal Gears Harms Fishermen	1
Fish dept. tries to stop fishermen from fishing	1
Doesn't know	1

The most common responses in both villages were persisting uses of illegal methods, on many occasions small nets were specifically noted. In Kizimkazi Dimbani specifically, the second most common problem was related to the Menai Bay Patrols; either they would not stop the bad practices, that they were not always ready to go to sea, they didn't really care about enforcing the regulations or the officials were in league with fishermen practicing illegal methods. In Jambiani some of the most common issues aside from illegal gear were issues of gear interference among fishermen, namely nets destroying *dema* traps or nets interfering with fish line users. Also, commonly heard responses in Jambiani were: lack of technology and capital, inability to fish further out from shore, competition with fishermen from elsewhere, and the problem of boats breaking down while out at sea. Kizimkazi Dimbani fishermen voiced none of these concerns.

Discussion:

I. Differences between two villages: Kizimkazi Dimbani and Jambiani

A. Capital Intensity

Fishing in Jambiani generally appears to be less capital intensive than Kizimkazi Dimbani. Kizimkazi has twice as many fiber-bodied boats with motors as Jambiani, as well as finding no fishermen who operate without boats in Kizimkazi Dimbani. The data gathered by Levine (2004) posits that 50% of vessels in Kizimkazi Dimbani are equipped with motors. The differences between the two sets of data could result from Levine (2004) including all boats while this paper's data is only looking at fishing vessels, excluding vessels for tourism activities. Another piece of evidence for higher capital intensity in Kizimkazi Dimbani is that when asked about the problems they face, 21.74% of Jambiani fishermen noted a lack of gear, as their main problem while this issue did not arise for Kizimkazi Dimbani fishermen. Differences in catch sizes also emphasize the point that fishing is less capital intensive in Jambiani.

B. Reporting Capabilities and Perceptions of Enforcement

The number of fishermen who bring phones with them to sea is much higher in Kizimkazi Dimbani than Jambiani. This seriously affects patrols abilities to respond to violations as they depend on fishermen to relay information of violators'. Almost 50% of Jambiani fishermen do not report violations at all, and those that do report upon return to shore must deal with a long delay between sighting the infraction and when the patrol is notified. Coupled with the fact that no patrol boats exist in Jambiani, but two are stationed in Kizimkazi Dimbani you would expect patrols to be more effective in Kizimkazi. This is seen in the data, as 65% of Jambiani fishermen do not think the patrols are effective, while 68% of Kizimkazi Dimbani fishermen think that the patrols are effective at least some of the time.[1] The effectiveness of patrols in both locations must be improved to allow regulations to take their full effects.

C. Catch Size and Markets

The data collected on catch size per week, by boat type and by gear used reveals some differences between the two villages. Perhaps Kizimkazi Dimbani is a more

[1] 35.71% of Kizimkazi Dimbani fishermen think the patrols are effective, while 32.14% believe the patrols are effective sometimes or a little bit.

productive fishing area, and that explains the difference in average catch per week or it could relate to past fishing practices. The difference in catch size per week translates to higher profits for Kizimkazi Dimbani fishermen, and greater financial security. Despite Kizimkazi Dimbani fishermen being slightly better off, based on catch size per week, both villages consume close to equal percentages of their own catches. This is interesting because you might expect a plateau to occur, whereby fishermen consume up to a certain number of kilograms and no more, however as Kizimkazi Dimbani consumption is on par with Jambiani (as a % of the total catch per week) it would seem that catching more fish translates to eating more fish. This possibly reveals differences in the availability of markets to each village. With many hotels in the area nearby Jambiani there is high demand for fish. However in Kizimkazi, where tourism is focused around morning dolphin tours, it seems fishermen consume more fish themselves as the demand for fish is less. Data gathered on markets reveals that 36% of Kizimkazi Dimbani fishermen seek out larger markets than the beach-landing site, while only 13% of Jambiani fishermen take their catch beyond the beach. This provides evidence for the above reasoning that there is higher demand for fish in Jambiani than Kizimkazi Dimbani.

There is a general consensus that average weekly catches have decreased since fishermen first entered the market. One reason for this decline in catch size could be that fish stocks have decreased, which many respondents did make note of in their interviews. Also possible however, is an overall increase in the number of fishermen reducing the catch size of each individual fisherman. Most likely a combination of the two above factors is causing weekly catches to decline. According to Pomeroy, due to poverty and the high cost of entering and exiting the market, "as long as small-scale fishermen can obtain a positive return, they will continue fishing." (Pomeroy, 2011) As more fishermen enter the small-scale fishing market the overall catch is spread over a larger number of people. If all of these fishermen take a survival strategy to fishing, catching as much as they can each day, then the overall catch will shrink. This situation reduces the welfare of all those involved with the fishery, by shrinking individual catches and endangering the future existence of the resource.

II. Price of Fish Increases but not Welfare

The price of fish is increasing, but as many respondents noted so is the cost of living. Fishermen interviewed were very familiar with the notion of supply fluctuations influencing the price, and it is for this reason that a concerted effort to reduce the size of catches is possible. As part of the knowledge base is already well understood fishing less could increase welfare for all involved with the fishery by increasing the price of fish. From the perspective of fishermen the "purpose of a fishery is to produce income rather than fish, and so costs of catching the fish have to be taken into account." (Cunningham and Boss, 2005) Catching fewer fish raises the price of the fish that are caught, while requiring less effort from fishermen. As long as markets are appropriately responsive, the revenue of fishermen could be maintained while reducing the time and effort spent fishing, effectively increasing the welfare of fishermen.

III. Pressure to Fish Less and Overcapacity

Pressure to spend less time fishing can reveal overcapacity[2] within a fishery. As catch sizes become smaller, the result of many fishermen and fewer fish in the sea, competition and pressure felt by fishermen increases. If capacity were at its optimal state, this pressure to fish less would be uncommon because catch sizes would not be shrinking. In Kizimkazi Dimbani where 83% of respondents feel pressure to reduce fishing efforts from other fishermen, there seems to be overcapacity. This pressure does not exist as strongly in Jambiani. Perhaps because the gear used by Jambiani fishermen is more diverse and less competition exists due to a greater diversity of species in Jambiani. Or due to larger markets in Jambiani, additional fish caught does not reduce the price of fish for other fishermen as it might in a smaller market situation. Another cause for differing levels of pressure could be that Jambiani fishermen are less educated about fishing and do not fully understand the danger of overcapacity, while Kizimkazi Dimbani fishermen are exposed to these dangers more often living in a town where a MBCA office is located. The other option is that overcapacity is less of a problem in Jambiani. As perceptions of past weekly catches are lower in Jambiani than in Kizimkazi Dimbani, perhaps fish stocks have not deteriorated as much in Jambiani and overcapacity

[2] Capacity for fisheries is defined as a fleet's ability to catch fish, therefore overcapacity occurs when a fleet's ability to catch fish is greater than the fishery's ability to replenish itself.

is in fact less of a problem. No conclusions can be drawn without further research looking into the actual state of fish stocks.

IV. Management Strategies

A. Knowledge of Current MBCA Regulations

In both locations knowledge of the regulations governing fishing in the MBCA was sparse. Although the interviewee was asked to identify only two or three regulations, a general understanding of the laws in effect was not present. This was seen to a greater extent in Jambiani, where 43.48% of respondents couldn't answer with a single regulation. The difference in awareness between the two villages is likely a function of having a Menai Bay Office located in Kizimkazi Dimbani, while such an office is not present in Jambiani. The issues that were noted by fishermen from each village perhaps suggest the fishing methods causing the biggest problems in their areas. Using this logic, small-holed nets are the largest problems for both locations, followed by the use of spear-gun's in Kizimkazi Dimbani and stun poisons in Jambiani, with the third most common illegal method being the use of drag nets in both locations. Complete knowledge of the policies governing fishing in the MBCA by fishermen was very uncommon, and likely the result of the transaction costs associated with providing these small coastal villages with the needed information. Making information of illegal practices more available to fishermen will reduce their use, as many fishermen do not know of the illegality of their practices. Also, since village fishermen are the ones charged with reporting sightings of bad practices, enforcement will be improved if fishermen know the extent of the methods they are supposed to report.

B. Understanding and Use of Traditional Management Strategies

The information about customs, traditions and taboos revealed that for the most part neither village is aware of, or practicing any traditional methods of fishery management. It is likely that in Kizimkazi Dimbani this question was not translated effectively. Answers varied widely in their nature from what gears are traditionally used, to general caution of the sea during rough times. In Jambiani translation was more effective and a few traditional management methods were uncovered, however in general fishermen were ignorant of community organized strategies of management.

C. Acceptance of and Participation with VFC

The data on attendance of VFC meetings was reassuring. This newly created institution as part of the strategy for managing fisheries seems to have high participation rates within both villages. Attendance is slightly lower in Jambiani, most likely due to less effective patrols and a more distant connection to a Menai Bay Office. Still, attendance is 70-75% in both villages and management initiatives must utilize these meeting places to their advantage and as a channel for future policies. Resilience is a goal of SSF management, and past attempts at management from the small coastal village of Kayar in Senegal, the many islands of Mauritania, and the Pacific Halibut Fishery have revealed the need to incorporate social, economic and biologic factors into the management scheme. (Cunningham and Boss, 2005) The creation of VFCs seems successful in satisfying the cultural aspects of the MBCA's strategy as it has been incorporated into the existing structures of these communities.

V. Effectiveness of Patrols and Proximity to MBCA Office

The problems of fishing in Kizimkazi Dimbani are the use of illegal methods and ineffectiveness of the MBCA patrols. Jambiani fishermen agreed with Kizimkazi Dimbani fishermen on the problem of illegal methods, but made no mention of the patrols. As patrols are constantly seen in the docking area of Kizimkazi Dimbani, their presence is constant, while Jambiani fishermen do not see the patrols or Menai Bay Officers very often. Additionally, less awareness of the regulations in Jambiani might reduce the perceived problems of patrols ignoring violators. Also a factor in the effectiveness of Jambiani patrols is the reality that patrols often fear violent reactions when attempting to enforce laws and seize illegal gears. (Haji Saburi Simai, *Interviews*)

Conclusion:

Kizimkazi Dimbani and Jambiani, although both being governed by the same policies and management schemes as part of the MBCA, differ in many ways regarding their relationship with nearby fishing areas. The composition of fishing vessels, gears used, the ability of fishermen to aid in enforcement, average catch sizes per week, levels of pressure to reduce time-spent fishing felt by fishermen, the perceived effectiveness of patrols, and knowledge of MBCA regulations all differ between Kizimkazi Dimbani and Jambiani. The policies of the MBCA have improved conditions of fishing in general by reducing the frequency of illegal practices however; within the MBCA many villages receive more effective management than others. The location of MBCA capital has a large influence on the success of patrols, but even in these locations there is plenty of room for improvement as illegal practices are still seen frequently by fishermen. Improving the effectiveness of patrols however, is not a simple issue. Fishermen lack the communication equipment to relay information of violators, the MBCA is underfunded resulting in a lack of patrols and petroleum for patrol boats, and corruption exists within patrols who do not always stop illegal practices. Each of these problems adds complexity to the dilemma of enforcement.

Although the price of fish is increasing, the welfare of fishermen is not. This reveals the need for a more comprehensive management plan. Evidenced by the pressure within the Kizimkazi Dimbani fishing community to fish less, overcapacity is a problem in this area and management should account for these concerns as well. Knowledge of traditional management methods was very uncommon in both villages, thus new policies must be created to solve these problems. Participation within VFC meetings is high within both villages and the potential for these meetings to accomplish additional management goals in the future is promising.

Recommendation:

The MBCA covers a large portion of Unguja. The most pressing issues currently include but are not limited to: enforcement issues, fishermen being unaware of the laws governing fishing, a lack of management that takes into account the differences existing between villages within the area, and a lack of funding. Policies must be crafted to remedy these issues, but key throughout this process is using a broadened definition of policy, to account for the cultural norms that govern community relations. As McConney and Charles (2008) write, "the delineation between social and ecological (and between nature and culture) is artificial and arbitrary." Policies must take into account the structures currently in place in each village to develop successful management schemes.

One of the greatest strengths of MBCA villages is the connectedness of their communities. While this is often the culprit of policy failures as shown by *muhali* in the issue of *bwana dikos*, if matched with the correct management strategy, these strong communities could support resilient systems. If for example, patrollers each came from the communities they were meant to protect, they would be less likely to allow illegal practices to continue as their fellow community members would be the ones suffering lower catch sizes due to ineffective patrols. Although this effort would likely reduce illegal practices, some patrollers might still act in self-interest, accepting bribes to allow a foreign vessel's entry. To remedy this issue, there should be a reward-based system, perhaps on a monthly basis, that gives salary bonuses to patrollers who effectively stop illegal practices. If for example, patrollers in the MBCA recorded the number of vessels apprehended by patrol teams and each month the patrol vessel that successfully stopped the most boats received a bonus to their salary, enforcement would become spirited as patrols seek the monthly salary bonus. The acclaim of being the month's most successful patroller could be handed out during monthly VFC fishermen meetings and in this way successful patrollers would feel appreciated for their efforts. By providing patrollers with a financial incentive to enforce the laws, they will be less likely to accept bribes, and by publicizing their success in VFC meetings they can gain social recognition for good work.

To improve knowledge of fishing regulations within the MBCA postings of the regulations could be placed on the beach where fishermen anchor their boats. Although it

is expensive to install and maintain signs in the many villages of the MBCA, the measure would increase knowledge of illegal fishing regulations, as fishermen would see the signs every time they went to sea and positively effect knowledge of management strategies.

Despite differences that make management a tricky task, these communities are not entirely dissimilar. To create effectively manage the MBCA it is essential that each village be visited and some degree of education for fishermen of the different management options occur. This would take a considerable investment of time and effort, but it is likely that successful management schemes for these villages would be similar. The creation of a portfolio of management schemes to present to villages within the MBCA would simplify this process and each village could choose a strategy appropriate to its circumstances. The goal here is to increase the welfare of fishermen by reducing the time they spend fishing while keeping incomes relatively stable, and at the same time allowing fish stocks to recover to increase future catch sizes. Management strategies must be adopted for each village, to account for their different fishing relationships and make management as successful as possible.

One of the difficulties with this tactic is that villages have overlapping fishing territories. One way to deal with this fact is by zoning the different areas of Menai Bay. Zones in this arrangement would not overlap, but if tied to the current system of vessel licensing fishermen with more mobile boats could purchase the rights to fish in multiple zones, through the purchase of their annually renewed fishing licenses. By color coding the zones and placing tags that correspond to the different zones on each licensed boat, enforcement could be made easier within this arrangement. The current system of enforcement, adjusted through the addition of financial incentives for patrollers, could be used to enforce this zoning policy. As fishermen will be purchasing the rights to different fishing areas, the policies would be self enforced (as fishers who do not purchase the rights to an area where they are fishing will be reported by those who did), with the exception of kinship limiting within community reporting. This exception would be minimal however, as it would generally be limited to the zone closest to their village, and entering other zones, with different villages' fishermen, would result in them being reported by non-related fishermen. Also, if introduced through the channel of VFCs with

appropriate education explaining the policies and reasons for them, communities would hopefully accept and adopt such a policy.

Currently policies extracting resource rents are largely unsuccessful due to the issue of *bwana dikos*, *muhali*, poverty and kinship discussed earlier. As mentioned above, if management arrangements can be found for the many villages within the MBCA, this opens the opportunity for the creation of a revenue generator. This revenue could be directed to VFCs efforts to increase their community's resilience and to provide more fuel for patrol boats.

Additional funds could be gained by liquidating gears confiscated by Menai Bay Patrols. In Kizimkazi Dimbani, many ships confiscated were beached onshore, not being used and their value was depreciating. While most gears confiscated cannot be sold due to their illegality, some can and this is a source of additional revenue.

Although only a few weeks were spent gathering information throughout this study, the issues were not difficult to observe. Living within these villages, talking with fishermen and gaining a surface understanding of the problems they face, some semblance of the scope of the entire issue has been exposed. Future research about fishery management is needed, especially research defining fish stock levels now and uncovering data or perceptions of past stock levels. It is my hope that these small coastal communities receive more global focus to aid management efforts and at the same time to create more intelligent local stewards of our world's resources.

References:

Cunningham, S., T. Boss. 2005. Successful fisheries management: issues, case studies, and perspectives. Eburon Academic Publishers, Netherlands. Available online: http://books.google.co.tz/books?id=hciiGlzyUQ4C&pg=PA3&dq=Successful+Fisheries+Management:+Issues,+Case+Studies+and+Perspectives&lr=&source=gbs_selected_pages&cad=3#v=onepage&q=Successful%20Fisheries%20Management%3A%20Issues%2C%20Case%20Studies%20and%20Perspectives&f=false

Daily News, 2012. Illegal Fishing in Zanzibar: still a Big Headache. Daily News Paper, March, 2012. URL: http://allafrica.com/stories/201203210113.html

De la Torre-Castro, M. 2006. Beyond regulations in fisheries management: the "beach recorders," *Bwana Dikos* in Zanzibar, Tanzania. Ecology and Society 11(2): 35. URL: http://www.ecologyandsociety.org/vol11/iss2/art35

De la Torre-Castro, M., L. Lindstrom. 2010. Fishing Institutions: Addressing regulative, normative and social-cognitive elements to enhance fisheries management. Marine Policy dol: 10.1016/j.2009.04.012.

FAO. 2004. Fiscal Arrangements in the Tanzanian Fisheries Sector. FAO Publishing Management Services, Rome, Italy.

Grant, S. 2006. Managing small-scale fisheries in the Caribbean: the surface longline fishery in Gouvave, Grenada. Ph.D. thesis, Department of Philosophy, University of Manitoba.

Hill, Hannah. 2011. Hannah Hill ISP. School for International Training, Fall 2011.

Jiddawi, Narriman 2012. Lecture on Zanzibari Fisheries. Instutute of Marine Science (IMS) Lecture Series.

Khalfan, J. 2011. Muhali is an untranslatable concept particular to Swahili society. URL: http://www.mambomagazine.com/forum/teach-me-kiswahili/muhali-enigma-confusion-disappointment-and-swahili-politeness-explored

Kharousy, M., B. Juma. 2006. Establishment and involvement of village fishermen committees in management of fisheries in Zanzibar. Department of Fisheries and Marine Resources.

Levine, A. 2004. Local Responses to Marine Conservation in Zanzibar, Tanzania. University of California, California USA.

Maulid. Personal Interview. Zanzibar Department of Fisheries: Nungwi *bwana diko*. March 2012.

McConney, P., A. Charles. 2008. Managing Small-Scale Fisheries: Moving Towards People-Centred Perspectives. Centre for Resource Management and Environmental Studies University of the West Indies, Barbados.

Phelan, C., A, Stewart. 2008. A Sustainable Fishery through Species Size, Unguja Island. School for International Training, Spring 2008.

Pomeroy, R.. 2012. Managing overcapacity in small-scale fisheries in Southeast Asia. Marine Policy 36 (2012) 520-527. URL: www.elsevier.com/locate/marpol

Revolutionary Government of Zanzibar. 2010. The Fisheries Act of 2010. Zanzibar, Tanzania.

Salayo, N., L. Garces, M. Pido, K. Viswanathan, R. Pomeroy, M. Ahmed, I. Siason, K. Seng, A. Masae. 2008. Managing excess capacity in small-scale fisheries: Perspectives from stakeholders in three Southeast Asian countries. Marine Policy 32 (2008): 692-700. URL: www.elsevier.com/locate/marpol

Simonsen, S. Publication Review: De La Torre-Castro, M., L. Lindstrom (2010). Stockholm Resilience Centre. 2010. Available online: http://www.stockholmresilience.su.se/publications/artiklar/fishinginstitutionsaddressingregulativenormativeandculturalcognitiveelementstoenhancefisheriesmanagement.5.fb3ee2f125e9da349a80002608.html

Tobey, J., E. Torell. 2006. Coastal poverty and MPA management in mainland Tanzania and Zanzibar. Ocean and Coastal Management 49 (2006) 834-854. URL: www.elsevier.com/locate/ocecoaman

Torell, E., A. Mmochi, K. Palmigiano. 2006. Menai Bay Governance Baseline. Coastal Resource Center, University of Rhode Island. 18-38.

Zanzibar Action Project. 2012. About Jambiani. URL: http://www.zanzibaraction.co.uk/pages/about.html date viewed: 4/25/2012.

Appendices:

Appendix I: Questions asked during fishermen interviews.

Name, Age, Origin, Boat Type
How many years have you fished?
Why did you start fishing?
Did your father fish?
What gear do you use?
What navigation and/or communication equipment do you take with you in the boat? (many respondents failed to understand this question without the addition of suggesting a map, a GPS, or a cell phone as possible answers)
How many kilograms of fish do you catch in an average week? (Best guesses were encouraged as weighing of fish does not occur in the villages studied)
How much do you keep for yourself and your family to eat?
How many kilograms of fish did you catch in an average week when you started fishing?
Do you ever feel pressure from other fishermen or the fisheries department to spend less time fishing, even using legal methods?
Where do you sell your catch?
How has the price of fish changed since you started fishing?
Why do you think?
How many days per month do you fish?
How many days per month did you fish when you started fishing?
(If different from now) Why?
If you see someone break a regulation do you report them, to whom and how do you report?
Are the Menai Bay patrols effective?
Are you aware of any fishing regulations in (insert village name)? (Respondents were asked to explain 2 or 3 that they were aware of)
Do you know of any customs, traditions or taboos for when to fish and when not to fish in (insert village name)?
Do you attend Kamati za Wavuvi meetings?
What are the current problems with fishing in (insert village name)?

Appendix II: Fishermen interviewed, and time of interview.

Interview Start	Interview End	Interview Length	Name	Age
9:47	10:02	0:15	Daudi Hamadi	39
10:03	10:20	0:17	Muhammed Abul Achmed Salu	29
10:28	10:44	0:16	Haji Juma	29
10:45	11:00	0:15	Nuhu Ibrahim	39
11:04	11:16	0:12	Nuhu Said	25
11:20	11:34	0:14	Hasan Hatibu Kidete	21
16:17	16:30	0:13	Isah Maulid	19
16:38	16:52	0:14	Ali Hasan	47
16:52	17:01	0:09	Hafud Musa	60
17:01	17:13	0:12	Abdallah Ali	55
17:14	17:23	0:09	Hasan Ibrahim Haji	70

17:24	17:34	0:10	Tahir Suleiman	35
17:35	17:47	0:12	Ali Saidi	43
17:53	18:03	0:10	Haladi Twalid Haj	42
18:04	18:15	0:11	Hasan Ibrahim	35
18:16	18:25	0:09	Juma Abdallah	35
13:47	14:00	0:13	Juma Kamati Ali	45
14:03	14:12	0:09	Ibrahim Hieri	36
14:13	14:26	0:13	Daudi Simba	65
14:27	14:39	0:12	Talib Hamis Muombawa	66
14:42	14:50	0:08	Talid Ibrahim	40
14:51	15:03	0:12	Hatid Amur	60
15:35	15:48	0:13	Ibrahim Naim	40
15:49	16:00	0:11	Ali Pandu	70
16:13	16:22	0:09	Muhammed Ibrahim Haji	53
16:31	16:42	0:11	Musah Machfun Musan	40
16:43	16:55	0:12	Suluhu Abdallah	48
17:00	17:06	0:06	Aboss Juma	29
16:36	17:00	0:24	Fasihi Usi	39
17:10	17:32	0:22	Siasa Pandu	35
13:21	13:45	0:24	Haji Mrisho	40
13:49	14:01	0:12	Mrisho Haji	60
14:03	14:14	0:11	Pandu Abdallah	31
14:16	14:30	0:14	Okala Muhammed	37
15:02	15:13	0:11	Jafar Hasan	27
15:15	15:29	0:14	Maudini Vahoda	36
15:31	15:37	0:06	Ibrahim Haji	30
15:38	15:44	0:06	Makame Hajaka	24
15:47	15:56	0:09	Ujudi Kipatu	28
16:10	16:20	0:10	Takima Abdallah	32
16:20	16:26	0:06	Chum Yahaya	40
16:27	16:33	0:06	Ahmed Haji	16
16:34	16:40	0:06	Muada Haji Vuay	21
9:42	9:52	0:10	Suleiman Kipatu	19
10:02	10:11	0:09	Musa Jeca Vuoy	52
10:16	10:26	0:10	Hasan Sinene	42
10:28	10:38	0:10	Haji Pandu	69
10:40	10:50	0:10	Daudi Abdallah	60
10:52	11:01	0:09	Hamis Pandu	66
11:20	11:28	0:08	Ali	45
11:32	11:40	0:08	Haji Snak	52

Appendix III: Government officials, local community members and other persons interviewed in an unstructured manner.

Mr. Zahor Mohamed El Kharousy, Department of Fisheries Stone Town

Juma Haji Ame, Fisheries Department: Menai Bay Conservation Area, Stone Town

Okala Muhammed, Director of Jambeco: an NGO, Jambiani

Haji Saburi Simai, Chairmen of the Kamati za Wavuvi, Jambiani

Jafar Hasan, English Teacher/Fishermen/Translator, Jambiani

Halfan Isah, Financial Officer of the Menai Bay Conservation Area, Kizimkazi Dimbani

Pandu, Business Owner/Fisherman, Kizimkazi Dimbani

Khamis Ali Pandu, Restaurant Owner/Tour Guide Organizer in Kizimkazi Dimbani

Aboss Juma, Chairmen of the Kamati za Wavuvi, Kizimkazi Dimbani