

The Constraints of the Artisanal Fishing Industry in Lamu District

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“And he it is who has subjected the sea that you eat there of fresh tender meat and that you bring forth out of it ornaments to wear. And you see the ships plowing through it, that you may seek of his bounty and that you may be grateful.”

SURAT ANNAHL AYA 16
NAMBA YA SURA 16

“If you give a man a fish, he’ll eat for a day. If you teach him how to fish, he’ll eat for a lifetime.”-Chinese Proverb

“Our shamba is the sea and we don’t like people playing with it.” Ahamed
Shiek Ahamed

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Abstract:

This proposal explores the challenges of the artisanal fishing industry along the northern coast of Kenya in hopes of generating community informed recommendations for transforming and revitalizing the industry. This proposal is written in hopes of empowering Lamu coastal communities to capitalize on their own resources.

In general, along the Kenyan coast, inshore marine productivity is declining. Fisheries data confirms a declining trend over the past 10 years, with daily fish catch declining from an average of 50 kilos per fisherman per day to 10 kilos per day to sometimes no catch at all.¹ Local fishermen confirm the declining productivity and acknowledge the increasing population of participants in the industry. This has perpetuated the decline of the inshore environmental and economic resources.

Contributing to the perplexity of the situation, offshore marine resources are abundant and vastly underdeveloped. But local fishermen are disempowered and unable to develop these vast offshore coastal marine resources that have been largely underutilized. They lack adequate equipment—boats, engines and nets, the ability to preserve and process their products and the basic infrastructure to successfully market their catch in national or international markets. Fishermen and dealers lack the educational and management resources to effectively organize themselves in order to sustain and remain in control of what could be a profitable industry. Under current circumstances, subsistence inshore fishing drives a cycle of poverty along the coast that inhibits the development of a sustainable fishing economy.

In addition, the coastal fishing industry has been largely neglected by national and international investors and by the Kenyan government as a whole. This proposal seeks to challenge this and recommend ways in which Kenya's artisanal fishing industry can be transformed to not only empower coastal communities, but to contribute significantly to the growth of Kenya's national economy as a whole. This proposal seeks to identify ways in which the artisanal fishing industry can be sustained and driven from within coastal communities, giving them the resources and education to effectively improve their lives.

Objectives:

1. To appreciate and understand the difficulties and challenges hindering the artisanal fishing industry along the coast through community input, feedback and sentiments.
2. To understand how the community perceives proposed solutions and recommendations for the revitalization of the industry, so change is driving from within.
3. To utilize community sentiment in requesting funding to bring more sustainable technology and fishing techniques to the Lamu community and the surrounding areas.
4. To highlight the industry's potential in the context of the vast, underexploited offshore marine resource.
5. To use this study as a tool in alleviating poverty by creating a more sustainable fishing industry operated and driven by the people.
6. To educate fishermen on environmental conservation and preservation initiatives so that a sustainable, highly productive industry can be created and maintained.
7. To educate artisanal fishermen about their rights and opportunities so they are able to gain more control over their resources.
8. To unify the industry, which will encourage more investment and development.
9. To solicit significant national and international investment needed to develop, improve and increase the coastal economy so that it can adequately contribute to the Kenyan economy as a whole.

Research Methodology:

Although this proposal and study focused on the Lamu district, it has been approached in context of the greater fishing industry along the northern Kenyan coast. The researcher undertook a comprehensive study of the coastal artisanal fishing industry from Mombasa to Lamu focusing on areas of Malindi, Mayungu, Ngomeni, Lamu, Faza, Kizingitini, Kipungani, Matondoni, Mkokoni and Kiwayuu. The researcher worked closely with Kenyan national Department of Fisheries in Mombasa, Malindi and Lamu. Informants included Fisheries Officers, fisherman from all areas, fish dealers, processing plant owners, WWS and KWS officers, BMU leaders, members and leaders of the Malindi Cooperative Society, Lamu East Cooperative Society (Faza and Kizingitini branches), Lamu West Cooperative Society, private business owners, local and foreign, hotel owners and many members of the community. Qualitative and Quantitative field research was conducted through formal and informal interviews, survey methods and through group meetings moderated by the Fisheries Department.

These research methods were employed to generate the maximum amount of community input and to analyze the problems and subsequent recommendations.

Study Significance and Literature Review:

This study is written in the context of several other academic studies and takes into account their findings, recommendations and research methodologies. The researcher has consulted the following works, using them to formulate background knowledge and a perspective of the industry in its current state.

The first study, *Constraints on the Fishing Industry in Lamu District: A Case Study*, written by Omar Famau, is a descriptive study highlighting the challenges local fishermen face in the context of environmental degradation, tourism and the current status of the Lamu community. The study recommends investment from the national government of Kenya “in providing

environmental management, formation and management of c

operatives to enable the fishermen operate and sell their catch at better prices.” The study also highlights ways to improve infrastructure in Lamu so that marketability and transport of coastal resources can be revitalized. Finally, the study suggests ways in which loan schemes can be provided to fishermen to allow them to acquire modern fishing equipment, motorized vehicles and cold storage facilities.

Another study influencing this proposal is *The Lamu Artisanal Fishery Industry and its Potential Development* by Athman Lali Omar written in conjunction with Tawasal Institute, Lamu, conducted in March 2005. This report recommends that offshore coastal resources be developed in order to utilize the potential of the industry as a way to stop overexploitation of inshore fishing environments, which is causing a cycle of environmental degradation and declining productivity. This study highlights the positive outlook of the coastal fishing industry and ways the socio-economic position of local, artisanal fishermen can be enhanced. The study also recommends that the governmental regulation and management of the industry be improved, cold storage facilities be introduced and that loan schemes be developed to bring modern, more effective gears to local fishermen who are unable to access this technology independently.

A proposal written by Professor M. Hyder, *Lamu Fishery Industry*, in 1997 in conjunction with the Alliance of Religions and Conservation, highlights many of the same issues. It focuses on developing the industry in ways that maximize productivity, through the transport of products to larger markets. It also suggests ways local fishermen can form their own fisher groups in order to access loan schemes and management facilities.

Similarly, the Coast Development Authority submitted a report that highlighted the challenges of the coastal artisanal fishing industry. It submitted a Symposium Report on Investment Opportunities in Coastal and Marine Fisheries in Kenya in 2004 that emphasized the effects of lack of infrastructure, cold storage, modern equipment, credit facilities and underdeveloped organizational and marketing strategies for coastal fishermen. The purpose of the report was to present the problems and potential ways investment could revitalize the industry.

In addition, Hussein M. Aldina conducted a study, in conjunction with CORDIO, Coral Reef Degradation in the Indian Ocean, *Local Level Fisheries Management in Diani-Chale Kenya: Current Status and Future Directions*, which emphasized fishermen's inability to control and manage their own resources. The study summarized the socioeconomic condition of fishermen, their fear of losing landing sites and the continued disregard for local fishermen's rights. The study recommends ways in which fishermen can be educated and organized so they can maintain more control over their beaches.

Another study that contributed significantly to the context of this study was produced by Kenya Fisheries Marine Research Institute (KENFRI) titled, *The Current Status of Trawl Fishery of Malindi-Ungwana Bay Executive Summary*, published in 2002. It was a four year project conducted with the help of Basta and Sons and East African SeaFood, which are international commercial fishing companies on the Kenyan coast. KENFRI sought to identify the social, environmental and economic impacts of prawn trawling on the local community. KENFRI offered the following recommendations regarding the regulation of trawlers in these areas:

1. The elimination of destructive fishing gears
2. The elimination of the fishing and landing of juvenile fish

3. The demarcation of fishing zones specifically for trawlers in order to protect the nursery grounds of fish
4. The development and implementation of adequate Bycatch Reducer Devices to reduce incidental capture of juvenile fish and reduce the quantity of bycatch

Through adoption of these measures, it was determined that trawling is economically and environmentally sustainable only under strict regulation and management. The study also offered ways international trawlers should be monitored in order to minimize the conflict between them and the local industry.

Two other proposals that have significantly informed this study were written by KENFRI about quality improvement for traditionally dried and smoked fish along the coast. The proposals request funds to pursue more effective methods of processing, transporting and hygienically storing fish products. It is written in conjunction with a pilot program on the south coast, which is currently in the test phase. This program aims to improve the current drying and smoking techniques practiced by local communities along the coast.

The proposal highlights the consequences of inadequate infrastructure, lack of cold storage facilities and the general inability of local fishermen along the coast to transport and preserve fresh fish. It illustrates the high prevalence of perishable fish products and proposes strategies to preserve fish and increase quality through new ways of drying and smoking fish. Ultimately, KENFRI proposes investment in solar tunnel driers and Chorkor smoking ovens as technology able to “produce high quality fish products, reach a wider market, reduce pressure on the declining artisanal fishing industry and increase income for local fisher families.”ⁱⁱⁱ The proposals explore use of this type of technology in other parts of the world and seek to introduce new strategies in Kenya.

Overall, significant research regarding the productivity and sustainability of the coastal, artisanal fishing industry has been conducted. Unfortunately, recommendations from these studies have not been implemented and few action plans have actually been initiated.

This study differs in many ways from previous studies in that it seeks to represent the voices of the local, disempowered community. It also seeks to establish grass-roots revitalization of the industry from within, where improvement and sustainability must be

inspired and driven from within the capabilities, initiatives and passions of the people who live along the coast.

Introduction and Background: Definition of the Lamu

Artisanal Fishing Industry, Seasons, Methods and Equipment:

The Kenyan coastline stretches 640 km from Vanga at the Tanzanian border to Kiunga on the Somali border with access to 12 nautical miles of territorial waters and 200 nautical miles of the Exclusive Economic Zone, EEZ, which is a high potential fishing ground.ⁱⁱⁱ The inshore fishery has an approximate productivity of 12,000 tons, while offshore fishery including the EEZ, has a potential of up to 200,000 tons yet to be exploited.

The coast province is divided into four stratum: Lamu, Malindi, Mombasa and Kwale. The coast province maintains approximately 9,000 fishermen, which are supported directly through fisheries with a total production of 11,597,244 kgs. valued at Kshs. 813,709,546 for last year.^{iv}

The Lamu stratum, one of the seven districts within the coast province, extends from the Somali border to about 2° 22'S and includes the entire Lamu archipelago. The Lamu stratum makes up about 4,176 square km in area, which is about 22% of the total shelf area.^v The Lamu archipelago consists of several islands with numerous fishing villages and hubs, all which specialize in specific areas of the industry, with Kizingitini and Kiunga leading in fish landings.

Other than the mainland

areas,

Mokowe, Mkunumbi, Witu, Barigoni, Mpeketoni, Kiongoni and Hindi, most of the district is a series of islands. To the far north, the islands of

Kiungamwini, Siyu, Faza, Mtangwanda, Bori, Shanga, Chundwa,

Mbwajumwali,

Iyabogi, Kizingitini, Mkokoni, Simambaya and Kiwayuu lie, while to the

south, Ndau, Pate, Manda and Lamu Islands lie. The Lamu district has seven

administrative divisions mainly: Amu (on Lamu Island), Faza (on

Pate I

sland), Kisingitini (on Island), Hindi (mainland),

Witu (

south mainland), Mpeketoni (south mainland) and Kiunga (north mainland).^{vi}

In Lamu district, there are approximately 1,500 fisher folk using 14 landing beaches.^{vii} And on average, the district realizes 1,500 metric tons of productivity per year.^{viii} Further, approximately 40% of the district's productivity is exported each year with 12% commission paid to the Lamu County Council.^{ix} For example, the total landing of fish transported outside of Lamu for the month of December, 2005, was 63,470.5 kgs., worth approximately Kshs. 5,035,020, while the total fish locally consumed was 12,597 worth Kshs. 1,709,000. ^x

In Lamu district, the main species of catch are rabbit fish, scavenger, snapper, cat fish, cavalla jacks, mackerel, blackskins, barracuda, mullets, queen fish, sail fish, tuna, prawns, lobsters, crabs, and sharks/rays in dried form, sardines, oysters and octopus. Prawns are caught in areas like Dodori creek, exploited by fishermen from Kipungani and Matodoni. Lobster and crab, which represent some of the best in the world, are caught in places like Kizingitini, Faza and Kiwayuu. Kiwayuu also produces sharks and rays for the dry fish market. And places like Kiunga produce shells, lobster, crab and finfish. Local fishermen use equipment such as lobster diving masks, gill nets, handlines, beach seines, longlines, uzio and melema, traditional equipment used by fishermen for centuries.

In Lamu district, fishing has been the main economic source of sustainability for hundreds of years, perpetuated through generations of family fishermen. Fishing is one of the most important economic sectors in the area, sustaining the livelihood of 70 % to 75 % of the residents either directly or indirectly. ^{xi} The Lamu people have been well-known for their skills in fish production, boat building, sailing and other marine activities. The people along Kenya's coast have been involved in trans-Indian ocean trade for more than 1,200 years, producing a vast

seafaring and mercantile society. Fish constitute the primary natural resource and source of protein and livelihood for the Lamu people. There is high local consumption as well as sales of quality resources like lobster, crabs and prawns to tourist markets in Lamu, Malindi and Mombasa.

In addition, tourism has affected the fishing industry by creating a larger market for products and relieving some of the population pressure for jobs from the fishing industry. However, the tourist industry, especially in Lamu, is monopolized by foreign investors who do not contribute to the local community in any significant way.^{xii} Further, a great divide exists between the international tourist community and the Swahili and Bajuni people of Lamu. In Lamu district, absolute poverty is currently at 60%, leaving local people, 70% of which are sustained through the fishing industry, with few resources or ability to compete with national and international tourist markets.^{xiii}

The seasonality of the tourist industry also perpetuates an inconsistent market and contributes to the fishing industry's already irregular nature. The artisanal fishing industry in Lamu is largely seasonal and affected by two wind and weather patterns known as the South East and North East monsoons. The North East (Kaskazi) winds are characterized by calm sea conditions ideal for small scale fishing, occurring from November to February. The South West (Kusi) winds, occurring between March and October, are characterized by strong winds and rough sea, making offshore fishing nearly impossible with traditional, small-scale fishing techniques.

Overall, the Lamu offshore, deep water stratum has great potential, with nearly 85% of its continental shelf lying above 200m. However, only 10% of fishing is done above 20 m which is called the off-shore area.^{xiv} In summary, the Lamu district, which includes a very unique island archipelago, is an area of huge marine potential with a vast amount of underutilized assets.

Outline and Statement of Problems:

Mismanaged Potential:

As illustrated, Kenya's offshore coastal marine resources have been vastly untapped and the fishing industry extremely underdeveloped. Current Kenyan marine production is estimated between 6,000 and 7,000, with an annual catch potential of 90,000 to 100,000 metric tons.^{xv} A recent study on coastal marine fisheries has demonstrated that there is a potential of over 10,000 metric tons of various types of marine fish that can be exploited with the prospects of employing over 10,000 Kenyans in fishing alone.^{xvi} It is understood that in Lamu district alone, only one sixth of the resources are being utilized.^{xvii} Especially in Faza and Kizingitini, where potential for lobster and crab, some of the best in the world, go vastly harvested. Foreign seafood companies with the financial ability and equipment to utilize offshore fisheries have repeatedly demonstrated that there is an incredible market for seafood caught off the Kenyan coast.

Shella Sea Foods, a company in Malindi that supplies many tourist hotels, reports that people are willing to pay almost double the prices currently being paid for the lobster and crab they buy from Lamu. They buy products for around Kshs. 250 and routinely sell Kshs. 500 in Mombasa and Malindi markets. And, in the Nairobi area, people are willing to pay up to Kshs. 1,400 for lobster while European markets will pay up to Kshs. 4,000. Unfortunately, artisanal fishermen not only lack the resources to catch a wide supply of

these abundant resources, but do not possess the ability to transport their catch to these lucrative markets. Underdevelopment is a result of many factors, which will be discussed below. Most significantly, fishermen lack the initial capital or credit facilities, especially within local contexts, to initiate investment and development of the industry.

Lack of Modern Fishing Equipment:

Artisanal fishermen's lack of modern or effective fishing technology is fueling the large decline in productivity. Eighty-eight percent of fishermen use outdated equipment such as juwa, yema, uzio, mshipi.^{xviii} Most are still using dug out canoes, mashuas, or sailing dhows, and hand lines.

Poverty prevents fishermen from purchasing adequate nets, boats or engines, confining them to inshore or shallow water fishing. Fishermen from Lamu know and express the potential of offshore fishing, but are largely unable to access any of these resources. This results in the overexploitation of inshore areas, which contributes to environmental degradation and a decline in productivity that feeds the cycle of poverty and disempowerment among local fishing communities.

Further, an inability to purchase modern, environmentally sustainable gears is causing conflict between local fishermen and local Fishing Departments. For example, most fishermen, especially in the Faza and Kizingitini areas, are still using beach seines, which have just been deemed illegal by the government due to their highly destructive environmental and coastal impact. Beach seines and undersized nets have been utilized by artisanal fisherman for hundreds of years.

When fishermen are challenged to purchase new nets and equipment, many are unable due to financial, social and cultural reasons. Even for those who recognize the environmental destruction, economic limitations prevent the majority from complying, especially without governmental assistance for replacement. The local Fisheries Officials in Lamu are responsible for confiscating these illegal nets, while knowingly seizing the only equipment local fishermen possess. Based on interviews, a standard, legal gill net cost between Kshs. 10,000 and 25,000. Local fishermen earn anywhere from Kshs. 0-500 per day, which they must use to support families and pay rental fees to boat owners and other costs. A very small population of local fishermen can afford proper equipment.

Without adequate gears—motors, proper nets and sails—it is almost impossible to reach offshore resources especially during the monsoon winds, further confining fishermen to inshore area. Thus, the nature of the fishing industry along the coast is extremely seasonal and inconsistent, leaving fishermen and dealers largely unable to maintain a consistent market.

Environmental Degradation and Use of Illegal Fishing Gears:

In addition, due to financial disempowerment and a lack of resources, environmental degradation of fishing grounds has tremendous effect on the industry. As a result of the increased number of fishermen, almost all of whom use inadequate nets and gears, inshore fishing areas are being destroyed, which in turn decreases productivity and the economic livelihood of local communities. Local fishermen cite a significant decrease in catch.

Beach seines and undersized nets are destructive because they damage fish breeding grounds, coral reefs and sea-grass areas, which affect the ability of fish population to reproduce and thrive. Such equipment also captures a large amount of juvenile fish, which are discarded because they are too small to be considered appealing for market. This also affects productivity and contributes to the yearly decline in catch.

Beach seines were originally introduced to the Kenyan coast by migrant fishermen from Tanzania, especially from Pemba Island, approximately 30 years ago. Since their introduction, local fishermen have estimated a 90 percent drop in trap catch.^{xix} Further, research has shown that in areas where beach seines are not used, higher fish catch was reported.^{xx}

Under current law, all nets must be a minimum of 2 inches, but in almost all of the fishing villages surveyed by the Fisheries Department in Lamu nets less than 2 inches and beach seines were openly and widely used, especially by the large population of migrant fishermen from Tanzania who reside in Lamu district. In Faza, approximately 70 percent of fishermen use illegal beach seines.^{xxi} Cooperative leaders have urged Fisheries Department to compromise with fishermen because they are financially unable to replace their old, destructive nets.^{xxii}

The lack of financial resources of Beach Management Units, BMUs, and the Department of Fisheries as a whole, is also contributing to degradation. These entities are responsible for patrolling landing beaches, registering fishermen, collecting data, protecting the area from environmental destruction, making sure juvenile catch is minimized and other regulatory duties that protect environmental integrity. Currently, these entities lack the ability to monitor and enforce policy. They lack boats, personnel and technology to record data and regulate and patrol the coast. Communication between landing sites is poor and few BMU leaders possess their own boats, making it easy for fisherman to claim they have registered their fish or catch at a different landing site.

Local fishermen and BMU leaders from Lamu and Faza feel challenged in regulating beach landings because of the way their society is structured, especially in the context of the prevalence of intermarriages and close relational proximity within communities. For example, “someone has toiled with the sea for eight hours and has returned home with five lobsters, three of which are undersized. It is difficult for a BMU leader to tell the fisherman, who is probably his brother’s cousin, to return three lobsters to the sea because they are undersized, especially when he has five starving children at home.”^{xxiii} Often environmental issues are ignored due to socioeconomic circumstances of the community. This contributes to the challenge of BMUs’ legitimacy and ability of these structures to function as a regulatory unit.

Poverty is also leading to the mismanagement of fish habitats. For example, Lamu’s mangrove forests, which serve as breeding grounds for many fish species, are being mismanaged and largely destroyed. Lamu district possesses over 60 percent of Kenya’s mangrove resources.^{xxiv} But, tourism and general lack of conservation or preservation in Lamu district has led to mangrove degradation. This continues to decrease productivity of inshore fishing.

The influx of pollution, especially in Lamu district, also contributes to the loss of breeding grounds and fish habitats. Currently, due to the increase in tourism and the government’s failure to provide adequate sewage, drainage and waste removal systems, there is a large amount of human and animal waste being dumped into the sea. Many fishermen say that the power plant in town and a large number of foreign owned hotels account for much of the pollution, contributing to the decrease in catch.

Further, fishermen lack the ability to control landing sites and maintain ownership of landing beaches, due to the snatching of land by foreign hotel and restaurant owners. This was a growing concern among fishermen who also see these same hotels as potential markets for their catch.

In all these ways, inshore resources are being overexploited and degraded, while offshore fisheries remain underutilized, driving a vicious cycle of poverty and disempowerment for local fishermen.

Lack of Education and Organization:

Another factor disabling artisanal fishermen is lack of education and organization. Subsistence fishing has created a cycle of poverty that leaves very few resources available for higher education. Generally, families of fishermen make so little that they are unable to generate the capital to send their children to school. Their children become fishermen in order to survive, thus perpetuating poverty for future generations.

Lack of education also means that local fishermen do not know how to market their product or manage their share of the industry. Individually, fishermen have no formal access to credit or loan schemes. Bank interest rates are extremely high along the coast and fishermen lack a regular, consistent income. There are no development banks or microfinance schemes available to fishermen on the coast^{xxv}. Self-employed fishermen are forced to borrow from local lenders with extremely high interest rates.

Because of the prevalent attitude of competition and distrust of cooperatives, fishermen remain unorganized and unable to gain access to their own equipment. For example, few fishermen own their own boats or gears and are forced to borrow daily, paying commission from the little catch they bring in each trip. Individually, they borrow frequently from middlemen and dealers who possess the capital to own a few nets and a motor. But because they are working independently, it is nearly impossible to catch enough to pay the commission fee and generate anything else besides daily subsistence, leaving local fishermen unable to build enough capital to purchase their own gears.

The lack of unity among local fishermen further fuels a cycle of dependence, which makes fishermen vulnerable to exploitation from middlemen and dealers. The establishment of fisher groups and cooperatives could help alleviate this problem by

creating entities from which fishermen could access loans and support for the acquisition of new equipment.

But in Lamu district, the few established cooperatives societies and BMUs lack organization and management. These entities are young and extremely weak, with most of the fishing population uninvolved. Initially, fisheries cooperative societies were created by an Act of Parliament (CAP 490) to “exploit, manage, develop and conserve the fishery. The cooperatives were mandated to elect management communities, employ and train staff, seek loans and collect revenue, provide loans to their members and develop as per the wishes of the members, but within the confines of the Act.”^{xxvi} Lamu East Cooperative Society, Faza branch, which is about one year old, has about 150 members out of the approximate 500 fishermen in the area.^{xxvii} Also, Lamu West Cooperative, has about 150 members and is only two about two years old.^{xxviii} All cooperatives in Lamu charge Kshs. 2 per kilo of fish caught in return for benefits and support as local fishermen. Most fishermen surveyed or interviewed were extremely skeptical of cooperatives’ potential to assist them.

The prevalent skepticism and distrust between fishermen is an intensified within an atmosphere of competition and tribalism. Most fishermen cited competition as the main reason they wanted to remain independent, along with a desire to stay in control of their entire income rather than pledging to a cooperative society.

The collapse of the North Coast Cooperative Society, which disbanded due to mismanagement and corruption, has also affected fishermen’s views of cooperatives. After it collapsed, it separated into four units, each with new administration. Lamu West Cooperative Society includes Lamu Island and Lamu East Cooperative Societies have branches in Faza, Kizingitini and Kiunga. Cooperative leaders expressed the challenge of the counteracting fishermen’s weariness and skeptical attitudes toward the organizations. “Most [fishermen] are just waiting on the fence to see if we actually do something, instead of joining and helping us grow strong.”^{xxix} Distrust and the difficulty of beginning something new fuel a lack of commitment to cooperatives in community fishing along the coast.

Cooperative societies and BMU leaders are working to educate fishermen about the benefits of becoming united, not only to monitor the coastal resources, but to set prices,

market their products, minimize exploitation from middlemen or dealers and to safeguard each other in times of low production or hard seasons. Ironically, 56 percent of fisherman recognized that the non-existence of a strong fishing cooperative in Lamu is a problem for empowerment and for marketing.^{xxx} Many felt that if the cooperatives were stronger they would be more willing to join.

Perhaps the biggest obstacle to growing cooperatives is the lack of financial resources to provide loans for new equipment to members. A lack of capital in subsistence fishing communities inhibits the cooperative's ability to generate enough funds to truly be an effective entity able to support individual fishermen. For example, the Mijikenda Fishermen's Association, located in Malindi, collects Kshs. 10 for every 5 kilos of fish, which goes to support the cooperative and the BMU, which are aligned. The members work hard to support each other and patrol their landing sites for illegal trawling, the catch of juvenile fish and environmental degradation, but as a group, they are still too poor to adequately assist a member during hardship or provide funds when a net has been destroyed.

In addition, inadequate infrastructure and lack of technology make it difficult for cooperative leaders to collect commission due to the presence of mismanaged landing sties and undocumented catches.

BMUs, are supposed to represent entities that unify and help organize fishermen. Legally, each landing beach is supposed to be managed by a BMU whose responsibilities include documenting rules and regulations specific to each landing site, assisting fisheries in documentation of catch, working to prevent environmental, monitoring trawlers and remove illegal equipment. BMUs have the potential, working together with fisheries department and cooperative societies, to empower fishermen to control their own resources. But many sites, like Matondoni and Kipngani, have no current BMU because of lack of finances and interest.

Inability to effectively market products:

Because of the lack of unity, education and dependence on middlemen, fishermen are largely unable to successfully market the catch that they do harvest. Because local fishermen in Lamu district have few resources, it is almost impossible to transport catch

to larger, more profitable markets in Malindi and Mombasa. Transportation from the Lamu district to Mombasa and Malindi can take hours over failing roads, or by sailing boats without motors, without adequate ice supply.

As a result, local fishermen are often forced to sell their products at a throwaway price because they do not have reliable transportation facilities or cold storage facilities. Any catch not absorbed by the local community is sold at extremely low prices to dealers who then sell fish for almost twice the price at markets in Malindi and Mombasa. It is not uncommon for dealers to buy fin fish for Kshs. 60-70 per kilo at landing sites and sell for Kshs. 120-150 in Lamu town. It sells for even more to hotels.

For these same reasons—lack of capital, cold storage facilities and the failing coastal infrastructure—fishermen are unable to utilize upcountry, national or international markets. Almost all local fishermen consulted by this study acknowledge the potential of larger national and international markets, but expressed the obstacles inhibiting them from accessing them. Almost all fishermen acknowledge the success of companies such as Basta and Sons, Wananchi Marine, East African Sea Food and other companies who cater to large European markets and have access to cold storage, adequate gears and resources to maneuver the failing infrastructure along the coast. Wananchi Marine, who processes and exports frozen fish loins to markets in Italy and Spain, exported 10,596,457 kg of frozen tuna products at a value of Kshs. 475,092,470 last year alone.^{xxxii} The Mombasa-based company also transports excess tuna products to Malindi and profits from local markets, selling tuna for Kshs. 50 per kilo to local mama karangas. These are women who buy small quantities of fish, fry it and then sell to the local community. This illustrates the market potential of products like tuna, which exist in abundance, but remain inaccessible to local artisanal fishermen who possess no access to modern fishing gears or ice supplies.

In addition, many landing sites lack power, fresh water or even sea walls preventing erosion, especially in areas like Faza and Kizingitini. Most significantly, there is no functional cold storage facility at any landing site in Lamu district. The Kenyan government did establish a cold storage facility at Mokowe, which is the town directly opposite Lamu Island on the mainland. Mokowe remains the major road connection between Lamu, Malindi and Mombasa, which leads to all major upcountry urban centers.

Mokowe also remains the major road connection between Lamu and Kiunga, another key fishing port, which borders Somalia. However, since its inception, the facility has been plagued by mismanagement, corruption and a lack of fresh water.^{xxxii} In another example, Crustacea Processing International, a private company, opened a cold storage facility in Kiunga in 1993. But the company closed after one month due to mismanagement and corruption.

Currently, there is one small scale ice producer on Lamu Island. All other ice comes from companies in Mombasa and Malindi. By the time the ice reaches fishermen's boats at Mokowe, the quality is extremely poor. Consequently, local dealers have acknowledged that only one third of a catch makes it to the market while still fresh and much catch is spoiled even before the fishermen return from the sea, especially with tuna and big game fish.^{xxxiii} Thus, this is another reason fishermen sell fish at throwaway prices, without the capability of preserving their catch for larger potential.

Another factor affecting marketing is the seasonality of the monsoon winds and the irregularity and volatility of the tourist industry, a major outlet for local catch. Without adequate infrastructure, ways to utilize larger markets or gears to go deeper into the sea, local fishermen are forced to succumb to the cycle of seasonality and dependency which generates unpredictable income. This unpredictability further inhibits capital accumulation and a dependence on middlemen and tourist resorts that control prices.

International Prawn Trawling and its Affect on Local Fishermen:

Local fishermen are unable to compete with growing foreign and international competition, especially national and foreign trawlers. Last year, Kenya exported 637 tons of prawns mainly from commercial trawlers.^{xxxiv} For example, in 2002, commercial trawlers from the coast province brought in approximately Kshs. 131.5 million while local fishermen in Lamu district brought in Kshs. 22.2 million in total tons of product for the year.^{xxxv}

According to Mr. Abu Chiaba of the Kenyan Department of Livestock and Fisheries, there are more than 60 trawlers in Kenyan waters. "It is ridiculous that the Kenyan government is earning a mere Kshs. 75 million from license fees granted to foreign trawling companies that are in turn raking in billions of shillings in fish exports," Chiaba

told Nation reporters.^{xxxvi} Local communities are not benefiting and the national government does little to regulate international companies.

Currently, Kenyan Fisheries have licensed over 200 commercial trawlers.^{xxxvii} The numbers of international and national trawlers are supposed to be regulated through the Fisheries Department in Nairobi. The Nairobi office is supposed to limit the number of licenses issued to international companies. Further, a Kenyan Fisheries Official must be on board every operating trawler. Again, due to corruption and understaffing, more licenses are granted each year than the coast can sustain and there is rarely an official aboard every trawler. Local Fisheries Officials in Malindi and Lamu district can do little to combat this corruption since it stems from a national level.

Trawlers must adhere to other specific regulations designed to protect and conserve the coastal inshore environment. Legally, there is no trawling allowed within 5 nautical miles of shore. Trawlers must adhere to a closed season where no trawling is permitted in order to allow fish breeding to take place and must also only trawl during daytime hours. And all trawlers must employ bycatch reducer devices, which reduce the amount of fish and other wildlife caught along with the prawns. Local informants in all areas of the industry acknowledge that few of these regulations are being followed or enforced.

Because they go unregulated, trawlers are destroying local fishermen's nets and natural habitats for fish and other wildlife. According to the Ngomeni Sea Food Women's Group, trawlers have destroyed Kshs. 320,000 worth of local fishermen's nets over the past year.^{xxxviii} Almost everyone consulted in the Malindi and Ngomeni areas expressed that trawlers contribute directly to the impoverishment of the people.^{xxxix} And many believed that if trawlers were eliminated or effectively regulated, artisanal fisherman would benefit and productivity would increase.

Not only have unregulated international trawlers destroyed fishermen's nets, but they produce high levels of discard that have diminished cycles of fish productivity. It has been reported that for every one ton of prawns caught by trawlers, there is approximately 7 tons of bycatch produced.^{xl} And because so many of the trawlers go unregulated they contribute vastly to the degradation of inshore fishing grounds.

Lack of National and Foreign Investment:

Many factors have prevented international investment in Lamu district and on the coast of Kenya as a whole. First, most national and international investment in the fishing industry is primarily concentrated in Lake Victoria, which accounts for 90% of Kenya's fisheries production.^{xii} The coastal marine resource stretches 640 km by 200 nautical miles, while Lake Victoria is only 68,870 km in size.^{xiii} Lake Victoria has 14 cold storage units, while one effective, operating storage unit has yet to be implemented on the coast.^{xiiii} In addition, ongoing research, educational and social programs are conducted in the Lake Victoria region, which has attracted most of the investment.

Second, the lack of consistent data regarding coastal fishing makes it difficult to attract foreign investors. This is a direct result of lack of resources—few Fisheries staff members, lack of patrol boats and lack of documented formal and informal landing sites, contributes to informal buying and selling. Thus, an underrepresented picture of the marine resource potential is painted.^{xiv} Lack of investment from the national government and the absence of scholarly work from government sponsored universities fuel the inequity.

Ineffective and Inadequate Assistance:

Any investment or assistance based projects, either government or private, have been largely unsuccessful. Either they have not been implemented to their fullest potential or they are just in the beginning stages.

For example, Kenya Wildlife Service, KWS, and Safaricom are currently partnering an exchange project that provides local fishermen with modern gears. Safaricom initially pledged Kshs. 4.4 million for the project; however, tension between donors and the local community has currently inhibited a successful exchange. Discrepancy regarding prices and exactly which gears the community can use has created conflict between the two parties. Fortunately, the disagreement is being mediated and solved through meetings and dialogue, but progress is slow and only a few fishermen have successfully applied for loans and received gear that will improve their lives.

Further, government assistance is relatively unstable and ineffective. For example, according to cooperative leaders in Faza, the national Kenyan government through the Coast Development Fund promised Kshs. 300,000 in assistance last year, but local

fishermen claim deny having received the promised funds.^{xlv} Government Officials and private donors cite a lack of accountability from fishermen as a cause for the hesitance to fund. Fishermen need to be instructed how to apply for and use funds given by donors and governmental organizations and they need to be trained on how to show accountability.

Another example from the East proves that understanding between donor entities and local communities needs to be established before gear exchanges can be successful. Sometimes disconnect between the intentions of the donor and the actual needs of the community can make projects ineffective. For example, the European Union established a project that provided boats for local fishermen in Indonesia whose boats had been devastated by the Tsunami. However, the community was unable to use the boats provided because they did not fit into their existing fishing scheme and practices.^{xlvi} Equipment must be provided within the strategic, economic, social and cultural context of the local fishing community. The needs of Lamu fishermen must be properly addressed through adequate documentation and study of the industry and fishermen's lives.

There are a number of other projects beginning along the coast, providing hope to local communities. A promising project organized by the Red Cross and the Fisheries Department in Ngomeni near Malindi has been designed to help Kenyan fishermen also affected by the Tsunami. The Red Cross plans to provide gears to fishermen whose boats and nets were destroyed, introduce cold storage facilities and construct a fish market and boat yard for local fish dealers. The project is also educational and is attempting to unite and organize fishermen in the Ngomeni areas. Currently, the community is being consulted regarding input and involvement, urging local fishermen to support the project from within. Plans for the construction of the fish market in Ngomeni are in the process of being approved.

Similarly, in 2003, the Coast Development Agency began the Kenyan Coastal Management Program, which is designed to empower fishermen to be able to access offshore resources. It is a pilot program initially designed to benefit the Northcoast Bambrui Fishermen's Group and the Mwaepi Fishermen's Group by providing them with adequate boats, nets and quality control and sanitation training. The project is also working to establish BMUs in the area. It will hopefully become a self-sustaining

program that can serve as a model for other fishing communities.^{xlvii} However, the project is just beginning and progress is slow.

Another regional project currently under development is aimed at providing information about Kenya's offshore resources. In 2000, the World Bank launched research regarding the nature and scale of the harvestable offshore marine resources in the West Indian Ocean. The project, South West Indian Ocean Fisheries Project, SWIOFP, in conjunction the Global Environmental Facility, GEF, is designed to assist countries in utilizing offshore resources. The study will provide scientific data on Kenya's potential offshore resource, which will aid local fishermen. "The SWIOFR aims to build human and institutional capacity in the nine participating countries and to forge a regional approach to resource management. SWIOFP plans to collect scientific information necessary to make informed decisions about the development and management of living resources in the respective 200 nautical mile Exclusive Economic Zones of Madagascar, Kenya, Tanzania, Mozambique, Mauritius, Seychelles, Comoros and South Africa."^{xlviii} However, in order to benefit from the scientific data and information identifying offshore potential, local fishermen must be given resources to venture into the deep sea.

All of these projects seek to bring investment and relief to the local artisanal fishing communities along the coast, but few efforts have been effective and the industry awaits large scale revitalization and transformation. Conferences and forums have been held identifying the challenges and obstacles of the industry, but few actual, practical improvements or investment have been initiated.

General Recommendations:

Overall, the subsequent recommendations represent the views of individuals in the Mombasa, Malindi and Lamu community: fishermen, dealers, restaurant owners, Fisheries Officials, members of marine organizations and other locals that were willing to share their insight. The ideas and views expressed are not completely developed, but characterize the current sentiments among local members involved with the artisanal fishing industry in Lamu district. It is hoped that all of these recommendations will be considered in context of the new constructive mood prevailing in the Fisheries Department and the Ministry of Tourism and Wildlife perpetuated by the introduction and formulation of a national fishing policy.^{xlix}

International Investment:

It is recommended that a private investor be identified who can help fishermen not only transport and market their products internationally, but allow fishermen to seek the benefits of a more stable market with consistent prices and a more reliable income for local fishermen. Private business, in the form of international investment will solve some of the challenges of the local and national markets inhibited by inadequate infrastructure, poor preservation abilities and the inconsistency and seasonal nature of the tourist industry.

In 2004, the coast province exported a total of 11,481,965 kgs. of fish and fish product at value of Kshs. 775,170,658.¹ Many fishermen and dealers believed these numbers held huge potential. Most fishermen and dealers interviewed supported private investment and expressed the advantages of possessing a stable venue to sell their product. They identified a stable market as a key motivator for local fishermen and as a way for fishermen to regain control of their resources. Many expressed that fishermen would work harder and fish more if they had an expanded market for their product. For example, fishermen in Kizingitini and Faza expressed the potential of being able to catch more lobsters and crabs if they had the means and ability to reach bigger markets than the Mombasa, Malindi, Lamu circuit. A private investor would enable local fishermen to utilize an expanded market, establish a consistent price and allow the artisanal fishing industry to develop a more stable enterprise. Private investment would further educate local fishermen of the benefits of a competitive market.

It is further recommended that private investors be identified who are willing to invest profits back into the community. Fishermen also expressed the importance of private investor's relationship with the community. Any profits should be used to create loan schemes for local fishermen, used to introduce modern fishing equipment and to invest in the education and management of local fishing groups. Through this, a self-sustaining, business based venture would be established, with a built-in system of accountability for local fishermen, who would gradually own their own equipment and be able to store, transport and market their own products.

The importance of investing profits back into the industry can be illustrated by the development of the fisheries in the Lake Victoria region and its evolution as an export orientated industry. In the early 80's, with the dramatic increase of Nile perch, the local fishing industry was transferred into the hands of private companies and factories who now dominate the industry. As a result, local people cannot afford to consume fish on the community level. "The export-oriented fisheries is a threat both with regard to employment and food security for millions of poor people in East Africa," claims a Lake Victoria participant.ⁱⁱ High utilization of international markets by huge corporations who are seeking only to benefit themselves at the expense of local community should not be applied on the coast. Companies and donors must be identified who are willing to invest

a certain percentage of profits into poverty alleviation, gear provision and educational resources for local fisher communities.

With investment, local coastal marine fisheries could eventually become a substantial contributor to the greater Kenyan economy. Initial investment from abroad, an established international market and profits invested in the community could not only expose the vast potential of Kenya's offshore marine coast, but open up an array of opportunities for coastal communities.

Modern Fishing Equipment/ Loan Schemes:

It is recommended that investors be identified that will provide the initial capital and structure for the establishment of loan schemes through the existing management units such as BMUs and the Lamu East and West cooperative societies. A huge influx of modern fishing gears are required in order to empower local fishermen to utilize offshore resources. To relieve the pressure of an expanded industry, halt the destructiveness of the overexploitation of inshore areas and to allow fishermen to fully utilize the high, rich productivity of offshore resources modern gears, such as motorized boats, nets, traps and diving equipment needs to be introduced in vast quantities. Fishermen, once given the opportunity to own the equipment, must be economically and personally responsible for maintenance and upkeep. Many expressed the importance of financial ownership rather than simply being given the equipment.

Loan schemes could strengthen BMUs and cooperatives, giving fishermen control over their resources and reducing their dependence on dealers and middlemen.

A suggested structure might enlist groups of three to five participants in each loan scheme, so that fishermen learn about the benefits of operating through united fisher bodies rather than individually. This would also allow an increased number of fishermen to benefit from improved boats, motors and nets and would allow fishermen to travel in adequate number to protect themselves against harsh weather offshore.

Further, it is best that loans be paid back on a daily or weekly basis. Almost everyone consulted expressed the daily, subsistence nature of the fishing economy. The seasonality of the sea must also be taken into consideration. A system of accountability must be established, but it must remain flexible due to the inconsistent nature of the

current fishing industry. Nearly all fishermen interviewed expressed a willingness to work together under loan schemes such as the one suggested if provided.

Loan schemes must also be designed to instruct local fishermen how to invest the small capital they will begin to generate each day. Fishermen must be educated how to invest back into their own industry instead of squandering small amounts of profits. A “saving mentality” must be introduced and implemented. Loan schemes will teach fishermen cycles of saving and investing in order to revitalize the industry from within small groups.

It is recommended that a widespread government initiated gear replacement program be established in order to eliminate destructive illegal fishing equipment. Currently, fishermen have little resources to buy new, modern nets as their current gears have been deemed illegal. This will not only minimize environmental degradation, but empower fishermen with modern technology.

Introducing modern, sustainable fishing gears will ultimately enable fishermen to utilize offshore resources, relieving some of the current pressure on inshore areas. This will eventually increase productivity, minimize environmental degradation and allow local fishermen to capitalize on the resources they know and understand but currently cannot utilize.

Improve preservation:

It is recommended that massive cold storage facilities be introduced, adequately managed and operated, allowing fishermen to more effectively transport their catch to market. Further, local, small-scale ice production should be explored, with local community members producing small-scale ice products and supplying it to local fishermen.ⁱⁱⁱ With adequate storage facilities, fishermen could easily double their marketable products, providing more motivation for fishing.

It is important that the cold storage units be privately managed and introduced in a central area, making them easily accessible for a majority of landing sites. If the cold storage units and ice were provided for and by the community, mismanagement and corruption will be minimized. An ice production plant needs to be introduced in the Lamu district, where fresh water is plentiful.

In addition, it has been suggested that three ice schooners operate through the Lamu East and West cooperatives, to give fishermen easier access to ice products. The boats, run by community and cooperative members, could run ice from Mokowe to fishing villages along the coast. One would serve the Kizingitini through Kiwayuu area, another Kiunga and another should be employed to service Lamu Island.^{liii} This will equip local fishermen with ice to adequately transfer catch to Mokowe and then to Malindi and Mombasa markets.

In conjunction with cold storage, exploring alternative preservation and processing techniques would be beneficial to the industry. Although fresh fish are currently more marketable, drying and canning strategies could also be employed to preserve excess catch as simple protein for local consumption and eventually international marketing. These measures could be developed into an international industry producing dried and canned products for wider national and abroad markets. Canning is cost effective, simple and it could accommodate the seasonality of the industry.^{liv} It could also be expanded to process other locally grown products like mangoes and honey, which could be marketed for national and international consumption, benefiting the local community.

Donors should invest and implement KENFRI's proposals to introduce new and improved fish drying and smoking technology—solar tunnel driers and chorkor smoking ovens—that will not only improve the quality of fish products, but will increase the efficiency of production. Then, pilot programs be introduced in Kiunga, Kiwayuu and Kizngitini.

KENFRI's recommendations highlight the cost effectiveness, the ease of introducing this technology to the coast—socially and culturally—the large production capacity, the improvements in quality and the health and environmental benefits of this technology. Specifically, drying machines should be established at landing sites, powered by solar energy. For example, dry fish products, like shark fin, are increasing in popularity. For example, in the month of December, Amu Division produced approximately 3000 kilos of dry fish. These dryers and smoking ovens are also a way to produce high quality fish products while bypassing the failing infrastructure and lack of cold storage on the coast.

Also, it is recommended that the use of dry ice products be explored, allowing fishermen to not only successfully preserve fish caught and brought back from offshore waters, but to transport their catch to international markets.

Another way to improve transportation to and from buyers and sellers is to restructure the organization of landing sites and create a more centralized location for exchange, especially in the context of poor communication and transportation facilities. Many of the *mama karangas*—local women who buy small quantities of fresh fish each day to fry and sell to local communities—expressed the need of more centralized market, including easier access to fish coming and going.

Empowerment of Beach Management Units, Cooperative Societies, Fisher groups and local Fisheries Departments:

Along with investing in individual fisher groups, it is recommended that organizational bodies be strengthened. It is recommended that investors be identified to conduct large-scale education initiatives to teach fishermen how to monitor and manage their own landing sites.

NGO's like CORDIO, Coral Reef Degradation in the Indian Ocean, which work with BMUs and fishermen to educate them on how to unite and manage their own beaches, need to be supported. Strengthening the monitoring of landing sites will ultimately give fishermen more control over their resources and give them more power when middle men or dealers set prices.

Strengthened BMUs will help monitor and eventually stop the use of illegal fishing gears. Educating BMU leaders will also perpetuate environmental conservation and preservation so productivity can be optimized. Strong BMUs can help facilitate education initiatives that communicate how the use of illegal fishing gears ultimately decreases productivity and destroy fishing grounds.

Along with the introduction of adequate gears and storage facilities, these units could ultimately help halt the exploitation of offshore resources. “Although the development of an offshore fishery presents an opportunity to reduce fishing pressure inshore, it would not be prudent to develop it without any arrangements or institutions in place that can regulate its use. Integrating fishery development measures with other aspects of fishery

management is essential.”^{lv} Without strong BMUs, mismanagement of coastal resource will occur.

The need for investment in these organizations was expressed by fishermen, dealers, Fisheries Officials and other local leaders. As a study on the Kenya’s south coast asserts, “These units need to be strengthened, made more representative in their leadership, given greater control over their fishing grounds, and be empowered to be able to make decisions on the basis of information and local knowledge. Encouraging the development of arrangements among fishers, however simple, could be an initial step toward affording greater management responsibility to such local institutions.”^{lvi} By supporting local fishing groups, through education and financial resources, local fishermen will ultimately benefit.

Similarly, a system where BMUs, cooperative societies, fisher groups and Fisheries Department can work together and unite to control resources must be created. Currently, tension and mistrust between the four groups inhibit them from working together. However, if executive committees were formed, with representatives from each group, regulations and policy could be more effectively generated.^{lvii} Fisheries departments must be more of a driving force in uniting these groups through education and facilitation. Ultimately, these groups could represent a more unified, powerful body able to negotiate with dealers, write proposals for funding and produce an organizational scheme for loans.

Incorporation and Introduction of Women into the Industry:

It is recommended that women be given a stronger, more formalized role within the industry. Donors should be identified to invest in women’s groups such as local mama karangas in Malindi and Lamu, Ngomeni’s Sea Food Women’s Group and a group in Gazi, which is currently developing Oyster culture farming.^{lviii} The project is being developed through the Sirazi Women’s group in Gazi with support from the Belgian government through CDA and KENFRI. These established entities should be strengthened and given more power to contribute to the revitalization of the industry. Groups such as these, especially mama karangas, whose production of fried fish plays a huge role in local fish consumption, possess enormous potential and already have many

preservation techniques perfected. If improved technology could be introduced, women could begin marketing and selling their fried fish products on national and international levels. Funds are also needed to centralize the buying and selling of fish from fishermen to dealers, so these women have easier access to business.^{lix}

Investment in Cooperative Societies:

It is recommended that outside donors provide investment and loan schemes to local cooperative societies, so they can become self-sustaining, allowing them to create whole sale fish markets and providing the optimum benefits to their members. Leaders of the both the Lamu East and West Cooperative Societies expressed the need for additional funding from outside in order to generate the initial capital to invest in themselves. They strive to provide loans and gears to fishermen, buy their own fish and create a wholesale market and ultimately establish their own industry in Lamu. If they can generate the initial capital, they will ultimately be able to provide assistance to their members, convince more and more fishermen of the benefits of being united and produce more and more profits to invest back in their organization.^{lx}

Ultimately, both cooperatives in Lamu district seek to become self-sustaining in order to remove the pressure stemming from dependence on middlemen and dealers and give local fishermen more resources. This will stimulate the industry from within and provide more and more fishermen with the resources to increase productivity.

Government support and investment for the revitalization of the industry:

Perhaps, most significantly, it is recommended that government funds be used to improve coastal infrastructure—that adequate power and water facilities be introduced at each landing site, as well as improvement in roads in order to assist fishermen with transporting their catch to market.

It is also recommended that the national government support local Fisheries Departments, equipping them with more resources for patrolling, monitoring and documenting statistics. Fisheries Departments need increased funding for adequate boats, fuel, radios for improved communication and more personnel to adequately

monitor and manage the industry—the management of local fishermen groups, environmental resources and the monitoring of illegal trawling.

Further, by strengthening and implementing the new national fishing policy, District Fisheries Departments will gain more power in monitoring local fishing grounds and empowering fishermen. A policy, currently being submitted to parliament, represents the first national policy regarding fishing as an industry. Almost all interviewees saw it as a positive way forward and the next step toward bringing investment to the coast. The policy addresses fishermen’s rights, provides national, regional and local guidelines for future goals within the industry and provides the ability to amend Fisheries Act 378, which is relatively weak and the only current national document managing the industry. Further, it establishes a Kenya Fisheries Board, whose members or representatives will largely be elected by fishermen.

The new national policy was conceived through participatory research, community representation and is thought by many to represent the needs of many local fishermen. Further, it gives District Fisheries Departments bargaining power to fulfill the goals that will benefit their respective constituencies, and provides them with more management and patrolling capabilities. The policy also places Kenya’s fishing industry in the context of global fisheries development, hopefully stimulating investment in the largely underutilized potential of the coastal fishing industry.^{lxi}

It is recommended that the government of Kenya implement wide scale financial assistance for local fishermen entities similar to the way the national government of Senegal helped revive the industry through fish subsidies and applied marine resource management. The Senegalese government not only offered modernization assistance through the creation of adequate and improved infrastructure, but assisted fishermen in small scale processing, provided financial assistance for the acquisition of engines and modern fishing technology, assisted in foreign marketing for industry and created a policy of tax reductions for fishing equipment and fuel.^{lxii} They promoted the buying and selling of tax-free engines, created fishing wharves with improved conditions for freezing and packaging of fish, built a central fish market and established three refrigeration plants, three warehouses and three cold rooms.

They also supported domestic and international marketing of products through duty free export and formed a trade alliance with Japan, which provided a lot of outside investment in the Senegalese fishing industry. In all these ways, the government of Senegal not only revitalized their coastal fishing industry, benefiting local fishermen and their families, but created an international industry that contributed significantly to the national Senegalese economy and international trade relations.^{lxiii} Likewise, the coastal fishing industry in Kenya would flourish with widespread government support and investment.

Establishment of a marine educational institute:

It is recommended that education be started through workshops and seminars, along with the establishment of a coastal research institute. Most importantly, fishermen all along the Kenya Coast need to be educated on the geography of the sea, marketing and fish preservation strategies, management and organizational skills and environmental and international policies regarding the utilization of marine resources.

A marine science university or educational institute should be established on the coast. It would educate artisanal fishermen, give them more opportunities and resources, create greater management skills within the industry, bring further investment from other regions in Kenya and to scientifically apply current marine theory to current coastal potential. It would also help create a more educated and well-managed industry. The institute will also serve as a way to develop modern strategies and technologies within in the fishing industry. It will provide educational opportunities for fishermen who should be admitted at a reduced rate.

Most importantly, an educational institute has the potential to change the attitude within artisanal fishing community from that of subsistence and survival to a mentality of savings, investment and competitive business strategies. **It is recommended an institution, a Fisheries Training School, be established at locations such as Kiunga, Mkokoni and Kizingitini, places where fresh water is available.**^{lxiv} This will facilitate instruction in aquaculture development and new preservation techniques, such as smoking and drying fish.

Development of Sport and Ornamental Fishing Industry:

It is recommended that the national government and outside donors invest in sport fishing in conjunction with the tourist industry, as a way to generate capital, boost coastal economy, create jobs, utilize the vast amount of game fish and further conserve the natural environment.^{lxv} Developing the sport and ornamental sectors of the fishing industry is another way to capitalize on the industry's potential and assist local, artisanal fishermen. Sport fishing supports sustainable use because the fish caught are tagged and returned to the sea. Those fish injured or damaged during the process are sold to local fish dealers within the community. Sport fishing is also growing in popularity and currently contributes \$10 million US dollars per year through restaurants, casinos and night clubs.^{lxvi} Not only will sport fishing enhance the economy through the employment of local fishermen, but it assists in data collection for conservation and educational purposes.

In conjunction, it is recommended that the government and outside donors invest in ornamental fishing, which has the potential to bring capital from European and American markets. Fish for aquarium use are caught from the vast offshore areas from Malindi up to Kiunga, and sold to buyers abroad. Privately owned businesses, which have the equipment and motor boats to utilize this resource, express the potential of this sector.^{lxvii} Last year alone, 102,000 pieces of ornamental fish at a value of Kshs. 16,32,000 were exported to European markets.^{lxviii} More investment in these sectors will bring opportunities for local fisherman to exploit offshore marine resource for a wider market and has the potential to bring poverty alleviation to the area.

Development of mariculture and aquaculture:

It is recommended that the national government and private investors identify and develop mariculture and aquaculture projects in order to utilize the great potential of marine fish farming. In its most beneficial state, aquaculture represents a constant source of production despite the largely seasonal nature of the industry. It will produce food security for coastal communities where animal protein can be scarce and a way to alleviate over-fishing of inshore areas in communities that lack the ability to utilize offshore resources.

Currently, aquaculture only contributes .5 percent of Kenya national fish production and the majority of development in this sector remains in the Lake Victoria region.^{lxxix} In 2002, aquaculture production in Kenya totaled 512 metric tons compared to 55,520 metric tons in the remaining countries in Sub-Saharan Africa and 45,715,554 metric tons on a global level.^{lxxx}

Most significantly, there is a prevailing global interest in developing aquaculture, which represents a trend in development in fishing industries around the world. According to the FAO, aquaculture is growing more rapidly than all other animal food producing sectors in the world from 3.9% of total production of world production of fish in 1970 to 27.3% in 2000.^{lxxxi} Further, there is significant interest in developing aquaculture in African countries especially in context to the continent's food security and aquaculture's contribution to potential for economic development. The New Partnership for Africa's Development, NEPAD, recently held a "Fish for All" summit meeting in Nigeria in August 2005, which highlighted Africa's potential in aquaculture development and sustainable fisheries development. Leaders recommended greater regional cooperation in fisheries and aquaculture in Africa, empowerment of fishing and fish farming communities, development for more aquaculture initiatives through private investment, conservation and preservation of marine resources and the promotion of trade of artisanal and industrial fish products.^{lxxxii} It is recommended that action plans such as NEPAD be supported, as investment in regional, multination fish farming and management initiatives would largely benefit Kenya and other countries along the East African coast.

However, a lack of access to fresh water and availability of land will make these projects difficult to immediately implement on the Kenyan coast. Mariculture or cage farming is structurally more practical at the current time and could be easily applied.^{lxxxiii} Equipment such as floating cages that are used to cultivate undersized fish until they are the right size for market could be employed rather easily, similarly to project introduced in the Lake Victoria region. Fish farming with Nile tilapia was recently introduced in Nyeri district. It is predicted to increase production to 6,000 kilos, worth Kshs. 1.6 million annually after the introduction of high density fish culture.^{lxxxiv} Rearing fish in enclosed floating cages placed in open bodies of water is also widely practiced in South

East Asia and places like Cote d'Ivoire. Low scale cage culture development especially for production of lobster, crab, prawns and shrimp would not only generate income, capital and jobs to invest in the local fishing industry, but is a way to utilize juvenile fish otherwise discarded and largely wasted each day by local fishermen.

Also, the coast would benefit tremendously from the development of fish feeds. A rice fish farming project in countries like Bangladesh, Vietnam and Madagascar have produced results indicating that community based fish culture in rice fields can increase fish production by about 600 kg/ha/year in shallow flooded areas with up to 1.5 tons in deep flooded areas. This could be applied to mariculture strategy on the coast where rice is plentiful.^{lxxv}

Eventually, aquaculture should be pursued in Lamu district. If donors could be identified for long term investment, the coast province possesses numerous small inlets and freshwater havens for aquaculture. For example, the Sabaki River represents a fresh water resource largely unexploited. The river undergoes a flooding cycle every year that produces large amounts of overflow that could be channeled into a reservoir system for aquaculture.

Further, the Kenyan government should seek to revive the Ngomeni prawn aquaculture project. The project, introduced in 1979, represented the only significant aquaculture project introduced on the coast. Since then, the project remains in disarray and in the hands of a private individual. It is said to have collapsed because of corruption and poor management. But, in its glory days, the project was quite effective and successful, bringing in over Ksh. 70,000 per year, which represents the potential of these types of projects for the coast.^{lxxvi} In addition, Lafarge, the only commercial fish farm in the region, produced 9286 kgs of *Oreochromis niloticus* valued at Kshs. 815,258.^{lxxvii} Projects such as these should be supported and expanded.

Currently, marine shrimp and prawn aquaculture is at the forefront of the global fishing industry, with 26% of the world's production of shrimp coming from aquaculture, which were approximately 1.1million tones in 2000.^{lxxviii} Demand for shrimp and prawns are expected to increase globally in the mid to long term, with most of the international markets residing in Japan, the United States and the European Community. This represents a lucrative opportunity and market for Kenyan marine development, which

would allow local fish farmers to capitalize on global aquaculture trends. Kenya possesses the resources, especially for shrimp and prawn cultivation, to compete on an international level; however, investment in these sectors must be pursued if development is to occur. It is recommended that the government work to repossess the Ngomeni project along with initiate other projects to capitalize on the potential success of aquaculture, especially as it is on the forefront of the global fish industry.

The coast, especially in Malindi and Lamu districts, possesses an extremely fertile natural environment for prawn farming, especially in the Tana River and Dodori creek areas, where freshwater mixes with ocean sediment. It is recommended that projects be developed in these areas, along with the support of similar projects in Mpeketoni and Witu, which are government sponsored and in their initial phases.

Most people interviewed approved of mariculture and aquaculture because both represent an extremely effective way of creating a sustainable and consistent fish production.

Control trawling:

It is recommended that BMUs, cooperative societies, fisher groups and Fisheries Departments work together to control illegal and excessive trawling. International trawling, especially in the Malindi and Ngomeni areas, has devastated much of the artisanal fishing industry due to lack of patrolling by Fisheries Department. **It is recommended that governing bodies work together with lobbying groups such as Malindi Area Marine Association.**

MaMa, which was established in 2004, has begun to unite and motivate fishermen to fight against illegal trawling. The group has facilitated meetings between KWS, the Malindi Marine Park and the Malindi Fisheries Department to put pressure on these groups to enforce laws on illegal trawling. They also work to educate fishermen on managing themselves and protecting their rights. They have focused on environmental conservation and preservation, organizing initiatives to clean up and rid beaches of debris. MaMa has also sought to bridge conflict between local fishermen and the Malindi Marine Park. Overall, they represent an overwhelming community voice with members from fisher groups, sport fishing clubs, diving clubs, hotels and BMU units.^{lxxix}

In addition, it is advised that the recommendations brought forth by KENFRI in *The Current Status of Trawl Fishery of Malindi-Ungwana Bay* be implemented and enforced. The report urges that trawling take place at least 3 nautical miles from shore, that trawlers adhere to a closed season to protect breeding patterns of fish, that the number of trawlers be limited and controlled, that trawling only be allowed during daylight hours to reduce destructivity of local fishermen's nets, to enforce the use of bycatch reducer devices and finally, to enforce a 10 percent export levy for all trawlers so that the funds generated can be invested back into the industry.

Summary of Recommendations for Implementation and Sustainability:

In the context of the preceding general recommendations, identifying investors and donors for these projects is key. Investment will help establish an international market, expand the industry and allow local fishermen to sell their fish despite failing infrastructure, lack of cold storage and the difficulties transporting fish to national markets.

Simultaneously, modern gears—nets and motors—must be introduced either through loan or credit schemes. In order to respond to an increased market potential, fishermen must be given the opportunity to utilize offshore resources, capitalizing on their knowledge and skill. This will also decrease the use of destructive and illegal gears, which will ultimately increase fish productivity. Fishermen must own their own equipment to facilitate the successful accumulation of capital, accountability for the gears and a motivation to continue to invest in the industry. The most effective way to establish loans schemes are through the developing cooperative societies highlighted above. This will not only provide loans to local fishermen, but will serve to strengthen organizational, marketing and regulatory bodies within the industry.

Likewise, while expanding the industry's potential, large-scale strengthening of organizational and educational units is strongly advised. Donors must be identified to invest in the unification of cooperatives and BMUs, which currently possess the legal

capacity to effectively govern landing beaches. These entities must eventually become self-sustaining and must seek to educate fishermen, not only on marketing and business strategies, but on conservation and preservation strategies, which now are largely being neglected due to the cyclical nature of poverty along the coast. From these units, eventually a coastal fishery educational institute should be established, giving fishermen further opportunities to learn how to effectively manage their own resources.

Further, for the future sustainability of the industry and its ability to compete on a global market, aquaculture and alternative preservation strategies must simultaneously be explored. In many ways, investment in these activities will revitalize the industry allowing local fishing units to bypass some of the impediments currently inhibiting the industry. Women should be given key roles in the development of alternative preservation strategies, as they already possess the skills in these methods.

In all ways, a unified approach is recommended, supporting the industry from the community level, through the Kenyan national government and through international investors. All initiatives must be community driven, propelled by community empowerment and ownership in resources and the industry. By recognizing and cultivating the extreme potential of artisanal fishermen and the structures that currently govern their lives, a sustainable industry can be established; one that facilitates poverty alleviation and empowers local coastal communities.

Appendix A: Sources and Informants:

A. Studies and Development Plans:

1. Aldina, Hussein M. *Local Level Fisheries Management in Diani-Chale Kenya: Current Status and Future Directions*. Coastal Management, 33:459-470. Taylor and Francis, Inc. Publishers. 2005.
2. Famau, Omar. *Constraints on the Fishing Industry in Lamu District: A Case Study*. University of Nairobi. May 2003.
3. Hyder, M. *Lamu Fishery Industry*. Alliance of Religions and Conservation. 1997.
4. Jansen, Eric G. *Effects of the Export-Orientated Trade in the Lake Victoria Fisheries*. IUCN Eastern Africa Programme. Socio-economics of the Lake Victoria Fisheries. Report. 1.
5. Lali Omar, Athman. *The Lamu Artisanal Fishery Industry and its Potential Development*. Tawasal Institute. March 2005.
6. Malleret-King, Dr. D, Dr. A King, S. Mangubhahi, J. Muturi, E. Mueni, H. On'ganda, J. Tunje, eds. *Fishery Management Science Programme, FMSP Project R8196: Understanding Fisheries Associated Livelihoods and the Constraints to their Development in Kenya and Tanzania*. Review of Marine Fisheries Resources for Kenya. MRAG. Intergrated Management of Aquatic Resources. 2003.
7. Odour-Odote, Peter Michael. *Emerging Issues on Improved Fish Processing by Smoking and Solar Drying for Food Security and Environment Conservation*. KENFRI. 2006. podote@kmfri.co.ke.
8. Odour-Odote, Peter Michael. *Improved Methods for Traditionally Processed Fish and Fish Products in the Kenyan Coastal Area*. KENFRI. 2006. podote@kmfri.co.ke.
9. *Coast Development Authority: Statistical Abstract 2003*. National and Regional Selected Socio-economic Indictors: July 2003.
10. *Coast Development Authority Symposium Report on Investment Opportunities in Coastal and Marine Fisheries in Kenya, 2004*. Coast Development Authority.

11. Fisheries Act 378: Responsible for licensing, restricting destructive gear, and protection of breeding areas. Mombasa Fisheries Department.
12. Fisheries Department Annual Report, Coast Province. 2004.
13. Kenya Marine and Fisheries Research Institute. KENFRI. *The Current Status of Trawl Fishery of Malindi-Ungwana Bay Executive Summary*. December 2002. kmfri@kmfri.co.ke
14. Lamu District Development Plan 2002-2008. National Government of Kenya. Ministry of Finance and Planning.
15. Malindi District Development Plan 2002-2008. National Government of Kenya. Ministry of Finance and Planning.
16. Report Malindi Fisheries Department.
17. Samaki News: A Magazine of the Department of Fisheries of Kenya, Vol III, No. 1. January 2003.
18. Summary and Report, Fisheries Department, Mombasa.

B. Institutes and government bodies:

19. Coast Development Agency, (CDA). Agnes Mkazala. February 27, 2006.
20. Coral Reef Degradation in the Indian Ocean (CORDIO): A non-profit organization that works mainly on Kenyan's south coast facilitating Beach Management (BMU) education and assisting in the formation of local fisher groups. Hussein M. Aldina.
21. Fisheries Department in Malindi: Mr. Phillip Agwanda and Harrison Beja Yeri.
22. Fisheries Department in Mombasa: Ms. Barabara Mwaka and Mr. Ndege.
23. Fisheries Department in Lamu: Mr. Komu (District Fisheries Officer), Onyangu (Deputy District Fisheries Officer), Foud S. Mwenye (Fisheries Officer Kiunga), Wilson Mwangi (Fisheries Officer Faza na Kizingitini), Abu M. Shee (Fisheries Officer Lamu) and Omari (Fisheries Officer Matadoni and Kipngani).
24. Kenya Marine and Fisheries Institute (KENFRI): Peter Odour-Odote, Dr. Aruwa and Dr. Kimani.
25. National Environmental Management Authority (NEMA): Bwana Kahindi.
26. Red Cross Malindi: Ruth M. Muriungi: Tsunami relief project, Ngomeni area.
27. The World Conservation Union, IUCN. Dr. Melita Samoily, Regional Co-ordinator, Marine and Coastal Ecosystems. March 3, 2006.
28. United Nations Environment Programme, Ulrika Gunnartz, Associate Programme Officer, Regional Seas. March 2, 2006.

C. Businesses and Fish Dealers:

29. Baharini Adventure, Andrew Wright. Malindi.
30. Banners Limited., Mrs. Ishmael Lobsters and Crabs Processing. Malindi.
31. Barafu Malindi Limited.
32. Basta and Sons: Hesrm Amolo Ochola, representative. It is an international Prawn Trawling Company based in Mombasa, which mainly caters to a European market. They also assisted KENFRI on their study regarding the sustainability and economics of prawn trawling in the Malindi area.

33. Bayusefs Fish Shop, Yusef Swaleh Ahmed, owner and most productive fish dealer in Lamu.
34. Kikambala Fish Farm, Mr. Ziggy, owner. Ornamental Fish Farming. Mombasa.
35. Malindi Sport Fishing Club, Angus Paul.
36. Olympic Hotel, Areef Amershi, hotel owner, fisherman and dealer. Lamu. Areef has worked with aquaculture in the U.S. and Canada.
37. Shella Sea Food Suppliers, Malindi. They sell lobsters and octopus from Lamu.
38. Yusef's Fish Shop, Malindi.
39. Wanaichi Marine Products Ltd.: International Tuna processing company in Mombasa that also utilizes local markets in Malindi

D. Beach Management Unit, Cooperative Members, Fisher Groups and Local Fishermen

40. Mama Karangas, Malindi.
41. Ngomeni Sea Food Women's Group, Wawaruikya Saidi, representative.
42. Mijikenda Fisherman Association.
43. Ngomeni Fisherman Group, Omar M. Ismal, Muhammed Said.
44. Ngomeni BMU, Ahamed Shiek Ahamed: "If the government stopped trawlers and gave us a cold storage unit, the freezer would be filled in one day."
45. Mayungu Landing Site: Artisanal Migratory Fisherman from Pemba
 - a. Mwinyi Rashid
 - b. Ali Salim Mwalimu
 - c. Ali Hamadi Nahoza
 - d. Rambo Hamisi
 - e. Bakari Ali Bakari
 - f. Mwinyi Yaleyia
 - g. Mahafudhi Mohammed Torud
46. Faza Fisherman: Riman Abdalla.
47. Mohammed Famau, Dealer and fish shop owner.
48. Salama Marine Product Mombasa, Ice of Lamu: Omari Sheika.
49. Bakari Shahibu, Dry fish dealer.
50. Amal Fish Shop, Sae Saidi, owner and member of Lamu West Cooperative Society.
51. Fyhyd Mahsein Alwi, Lamu fisherman and member of Lamu West Cooperative Society.
52. Shekue Hemed Said, fisherman, lobster dealer and vice chairman of Lamu West Cooperative Society.
53. Fisherman Kipngani: Prawns and Fin Fish
 - a. Ali Abdalla
 - b. Yahaya Athman
 - c. Ali M. Famau
 - d. Khamis Abdu
 - e. Hassan Kale
 - f. Najim Abdu
 - g. Athman Badi
 - h. Ali M. Kheri

- i. Mahmoud Bakar
 - j. Abdrehman Mahmoud
 - k. Ali Kale
 - l. Mohamed Ali
 - m. Abdrehman Kale
 - n. Mohamed Ali Fundi
 - o. Farid Omar
 - p. Athman Mohamed
 - q. Bakar Athman
 - r. Mohamed Hassan
 - s. Abubakar Omar
 - t. Jamal Mahmoud
 - u. Feiswal M. Hashim
 - v. Arifun Mohamed
54. Fisherman Matondoni: Prawns and fish
- a. Mohammed Musa
 - b. Mohammed Bwanahami Simba Shee, fisherman and dealer
 - c. Ali Mohammed
 - d. Abdalla Kai, dealer of dried and fresh prawns
 - e. Ali Bakar Shee, dealer of dried prawns
55. Mwinyi Mohamed, Boat owner and transporter. He sells fish from Somalia to Mombasa and stops in Lamu to equip his boat with ice.
56. Ali Suo, chairman of Lamu West Cooperative Society.
57. Shee Lali, treasurer of Lamu West Cooperative Society.
58. Obo Athman, BMU chairman.
59. Miji M. Miji, BMU member.
60. Jafar Bwanasizi, fish dealer Lamu.
61. Fisherman Lamu:
- a. Mohamed Shiguu
 - b. Kibwana Hassan
 - c. Shaffii Sizi
 - d. Suleiman Lali
 - e. Shebunu Suleiman
62. Ali Salim, chairman BMU Kizingitini
63. Salim Mohamed, Kizingitini Lamu East Cooperative Society Secretary
64. Fisherman: 10-20 Kizingitini.
65. Mohamed Ali Mohamed, fisherman, dealer and chairman of Lamu East Cooperative Society, Faza division.
66. Fisherman: 5 Faza
67. Mike, Fred, Tinga: KWS officers, Mkokoni.
68. Fisherman Kiwayuu
- a. Mohamed Mwalimu
 - b. Mohamed Amin, chairman of BMU/leader

E. Other:

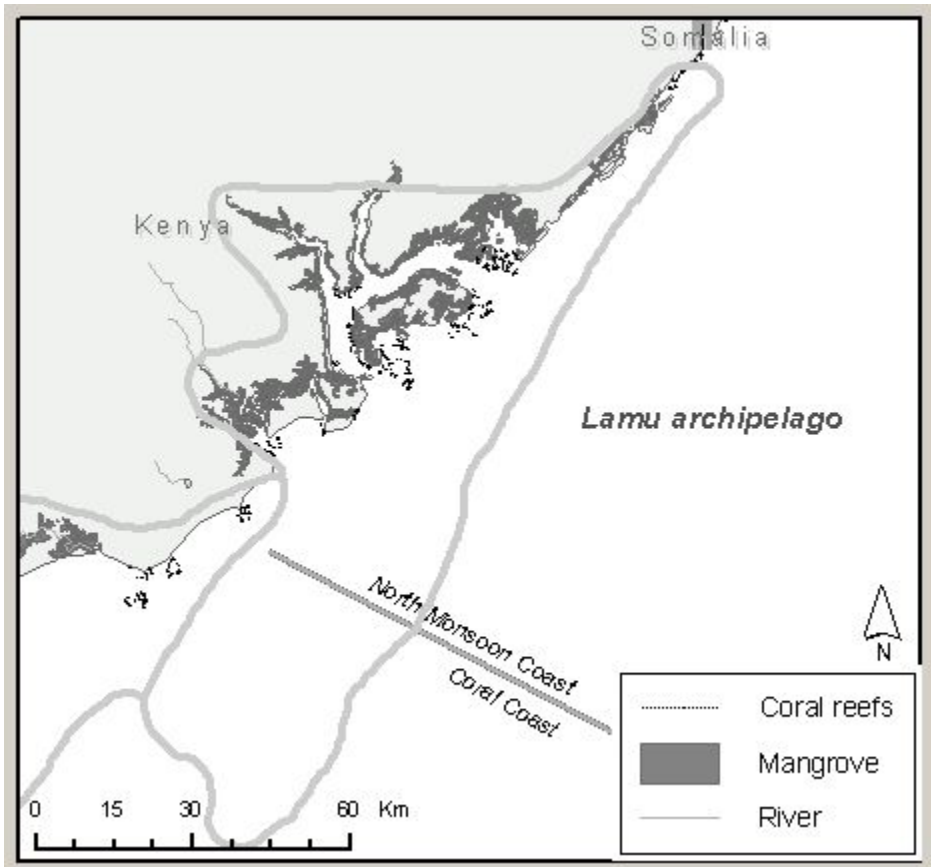
69. Buluku, Allen. *Drive to join top heritage list*. Daily Nation. January 13, 2006.
70. Bwena, Edmund. *State urged to ban trawling: Coast MP wants licenses of foreign vessels to be revoked*. Daily Nation. January 19, 2006.
71. Dahau, Karim, Enda Tiers Mande and M. Deme. *Support Policies to Senegalese Fisheries*. Fisheries Subsidies and Marine Resource Management: Lessons learned from studies in Argentina and Senegal. UNEP.
72. Gitonga, Muchiri. *New technology to harness fish*. Daily Nation. December 25, 2005.
73. Gwanga, Anthony. *Fishing faces serious dangers that require urgent solutions*. Saturday Nation. December 17, 2005.
74. Kwena, Edmund. *State urged to ban trawling: Coast MP wants licenses of foreign vessels to be revoked*. Daily Nation. January 19, 2006.
75. Pitkin, Melanie. *Local fishermen unite against environmentally destructive trawlers*. January 2006.
76. Wamukota, Andrew, ed. *Proceedings of the Exposure and Exchange Workshop on Marine Life Management*. April 2005.
77. CDA #4. Association of the Fisheries Processors and Exporters of Kenya. (AFIPEK)
78. *Enlisting Business Support for Africa's Millennium Goals*. Africa Renewal. UN Department of Public Information. Vol. 19, No. 3. October 2005.
79. Earthtrends Environmental Information. Country Profile. World Resource Institute 2001. Coastal and Marine Ecosystems-Kenya.
http://earthtrends.wri.org/register.php?reaction=form&theme=1&tool=1&mod_ref_href=index.php
80. *Fish for All*. The Nepad Action Plan for the Development of African Fisheries and Aquaculture. August 23, 2005.
81. *Kenya: Man-made Marine Disaster to worsen?* European Community on Protection of Marine Life. ECOP. January 26, 2005. <http://www.ecop.info/>
82. *The East African Marine Ecoregion Vision* 2004. WWF.
83. *The State of World Fisheries and Aquaculture 2002*. FAO Fisheries Department.
84. Report of the FAO-WARDA Workshop on Integrated Irrigation Aquaculture. Bamako, Mali. November 4-7, 2003.
85. http://www.nepad.org/2005/fishforall/action_plan_endorsed_en.pdf
86. http://www.greengrants.org/grantstories.php?news_id=92.
87. www.swiofp.org
88. www.thenewspaper.org.uk/world/pg000242.php

Appendix B: Maps

Area of Study: Kenya



The Kenyan Coast: Lamu District



Appendix C: Definition of Terms:

Gear and equipment typically utilized on the coast:

Beach seine net (juya): A bag shaped net with wings pulled towards the beach by manpower. It is used by 15-30 people and targets rabbit fish, scavengers, parrotfish, goatfish, snappers, mackerels and sardines.

Cast net (kimiya): A bell shaped gill net tied to a string held by the operator. It is thrown into the water where it is spread out and sinks at the bottom where once it is pulled out, it will scoop out what it entraps. It also targets rabbit fish, scavengers, parrotfish, goatfish, snappers, mackerels and sardines.

Trawling lines: Baited hooks on lines attached to a moving crafts as common in sport fishing. It is used to target barracudas, bonito, tunas, marlins and sharks.

Trawl net: A bag of netting set and actively dragged along the water column in order to sieve fish it encounters. It is operated from trawl boats and targets prawns.

Ring net (Nyavu ya kufunga): It is a surrounding net used to encircle fish and closed at the bottom to form a purse that traps fish. It targets mackerel, bonito and tuna.

Long lines: Lines with baited hooks attached. They are used to target tunas, billfishes and sharks.

Gill nets (jarife): Used to catch mullets, rabbit fish, scavengers, rock cods, bonitos, tunas, marlins, kingfish, skates and rays, barracudas, sharks, sole fish and lobsters.

Monofilament net (nyavu ya mkano): It is a gill net made from a single nylon filament. It targets mullets and pouter fish.

Trammel net: It has a triple wall net, the outer tow walls have a bigger mesh size than the inner wall and have been developed from gill nets. It targets lobsters and herrings.

Traditional Traps:

Uzio: A fence either made of sticks or netting material that is stationary. It is used to trap fish during high tides and targets rabbit fish, skates and rays, silver fish and lobsters.

Malema: Traditional basket trap made of palm tree leaves. Bait is left inside.

Pots (lema): Used to target finfish, lobsters and octopus.

Scoop nets: Scoop nets are bag like with a frame at the mouth and are operated at the surface, scooping up fish that are close. They target lobster, sardines and aquarium fish.

Spear Gun/ Harpoons: They are made of wood or iron bars and old tubes. They target snappers, rabbit fish, rock cod, octopus and lobsters.

Dhow (Mashua): Sailing vessels pointed at one end.

Ngarawa: Craft pointed at both ends with outriggers on both sides.

Hori: Flat bottomed boat with ribs at the sides and on the floor.

Dugout Canoe: A canoe with no joints or planks and is curved from a log of wood.

Dau (dutanyingi): Flat bottomed vessel with ribs at the bottom and pointed at one side.

Propulsion: inboard motors, outboard motors, paddles/ oars (makasia) and sails (tanga)

Fish and Other Marine Resources:

English/ Swahili:

Rabbit Fish—Tafi

Scavengers—Tangu

Snappers—Pali

Cavalla Jacks—Kole Kole

Mulletts—Mkizi

Kingfish—Nguru

Tuna—Jodari/Kiboma

Sharks—Papa

Prawns—Kamba

Octopus—Pweza

Lobsters—Kamba Mawe

Appendix D: Relevant Statistics

I. Data Collection in Amu Division December 2005, Lamu Fisheries
Department

Type	Transported Fish (Kilos)	Price Ksh.	Value Ksh.
Fish Grade I	44	50	222,700
Fish Grade II	10079	30	302,370
Fish Grade III	27791	25	694,775
Lobsters	1530.5	650	994,825
Crabs	3500	200	700,000
Prawns	344	400	137,600
Octopus	875	50	43,750
Dry Fish	2300	100	230,000
Total	50873.5		3,326,026

Type	Locally Consumed Fish Kilos	Price Ksh.	Value Ksh.
Fish Grade I	4297	100	429,700
Fish Grade II	5310	80	424,800
Fish Grade III	590	50	29,500
Lobsters	250	900	225,000
Crabs	400	300	12,000
Prawns	600	400	240,000
Squid	450	300	135,000
Dry Fish	700	150	105,000
Total	12,597		1,709,000

II. Marine fish prices in some Kenyan coastal beaches and markets,
April 2005. KENFRI.

Name	Malindi-Ungwana Beaches	Malindi Market
Catfish and other low value fish	KShs.30 per kg	KShs.60 per kg
Kingfish and other high value fish	KShs.90 per kg.	KShs.120 per kg.
Rabbit fish, scavenger, etc.	KShs.70 per kg.	KShs.100 per kg.
Lobsters	KShs.450-550 per kg.	KShs.600-650 per kg
Jumbo prawns	KShs.550-650 per kg	KShs.650-850 per kg

Appendix E: Research Survey: Mambo Ya Samaki

1. Jina lako?
2. Umri wako?
3. Wilaya yako?
4. Elimu
Hawachimu () Elimu yamsingi () Shule ya upili () Chuo ()
5. Kwa mdagani umekuwa ukivua?
6. Uvivi uinjia yako peke yakujipatia maisha?
7. Ikiwa siuvuvi minjia gani yakujipatia maisha?
8. Utalii unaathiri vipi mambo ya samaki?
9. Umekuwa nahudha katika boti tafauti katika maisha yako yote?
10. Iwapo umebadilisha boti? kwa nini? kwamuda gani?
11. Je wavuvi wanafanya kazi pamoja an kula mtu kivake?
12. Je kuna ushindani?
13. Unamaliekufundisha wuvua? Jamii?
14. Uvuvi unakupatia mapato yakutosha?
15. Je wewe ni mwanachama washirika? Na kwanini mwanachama au si mwanachama?
16. Je wavuvi walamu watafaidika na kuwa na mtambo wa barafu?
17. Ni shida gani zaidi kuleta samaki sokoni?
18. Je mvuvi anawezakupatia vifaa ambavyo bahari iweze kuzalisha?
19. Unavua wapi?
20. Unamuuzia nani samaki?
21. Unauza shilingi ngapi samaki?
22. Je wewe ni mwanachama wa B.M.U.?
23. Kwanini ni mwanachama ou si mwanachama?

24. Iwapo kuwa mtambo wabarafu ingekuwa uzui uwe waserikali au wa ubinatsi?
25. Iwapo utapatiwa mkopo kunanua vifaa vya uvuvi ungependelea kulipa vipi? kwa siku? kwa mwezi? kwa mwaka?
26. Iwapo umepatiwa mkopo ungependa kuungawa na wavuvi wenzako? au unje unga chama?
27. Ni sheda gani ziwzo kukupata?
28. Utaendeleza vipi maisha yako?
29. Ni sheda gani hupate kuuzia samaki materjini wa chini?

Appendix F: Endnotes

- Lamu Fisheries Department.
- ⁱⁱ Odote-Odour, Peter. *Improved Methods for Traditionally Processed Fish and Fish Products in the Kenyan Coastal Area*. KENFRI. 2006. podote@kmfri.co.ke.
- ⁱⁱⁱ See Appendix B: Maps
- ^{iv} Fisheries Department Annual Report, Coast Province. 2004
- ^v Lali Omar, Athman. *The Lamu Artisanal Fishery Industry and its Potential Development*. Tawasal Institute. March 2005. Pg. 27
- ^{vi} Famau, Omar. *Constraints on the Fishing Industry in Lamu District: A Case Study*. University of Nairobi. May 2003.
- ^{vii} Interview with Mr. Komu, District Fisheries Officer, Lamu Fisheries Department. Friday, January 20, 2006.
- ^{viii} Interview with Mr. Komu, District Fisheries Officer, Lamu Fisheries Department. Friday, January 20, 2006.
- ^{ix} Interview with Mr. Komu, District Fisheries Officer, Lamu Fisheries Department. Friday, January 20, 2006.
- ^x Data Collection in Amu Division: December 2005. Lamu Fisheries Department.
- ^{xi} Lamu District Development Plan 2002-2008. National Government of Kenya. Ministry of Finance and Planning
- ^{xii} Buluku, Allen. "Drive to join tope heritage list." Daily Nation. January 13, 2006.
- ^{xiii} Lamu District Development Plan 2002-2008. National Government of Kenya. Ministry of Finance and Planning
- ^{xiv} Lali Omar, Athman. *The Lamu Artisanal Fishery Industry and its Potential Development*. Tawasal Institute. March 2005.
- ^{xv} Coast Development Authority Symposium Report on Investment Opportunities in Coastal and Marine Fisheries in Kenya, 2004. Coast Development Authority.
- ^{xvi} Samaki News: A Magazine of the Department of Fisheries of Kenya, Vol III, No. 1. January 2003.
- ^{xvii} Interview with Mr. Komu, District Fisheries Officer, Lamu Fisheries Department. Friday, January 20, 2006.
- ^{xviii} Famau, Omar Famau. *Constraints on the Fishing Industry in Lamu District: A Case Study*. University of Nairobi. May 2003.
- ^{xix} Malleret-King, Dr. D, Dr. A King, S. Mangubhahi, J. Muturi, E. Mueni, H. On'ganda, J. Tunje, eds. *Fishery Management Science Programme, FMSP Project R8196: Understanding Fisheries Associated Livelihoods and the Constraints to their Development in Kenya and Tanzania.. Review of Marine Fisheries Resources for Kenya*. MRAG. Intergrated Management of Aquatic Resources. 2003.
- ^{xx} Malleret-King, Dr. D, Dr. A King, S. Mangubhahi, J. Muturi, E. Mueni, H. On'ganda, J. Tunje, eds. *Fishery Management Science Programme, FMSP Project R8196: Understanding Fisheries Associated Livelihoods and the Constraints to their Development in Kenya and Tanzania.. Review of Marine Fisheries Resources for Kenya*. MRAG. Intergrated Management of Aquatic Resources. 2003.
- ^{xxi} Interview with Mr. Komu, District Fisheries Officer, Lamu Fisheries Department. Friday, January 20, 2006.
- ^{xxii} Mohamed Ali Mohamed, fisherman, dealer and chairman of Lamu East Cooperative Society, Faza division.
- ^{xxiii} Interview with Wilson Mwangi, Fisheries officer Faza and Kizingitini divisions. January 27, 2006.
- ^{xxiv} The Eastern African Marine Ecoregion Vision. 2004. Publication of WWF.
- ^{xxv} Malleret-King, Dr. D, Dr. A King, S. Mangubhahi, J. Muturi, E. Mueni, H. On'ganda, J. Tunje, eds. *Fishery Management Science Programme, FMSP Project R8196: Understanding Fisheries Associated Livelihoods and the Constraints to their Development in Kenya and Tanzania.. Review of Marine Fisheries Resources for Kenya*. MRAG. Intergrated Management of Aquatic Resources. 2003.
- ^{xxvi} Fisheries Department Annual Report, Coast Province. 2004
- ^{xxvii} Mohamed Ali Mohamed, fisherman, dealer and chairman of Lamu East Cooperative Society, Faza division.
- ^{xxviii} Ali Suo, chairman of Lamu West Cooperative Society.
- ^{xxix} Salim Mohamed, Kizingitini. Lamu East Cooperative Society Secretary.
- ^{xxx} Famau, Omar. *Constraints on the Fishing Industry in Lamu District: A Case Study*. University of Nairobi. May 2003.
- ^{xxxi} Fisheries Department Annual Report, Coast Province. 2004
- ^{xxxii} Odour-Odote, Peter Michael. *Improved Methods for Traditionally Processed Fish and Fish Process Fish and Fish Products in the Kenyan Coastal Area*. KENFRI. 2006.
- ^{xxxiii} Coast Development Authority Symposium Report on Investment Opportunities in Coastal and Marine Fisheries in Kenya, 2004. Coast Development Authority.
- ^{xxxiv} Fisheries Department Annual Report, Coast Province. 2004
- ^{xxxv} Coast Development Authority: Statistical Abstract 2003. National and Regional Selected Socio-economic Indictors: July 2003.
- ^{xxxvi} Kwena, Edmund. *State urged to ban trawling: Coast MP wants licenses of foreign vessels to be revoked*. Daily Nation. January 19, 2006.
- ^{xxxvii} Kenya: Man-made Marine Disaster to worsen?. ECOP Marine. January 26, 2005.

- ^{xxxviii} Ngomeni Sea Food Women's Group, Wawaruikya Saidi, representative.
- ^{xxxix} Interview with Bwana Kahindi, district environmental officer from NEMA, National Environmental Management Authority. January 12, 2006.
- ^{xl} KENFRI, *The Current Status of Trawl Fishery of Malindi-Ungwana Bay Executive Summary*. December 2002. kmfri@kmfri.co.ke
- ^{xli} Gitonga, Muchiri. *New technology to harness fish*. Daily Nation. December 25, 2005.
- ^{xliii} http://en.wikipedia.org/wiki/Lake_Victoria
- ^{xliiii} Lali Omar, Athman. *The Lamu Artisanal Fishery Industry and its Potential Development*. Tawasal Institute. March 2005.
- ^{xliv} Samaki News: A Magazine of the Department of Fisheries of Kenya, Vol III, No. 1. January 2003.
- ^{xliv} Interview with Ali Salim, chairman of BMU Kizingitini. January 31, 2006.
- ^{xlvi} www.thenewspaper.org.uk/world/pg000242.php
- ^{xlvi} Interview with Agnes Mkazala, CDA. February 27, 2006.
- ^{xlvi} www.swiofp.org
- ^{xlvi} Lali Omar, Athman. *The Lamu Artisanal Fishery Industry and its Potential Development*. Tawasal Institute. March 2005.
- ^l Fisheries Department Annual Report, Coast Province. 2004.
- ^{li} Jansen, Eric G. *Effects of the Export-Orientated Trade in the Lake Victoria Fisheries*. IUCN Eastern Africa Programme. Socio-economics of the Lake Victoria Fisheries. Report. 1.
- ^{lii} Professor M. Hyder. January 2006.
- ^{liii} Athman Lali Omar.
- ^{liiv} Andrew Wright, Trees and Bees. Malindi. January 2006.
- ^{liv} Aldina, Hussein M. *Local Level Fisheries Management in Diani-Chale Kenya: Current Status and Future Directions*. Coastal Management, 33:459-470. Taylor and Francis, Inc. Publishers. 2005.
- ^{lvi} Aldina, Hussein M. *Local Level Fisheries Management in Diani-Chale Kenya: Current Status and Future Directions*. Coastal Management, 33:459-470. Taylor and Francis, Inc. Publishers. 2005.
- ^{lvii} Meeting of Fisheries Department in Lamu, Lamu BMU leaders, Lamu West Cooperative members and local Lamu fishermen and dealers.
- ^{lviii} Athman Lali Omar.
- ^{lix} Ngomeni Sea Food Women's Group, Wawaruikya Saidi, representative. And Mama Karangas, Malindi.
- ^{lx} Shekue Said, fisherman, lobster dealer and vice chairman of Lamu West Cooperative Society; Ali Suo, chairman of Lamu West Cooperative Society; Mohamed Ali Mohamed, fisherman, dealer and chairman of Lamu East Cooperative Society, Faza Division; Salim Mohamed, secretary of Lamu East Cooperative Society, Kizingitini Division.
- ^{lxi} Mr. Komu, District Fisheries Official, Lamu.
- ^{lxii} Dahau, Karim, Enda Tiers Mandé and M. Deme. *Support Policies to Senegalese Fisheries*. Fisheries Subsidies and Marine Resource Management: Lessons learned from studies in Argentina and Senegal. UNEP.
- ^{lxiii} Dahau, Karim, Enda Tiers Mandé and M. Deme. *Support Policies to Senegalese Fisheries*. Fisheries Subsidies and Marine Resource Management: Lessons learned from studies in Argentina and Senegal. UNEP.
- ^{lxiv} Athman Lali Omar.
- ^{lxv} Angus Paul, Malindi Sport Fishing Club. January 2006.
- ^{lxvi} Fisheries Department Annual Report, Coast Province. 2004
- ^{lxvii} Kikambala Fish Farm, Mr. Ziggy, owner. Ornamental Fish Farming. Mombasa.
- ^{lxviii} Fisheries Department Annual Report, Coast Province. 2004
- ^{lxix} Samaki News: A Magazine of the Department of Fisheries of Kenya, Vol III, No. 1. January 2003.
- ^{lxx} Earthtrends Environmental Information. Country Profile. World Resource Institute 2001. Coastal and Marine Ecosystems-Kenya. http://earthtrends.wri.org/register.php?action=form&theme=1&tool=1&mod_ref_href=index.php
- ^{lxxi} The State of World Fisheries and Aquaculture 2002. FAO Fisheries Department.
- ^{lxxii} *Enlisting Business Support for Africa's Millennium Goals*. Africa Renewal. UN Department of Public Information. Vol. 19, No. 3. October 2005.
- ^{lxxiii} Areef Amershi, Olympic Hotel, Lamu and Fisheries Officials Lamu.
- ^{lxxiv} Gitonga, Muchiri. *New technology to harness fish*. Daily Nation. December 25, 2005.
- ^{lxxv} Report of the FAO-WARDA Workshop on Integrated Irrigation Aquaculture. Bamako, Mali. November 4-7, 2003.
- ^{lxxvi} Interview with Harrison Beja Yeri, Malindi Fisheries Officer, January 10, 2006.
- ^{lxxvii} Fisheries Department Annual Report, Coast Province. 2004
- ^{lxxviii} The State of World Fisheries and Aquaculture. 2002. FAO Fisheries Department.
- Pitkin, Melanie. *Local fishermen unite against environmentally destructive trawlers*. January 2006. http://www.greengrants.org/grantstories.php?news_id=92.

