

Community Livelihoods and Fishing Practices Survey

Exploring the potential for alternative livelihoods in the Bazaruto Archipelago, Mozambique



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Executive Summary

Alternative livelihoods can be used to mitigate high levels of marine resource exploitation. The potential for the introduction of alternative livelihoods in the Bazaruto Archipelago was investigated through a livelihoods assessment. It was found that 76% of the community members interviewed are predominantly fishers but supplement returns from fishing with multiple other sources of income. With an average monthly income of \$52- which is well below the country average - and the already present culture of partaking in multiple occupations, it was concluded that introducing alternative livelihoods designed to decrease marine resource exploitation has the potential for success within the Sitone community on Bazaruto.

Introduction

Mozambique has one of the longest coastlines in Africa. Here, small-scale fisheries, (including artisanal and subsistence fisheries) employs over 343,000 people, of which 18% are women (IDPPE, 2013). For artisanal fishing communities across Mozambique, fishing is the most important source of income and food security (FAO, 2007). The fishery has been set aside by governance to act as a buffer for poverty and thus the country applies an open access policy (there are no quotas) to its small-scale and artisanal fishery, using a system of local fishery management through Fisher Community Councils (CCPs). The coastal marine resources of Mozambique are essential for the poor along the coast (Menezes *et al.*, 2011).

As a result of the civil war and with high levels of poverty and a lack of employment alternatives, unsustainable pressure has been placed on coastal resources and this has subsequently resulted and continues to result in widespread environmental degradation and the loss of marine resources. While there is limited data on the overall state of marine resources in Mozambique, anecdotal comments from fishermen across Mozambique, state that marine resources are dwindling (Benkenstein, 2013). Catch Per Unit Effort (CPUE) records (1995-2005) from the *Instituto de Investigacao Pesqueira* (IIP; unpublished dataset) also show a decline in catch (200kg/net/day – 80kg/net/day).

Alongside the fish resources, Mozambique hosts the West Indian Oceans largest area of seagrass, covering a total area of 43 900ha (Bandeira and Gell, 2003). Worldwide, the main threats to seagrass include coastal development and siltation, human population expansion and seine netting (Orth *et al.*, 2006). Due to high levels of artisanal fishing on the coasts, the ecologically important seagrass beds are under threat. Seagrasses provide a number of important ecosystem services: stabilising the coastal area and coral reefs, providing important nursery grounds for many fishery important marine species, are an important carbon sink and seagrasses are also the main food source for the Dugong (Fourqurean *et al.*, 2012).

The Dugong, on the IUCN's redlist of threatened species is rated as vulnerable (Marsh and Sobstick, 2015). In 1992 it was recognised that after years of unregulated fishing on the coasts of East Africa, populations of the *Dugong dugon* were small and fragmented (UNEP, 1992) and it was foreseen that the likelihood of their survival is very low. In Mozambique, the Dugong is now only reliably found around and to the north of Mozambique's Bazaruto Archipelago. Here an estimated population of approximately 250 individuals are found. This is most likely the western Indian Ocean's single remaining viable population (Findlay *et al.*, 2011).

The Bazaruto Archipelago has been populated since 200-300AD (Christina Roque and Brandt, 2010). Evidence suggests that the archipelago was one of the earliest commercial centres in the region and throughout recent history the archipelago has acted as an important site for trade, having traded in seed pearls, amber, tortoise shell, turtle carapaces and dugong teeth. The current population on the island is made up of the Mahoca tribe who immigrated to the islands from the north in the 19th century and as well as other families from the mainland who immigrated during the civil war. Most fisher families on the island are of the Mahoca ethnic group and there are strong traditional customs associated with fishing and the sea (Van der Elst, 2010). Everyone in a fisher family is somehow involved in fishing, with women and children sometimes crewing boats and women being involved in sand oyster collection. Many fishers that were previously interviewed in the region state that they have been fishing for over 23 years.

The use of alternative livelihoods as a method to increase community resilience to changes and to decrease pressure on natural resources has been recently gaining popularity (Ashley and Carney, 1999). By definition, a livelihoods approach to natural resource management (Alison and Ellis, 2001; Carney, 1998; Scoones, 1998) is used as a tool for the sustainable management of natural resources – in this case, marine resources in small-scale fisheries. The livelihoods approach seeks to assist communities at risk of resource depletion by reducing barriers of access to alternative forms of income as well as improving current resource use management. This approach creates a scenario whereby resilience to change is increased and pressure on the natural resources is reduced.

On the backdrop of marine resource decline in Bazaruto and with the mandate to conserve seagrass and the dugong population, it is important to get a clearer idea of the current Bazaruto Fisher community in order to assess the potential for successful alternative livelihood initiatives. To this end, a livelihoods survey was carried out at a sample site of Sitone community on Bazaruto Island. The surveys were designed to answer the following blanket questions:

1. What is the extent to which fishers on the Archipelago rely on fishing?
2. Which other livelihoods are available to the fisher families?

The results of the survey are being used to inform the Endangered Wildlife Trust at the project design level towards the development of alternative livelihoods that can diversify the fishers' sources of income, decreasing pressure on the seagrasses, fish stocks and ultimately the dugongs.

Methodology

Surveys were carried out in Sitone community on Bazaruto. Four enumerators were chosen from the community and the survey was carried out over a period of 3 months in 2015. 175 surveys were completed, with 124 males and 51 females being interviewed.

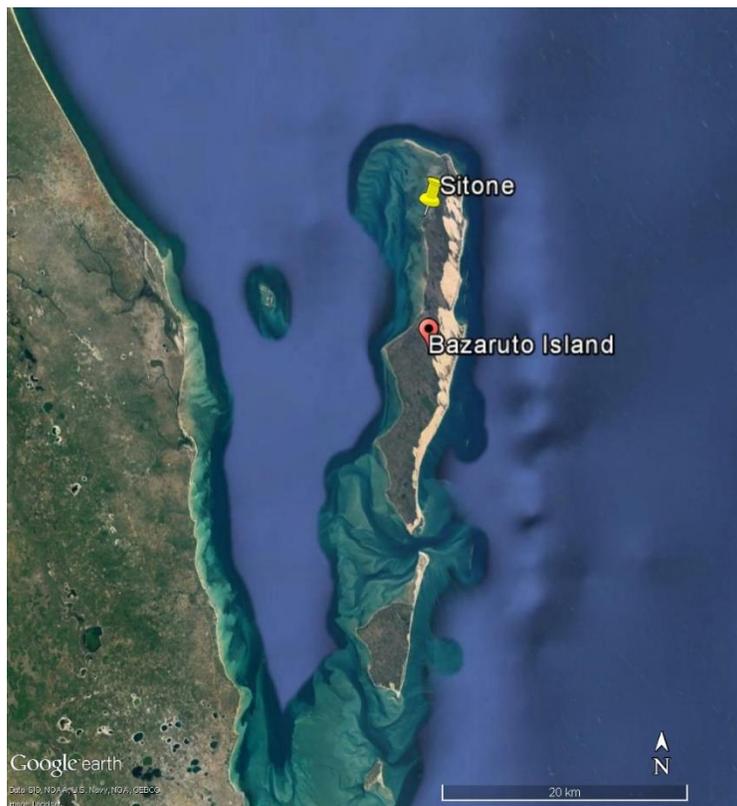


Figure 1: Map of Bazaruto Archipelago. The location of Sitone community is marked.

Results

Demographics

From the distribution of interviewees, it can be seen that the largest group in the community, excluding children (which we didn't count) is between the ages of 25 and 35, with relatively equal proportions of men and women across all age groups. Of the interviewees, 49% and 41% of the males and females respectively, are literate. The average number of

dependents is 5, with a maximum of dependents being 26 (dependent on an older person of 68 years) and the minimum of one. Everybody that was interviewed had at least one dependent. It is however not clear if the dependents are solely dependent on the interviewee.

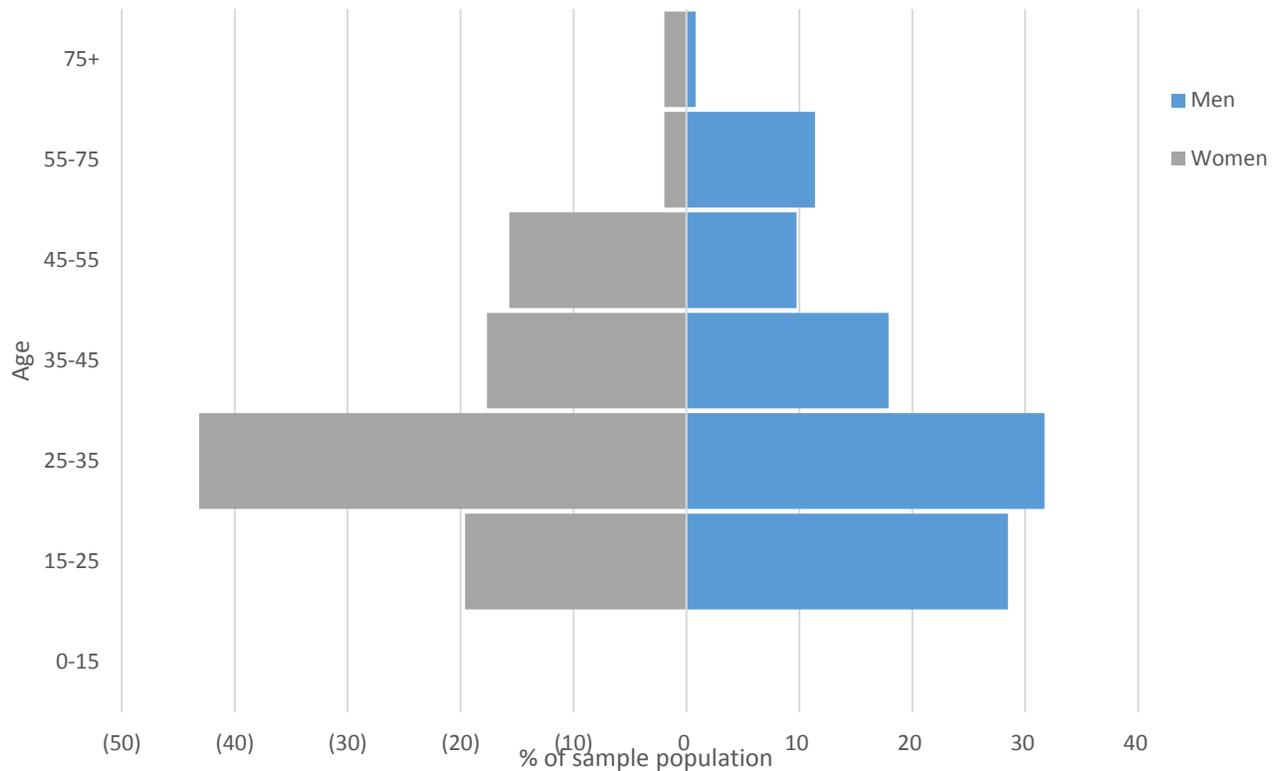


Figure 2: Population pyramid of sample population surveyed.

Economics

There is a large range of monthly income in the Sitone community. These results suggest that there are class differences in the communities. In terms of differences between average income of men and women, while women on average are earning \$48 per month which is less than men (\$54), the difference is not great.

Table 1: Average income in Sitone village. Assuming \$1=53MZN.

	MEN	WOMEN	ALL
AVERAGE INCOME	2860.47 ± 2338.37	2521.16 ± 1551.872	2762.67 ± 2142.48
MAX INCOME	17900	6500	17900
MIN INCOME	175	350	175

Livelihoods

The main livelihoods that the Sitone Community are involved in comprise of fishing, self-employment in the form of retail, small scale sales of artisanal products or harvested resources, skilled service provision (e.g. carpentry, mechanics, and construction), employment from the lodges on the island and other tourism related activities. While the majority of people are directly involved in fishing as a livelihood, of the 175 people interviewed, 43 (24%) are not directly involved in the fishing industry. Many people harvest natural resources to supplement incomes. The most common harvested marine resources are oysters, crabs, crayfish and octopus. Aside from marine resources, popular natural resources that are harvested are grass and natural building materials. Most people are involved in more than one occupation (Six being the most occupations listed by one participant) other than fishing. The figure below indicates levels of involvement in different occupations, other than fishing.

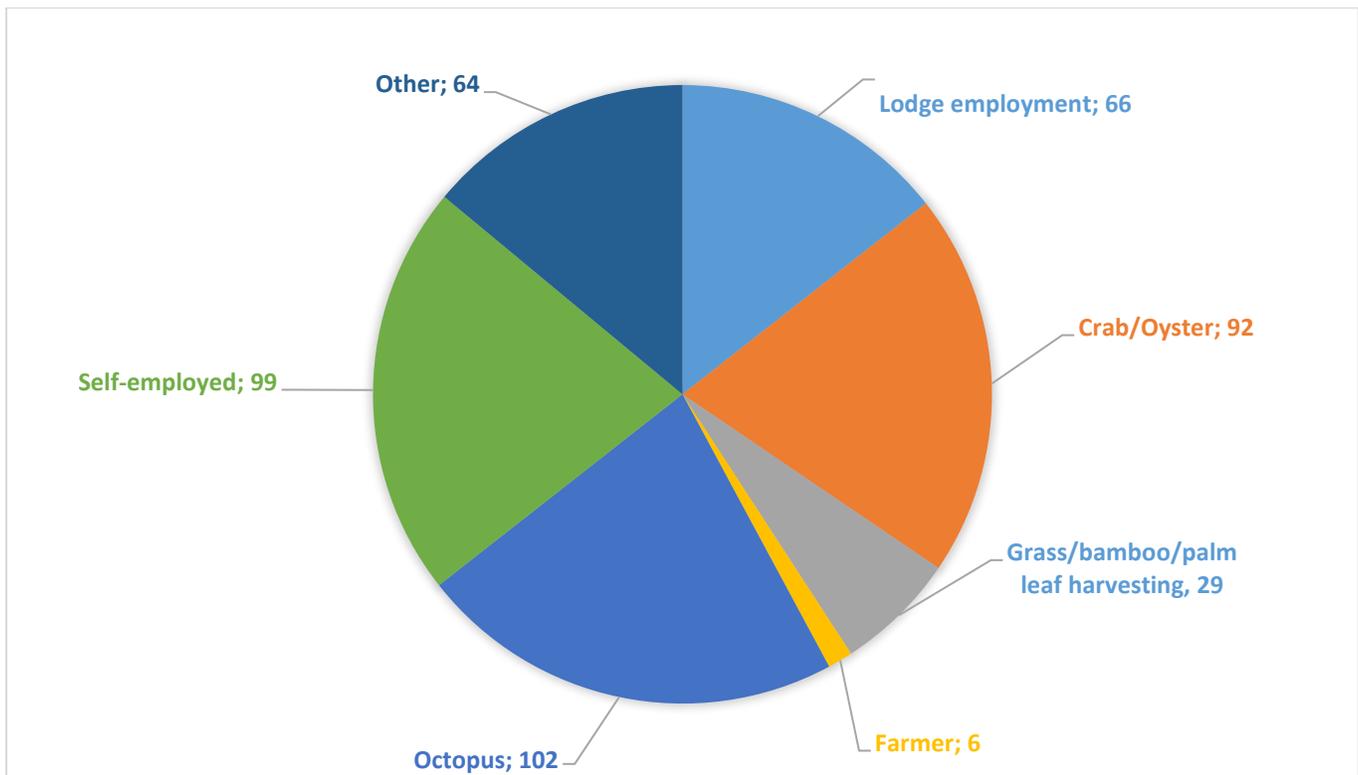


Figure 3: Livelihoods and the number of people involved in each sector. The total is greater than the number of people interviewed as many people are involved in more than one occupation. The other category includes skilled services, artisanal work, contract work, transport and traditional healers. The self-employed category includes shop owners, bakers, tourism related activities, and traders.

Fishery

Of the 132 fishers interviewed, 88 % use seine-nets, 63% use handlines, 13% use their own gill-nets (which are not permitted in the park but are mostly used as seine-nets), 5% use spear guns (not permitted in the marine reserve) and 1.5% use traditional fish traps. The majority of fishers combine seine-netting with hand-lining. Only 14 fishers out of the 132 interviewed actually own a boat and 12 fishers own a net. In most cases, the boat owners are also the net owners.

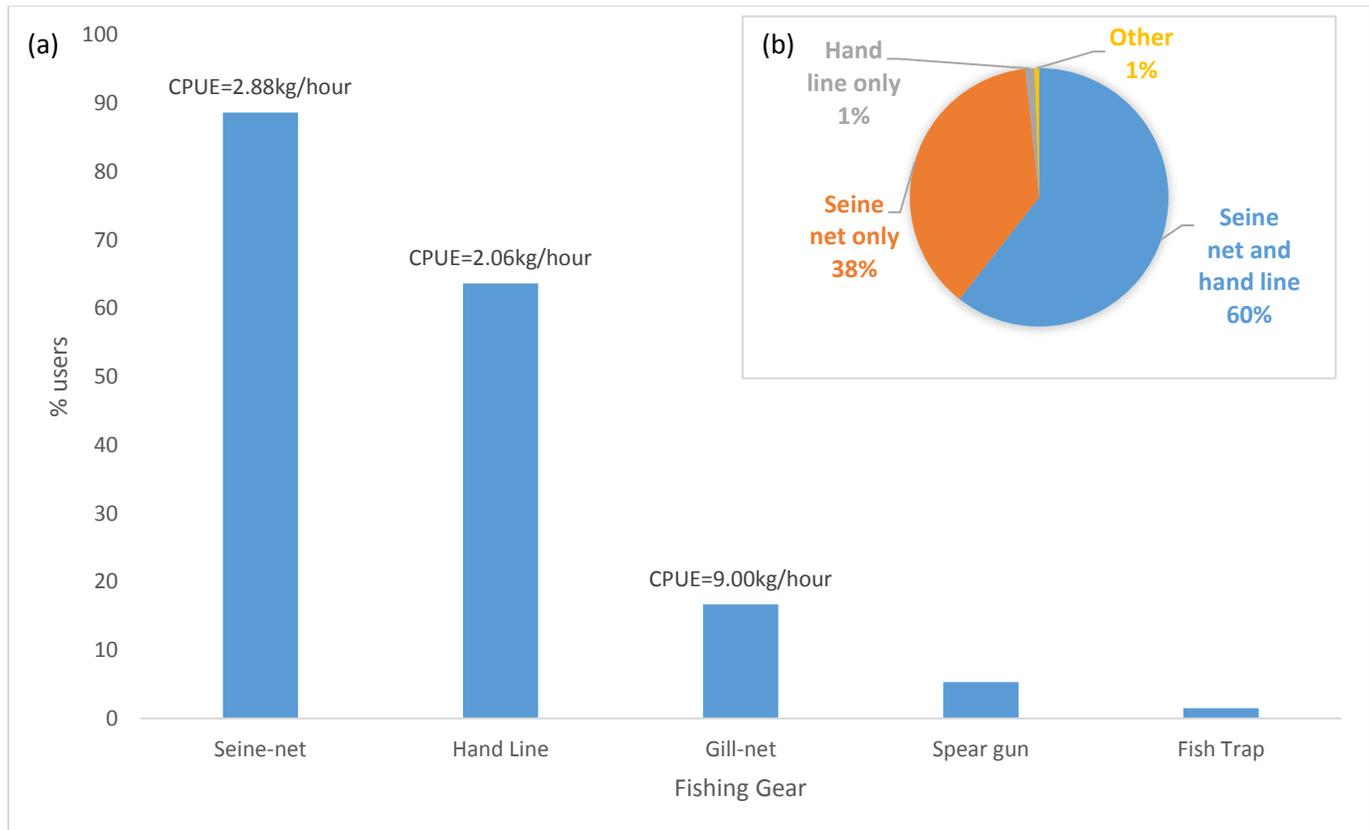


Figure 4: (a) Percentage of fishers using (out of 132 fishers) different fishing gear. The total does not add up to 100% as fishers often use more than one fishing method. An estimate of Catch Per Unit Effort (CPUE) is displayed for Seine-nets, Hand lines and Gill-net use. The inset (b) details fishing practices.

Markets

There are two lodges on Bazaruto Island: Bazaruto Lodge and Anataru. On average, fishers who responded to the lodge market questions (N=91) are supplying 37 ± 38 kg of fish at 57 ± 11 MZN/kg per month. This equates to a total of 2109 MZN (\$40) gross profit per month from the lodges, suggesting that the lodges are a very important market for the fishers. Fishers are also selling octopus to the lodges at an average price of 84 ± 16 MZN/kg. The weight of octopus sold per month in kilograms was not determined during the survey.

Of the 59 participants who gave additional sale data, 34% sell to the local community and 66% sell to middlemen, thereby identifying two other contributing market sources – the local community and the mainland community. Sales to the mainland community are most likely negotiated through the middlemen. It is undetermined whether the participants who didn't respond to the market questions fish purely for food or are involved in selling fish as well.

Discussion

The results from this livelihoods assessment indicate that many households rely heavily on fishing for food and income but are engaging in other forms of employment to supplement the household income. These alternative income sources rely on the local market, the lodge and tourism market, and the availability of natural resources. Overall, the average monthly income per person interviewed was about \$50.

Figure 3 illustrates how the inhabitants of Sitone are utilizing multiple occupations to fulfill their monthly needs in terms of food and income. The already diversified livelihoods suggest that people are using every possible opportunity that they have to attain food and income. This suggests that alternative livelihoods that are more reliable than the ones already practiced would be welcomed into the community. While the majority of people interviewed rely on seine-netting as the main subsistence and artisanal fishing method (in line with the country average, where seine-netting accounts for about 70% of artisanal catches (Tietze *et al.*, 2011), most people supplement this with another fishing method. The most common method of fishing (only counting those people that fish) is seine-netting (88%), closely followed by hand-lining (63%) (see Figure 4a). Seine-netting and hand-lining are often methods used in combination (see Figure 4b), and are easily linked as seine netting allows the fishers to fish for appropriate bait in order to catch larger fish with the hand-line. Gill-netting was not very common, with only 13% of fishers using this method. Only 1% of fishers only use hand-lining as their gear for fishing.

The average quoted Catch per Unit Effort (CPUE) for hand-liners is 2.068kg/hour and for seine-netters is 2.8827kg/hour (Figure 4a). This indicates that fishers are gaining more fish weight for their time by seine-netting – explaining why seine-netting is such a popular fishing method. The average CPUE for gill-netting is very high (9.0kg/hour) however, as gill-netting is not allowed in the park, it can be that the risk of fishing illegally outweighs the gain. This would only hold true if the fishing regulations are effectively enforced. With the high CPUE that gill-netting gives, it is understandable why fishers would choose this method.

The main threat to dugongs is the use of gill-nets. At least in the Sitone community, there are not many fishers who use this method, however to ensure that the numbers decrease further, the consequences of law enforcement should outweigh the gains from fishing using this method.

In an FAO study (Tietze *et al.*, 2011) on beach seine-netting in Mozambique in 2007 it was concluded that beach seine-netting had no negative impacts on seagrass (only hauling seagrass that was already floating in the water column) and finding that the main negative impact from beach –seining was the catch of juvenile fish due to small mesh sizes and the use of mosquito nets. This suggests that it is important to determine and enforce sustainable net mesh sizes. Furthermore, there is a need to robustly quantify the effects of seine-netting on seagrass habitats and fish populations.

In Mozambique, attained income levels in the small-scale fisheries are dependent on the fishers' role, broadly divided into boat and gear owners, crew, and fishers. Income is also dependent on the region and on the distance and ease of access to markets (ACLME, 2012). In Bazaruto, the case is such that the majority of people interviewed did not own their own boats or nets. Interestingly, the average monthly income of those who did own their own boats, usually the people who also own the nets, is not much greater than the overall average income (2910 MTN and 2762 MTN respectively). Access to markets is an issue for all fishers at Sitone, who rely on a transport boat that leaves the island only three times a week.

Recommendations

The findings from the above livelihoods assessment suggest that alternative livelihoods that are reliable and can secure consistent income will be accepted within the community and will, most likely, improve the quality of life of the community members. It is thus recommended that a range of alternative livelihoods be thoroughly investigated. These alternative livelihoods should however, not create conflicts with the current fishing practices, the conservation of dugongs, seagrass, coral reefs and fish populations, as well as tourism.

To achieve this, further, quantifiable information is required:

- Long term monitoring of fish population stock and diversity
- Increase in understanding of seagrass community dynamics, edge effects and the effects of seine netting on the seagrasses and fish stock. It is recommended that an innovation to seine-net design be developed in order to create a seagrass friendly seine-net and a minimum mesh size agreed upon
- Environmental impact and risk assessments of potential alternative livelihoods
- Value-chain analyses of potential alternative livelihoods
- A better understanding of dugong feeding habits in order to inform management practices
- Research into an alternative livelihood that provides food for subsistence in combination with some monetary income. It is envisioned that this livelihood would supplement the local fishers' diet and bring in supplementary income during closed seine-net season, therefore encouraging fishers to abide by the closed season laws and fish more sustainably

Conclusions

There is a well-known quote: “*The fisher is not poor because he is fishing; he is fishing because he is poor*” (MacKenzie 1979, footnote 5 on p. 816). In the case of the people of the Bazaruto Archipelago, one cannot be so sure that this applies. Fishing is at the heart of the fishers of these islands, as can be seen by the level at which the community relies on fishing (found in this survey) and enjoys fishing (*pers com. – fishers in Sitone*). Perhaps, even if the fisher were to become relatively wealthy, he would continue to fish, but potentially at a lesser extent. This decrease in fishing effort would already be a success in marine conservation. Having alternatives to fishing would also allow for more effective management of the marine resources and for extended closed seasons. It is thus concluded that there is potential for the introduction of alternative livelihoods, granted that they are managed and implemented effectively. This will assist in decreasing pressure on the fish stocks, Dugongs and seagrass communities within the Bazaruto Archipelago Marine Protected Area, as well as improving the quality of life of the inhabitants of Sitone.

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