

Epps, M. & Benbow, S.

Community attitudes and perceptions of marine and coastal resources and sustainable management in southwest Madagascar.

CORDIO



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Preface

Blue Ventures Conservation

Blue Ventures Conservation is a small international conservation NGO that has been working in the village of Andavadoaka, southwest Madagascar since 2003, with the aim of protecting the region's coral reefs, their biological diversity, sustainability and productivity while improving the quality of life of the local community which depends almost entirely on the region's marine resources for subsistence and income. Blue Ventures is actively involved in working at a local level to protect some of the region's most precious and vulnerable marine habitats and is continuously expanding and diversifying its work programme to encompass a broad range of research, capacity building and environmental education activities to help the local community sustain its traditional artisanal fishing economy as well as minimise the environmental impacts of human activities on the marine ecosystems, thereby protecting the coral reef systems and related habitats. As a small conservation organisation, its funds and efforts are channelled directly to execute conservation projects on the ground keeping administrative costs at a minimum.

Blue Ventures depends entirely on support from private donors, volunteers, research grants and fundraising initiatives to sustain its work together with local project partners. Productive partnerships have enabled the pooling of resources, talents and experiences from a range of national and international organisations, providing a wealth of technical expertise to assist in the successful development of research initiatives. Blue Ventures and its main partners the University of Toliara's Institut Halieutique et des Sciences Marines (IHSM) and the Wildlife Conservation Society-Madagascar (WCS) are currently focusing on the development of a network of community-run Marine Protected Areas (MPAs) in the Andavadoaka region, and are involved in a range of regional conservation and education initiatives in Madagascar.

The Andavadoaka Project

The Andavadoaka Project is a multi-stakeholder marine conservation project originally established by Blue Ventures and IHSM in 2003. In 2004, WCS and other partners joined the project as a pilot initiative aiming to demonstrate the effectiveness of marine protected areas for the conservation of the coastal environment and the sustainable management of marine resources in southwest Madagascar. The project has expanded beyond Andavadoaka into other villages throughout the local administrative area (the Commune of Befandefa), and is now a long-term multi-partner initiative involving national and local government, international conservation NGOs, the national marine institute for Madagascar (IHSM), a commercial fish and seafood collection company (Copefrito) and the local community and recently established *Velondriake* community marine protected area committee. The project has a range of objectives which include baseline ecological and socio-economic assessments, fisheries research, environmental education and awareness raising, demonstrating and developing sustainable fisheries management and developing alternative livelihoods for fishing communities in 23 villages around Andavadoaka. Each objective has a leading partner. The socioeconomic objectives fall under the responsibility of Blue Ventures because of its extensive knowledge of the site and good community relations due to its permanent presence in the region. Blue Ventures was able to conduct a first comprehensive socioeconomic assessment with generous financial and technical support from CORDIO, helping to achieve the overall project objectives. This report is the sister report to 'A Socioeconomic Baseline Assessment: Implementing the socioeconomic monitoring guidelines in southwest Madagascar' (Epps 2007) available at:

http://www.blueventures.org/images/downloads/research/bv-research-report-2007-socmon-part1_compressed.pdf

For more information on issues raised in this report please refer to Epps 2007 at the link above, or contact Blue Ventures Conservation at research@blueventures.org

Front cover photos, clockwise from top:

- 1. Women selling fish on the main street in Andavadoaka**
- 2. SocMon training workshop**
- 3. Pirogues lined up on Andavadoaka beach**
- 4. Pirogue with sail**
- 5. Children of Andavadoaka by the Blue Ventures information board**

Summary

In response to raised awareness of the importance of integrating social science with long standing biological monitoring programmes, and with the support of Coral Reef Degradation in the Indian Ocean (CORDIO), a long-term socioeconomic monitoring programme was implemented around the village of Andavadoaka, southwest Madagascar. The programme has been developed using the Socioeconomic Monitoring Guidelines for Coastal Managers of the Western Indian Ocean (SocMon WIO), in conjunction with the development of a Marine Protected Area (MPA) that incorporates representative areas of all local marine habitats.

SocMon surveying of three villages, Andavadoaka, Lamboara and Ampasilava, to be included in the 800km² 'Velondriake' marine protected area, took place between April and July 2006. This report presents the community attitudes and perceptions towards the local marine resources. The results of this study will be used to tailor marine conservation initiatives in the area to the individual needs of villages along the coast.

The results highlight significant differences in the level of environmental awareness between the three villages with the largest village, Andavadoaka generally showing a greater understanding of marine conservation issues. However, knowledge gaps for all three villages are documented, underlining the need for further training and capacity building workshops to raise awareness in all three communities.

Key points

The primary determinant of local behaviour is the desire for economic improvement. If this improvement can be demonstrated to communities through MPA establishment or the implementation of NTZs, individuals will be more willing to support adaptive management practices.

Differing perceptions of the three villages questioned towards marine resources highlights the need for adaptive resource management. Reserve managers need to match network capacity and capabilities to the demand of the coastal communities to ensure long term sustainability of the marine resources.

There is still a need for environmental awareness programmes in the region as knowledge and compliance levels for some national and local rules and regulations is worryingly low.

This study highlights the next steps for MPA managers in order to improve community awareness of environmental issues related to the over exploitation of marine resources.

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Introduction

Coastal areas have long been the centre for human settlements, due to their productivity environmental and cultural services, as well as being the main transport and trade routes for centuries. Coral reefs, mangrove forests, seagrass beds, and lagoons each provide their own distinct goods and services. Millions of coastal communities are directly dependent on these resources and services for their survival. This has resulted in high population densities in coastal areas due to increased coastal migration from inland areas, which exerts additional pressure on already scarce resources.

Establishment of marine and coastal protected areas (MCPAs) has been the predominant means of protecting our marine and coastal areas and their resources. The rationale for creating an MCPA varies according to the specific goals to be achieved, i.e. to conserve certain habitats or endangered species, allow collapsed fish stocks to recover, or manage tourism activities and other human induced impacts on coastal resources. Some may be created in very remote areas but are often located in or adjacent to poor and vulnerable coastal communities. Every year the number of protected areas being created through national or local initiatives increases. The number or the size of MCPAs tells us little about their true effectiveness in achieving their objectives. Considering the close link between human well-being and coastal resource exploitation, coastal communities' resource use patterns play a crucial role when trying to sustainably manage coastal areas. Community-based MCPAs are increasingly being recognized as a way of ensuring successful management of protected areas. Communities can make or break an MCPA, and it is therefore crucial to have genuine buy-in from the coastal communities to ensure long-term sustainability.

However, the primary determinant of coastal communities' behaviour is the desire for economic improvement. If an improvement can be demonstrated to communities through sustainable finance mechanisms within an MCPA establishment, they will be more willing to support adaptive management practices. Community attitudes and perceptions play a significant role in the implementation of an MCPA and its subsequent outcomes, and the successful adoption of an adaptive management plan.

Relationships between people and their environment, especially those in developing coastal communities who are wholly dependent on the availability of marine resources for their survival, are extremely complex. Managers of coastal resources have realised that it is not just a question of monitoring the biological features of the environment, human interdependence also needs to be recorded in order to determine the sustainability of coastal ecosystems. The long-term integrity of protected areas in low-income nations depends critically upon the support of the rural communities that live adjacent to them (Ferraro 2002). The number of people in the community will affect the level of pressure on local marine resources, and influence the degree of management required (Cinnner *et al.* 2005). Knowledge and focused management of the social and economic standards of the coastal communities is fundamental to the successful implementation of a long term management strategy.

Growing coastal populations in southwest Madagascar, coupled with increased resource extraction rates have put coral reef ecosystems at a high risk of catastrophic biodiversity loss. This predicted loss of biodiversity is likely to have severe consequences for the productivity of these systems and the human populations that depend upon them (Wilkinson 2002, Hughes *et al.* 2003). The development of effective management strategies for coral reefs has become a key challenge for conservation scientists and managers and the human aspect has become increasingly important in the production of management plans.

It is against this backdrop that a socio-economic monitoring programme was implemented in SW Madagascar with the technical assistance and financial support of Coral Reef Degradation in the Indian Ocean (CORDIO).

A long-term socioeconomic monitoring programme was established around the village of Andavadoaka, southwest Madagascar in 2006. The programme was developed using the Socioeconomic Monitoring Guidelines for Coastal Managers of the Western Indian Ocean (SocMon WIO), in conjunction with the development of a 800km² Marine Protected Area (MPA) named 'Velondriake'. SocMon surveying of three villages, Andavadoaka, Lamboara and Ampasilava, to be included in the 800km² MPA, took place between April and July 2006. This discussion paper presents the results from the 2006 survey on community attitudes and perceptions towards local marine resources and its regulation and enforcement. The results of this study have been incorporated into the MCPA plan and other conservation initiatives.

Threats to coastal livelihoods

Small subsistence communities are heavily dependent on marine resources for their livelihoods and a number of threats are becoming apparent. The increased demand and pressure for and on coastal resources are not always local in origin, but national or even global. The uncontrolled growth of fisheries once international markets have been tapped results in the over exploitation of target species. This has occurred recently in Madagascar with sea cucumbers (Conand & Mara 2000), and as a result of the shark fin trade, decimating stocks of these species.

International interest in local fisheries boosts the local economy and allows fishers to invest in more advanced gear which again aids the localised exploitation of marine resources. Destructive practises such as shell collecting and trading remove vital links from the marine ecosystem and can have devastating consequences on the environment. There is anecdotal evidence to suggest that in some areas fishers are seasonally migrating to other fishing grounds where fish stocks are better, due to overfishing in their local area.

Governance of Marine and Coastal Resources

The foundation of coastal zone management in Madagascar is the regulation of fisheries, which have focused on industrial fisheries such as shrimp and tuna. This has left limited capacity for fisheries surveillance in traditional and artisanal fisheries such as those found in the Andavadoaka region. This lack of formal regulation could potentially cause problems for the local fish stocks, but spiritual beliefs and locally implemented laws often prevent this from happening. In the Vezo communities in southwest Madagascar fishers adhere to traditional local laws, known as *dina*, which are recognised by the government and seem to represent valid and viable fisheries regulation mechanisms.

The Andavadoaka region's marine resources were largely unexploited, other than by local subsistence fisheries, until the arrival of commercial fisheries collection companies in 2002, which provided communities with ready market access for marine resources (L'Haridon 2006). Prior to the commercial exploitation of local fisheries, there was little demand for the creation of rules and regulations to aid fisheries management. The traditional subsistence fishing of Vezo communities, such as Andavadoaka, was not endangering the health of local marine resources. However, the need for fisheries laws arose once the value of commercial fishing for exportation was realised.

Since 2003, Andavadoaka and surrounding communities have worked with conservation organisations such as Blue Ventures (BV) and the Wildlife Conservation Society (WCS) to develop plans and strategies

for marine resource management for the first time in the region. The development of a new fishing cooperative in Andavadoaka and plans for the establishment of a regional protected area management committee, have created opportunities for structural and functional interactions in the community. The planned establishment of a network of community-managed marine and coastal protected areas will represent an important step for Vezo communities in the region in creating a new coastal regulatory framework directly affecting traditional livelihoods (Epps 2007).

Marine and Coastal Resource Management

A variety of marine resource management initiatives are being implemented in the south west region of Madagascar where the main source of income comes from fish- and fisheries-related produce, and over 80% of households engage in fishing (Epps 2007). The most valuable fishery product in the region is octopus. In November 2004, a pilot seven-month octopus no take zone (NTZ) was implemented as an attempt to preserve the valuable fishery (Humber *et al.* 2006). The success of this project led to the implementation of new national fisheries regulations on octopus fishing in 2005, including a specified minimum catch size and a regional closure season in SW Madagascar between 15th December and 31st January each year (L'Haridon 2006). Following the success of the octopus NTZs, discussions have been ongoing between conservation NGOs, the village of Andavadoaka and other surrounding villages within the commune of Befandefa regarding the creation of permanent marine protected areas in the region. The aim is the establishment of a series of protected areas in the Andavadoaka region, the first community-run MPA network in Madagascar. The MPA was named 'Velondriake' which means 'to live with the sea' in the local Vezo dialect. An elected management committee consisting of representatives of every village within the proposed MPA was formed to ensure that communities would reap the benefits of an MPA network in the Andavadoaka region. Velondriake committee members are responsible for raising awareness within their community regarding the benefits of protected areas. They will act to inform communities of the local *dina* and other laws developed as part of proposed protected area plans, as well as to enforce the local regulations.

The community-based MPA project "Velondriake" is already making headway by changing the perception and behaviour of the local communities in and around Andavadoaka. There is now a sense of support for marine and coastal conservation initiatives. The pilot octopus NTZ demonstrated the benefits of short-term management measures, and the surrounding villages experienced the direct benefits from this step towards ensuring sustainable fisheries. Subsequent government policy to improve national fisheries regulations reflects the tremendous contribution of the Andavadoaka project to marine biodiversity and conservation in Madagascar.

This study of the attitudes and perceptions of Andavadoaka, Lamboara and Ampasilava communities was undertaken at the infancy of the project and provides a baseline to measure future changes in the attitudes and perceptions of these communities as the project develops. Future socioeconomic surveys will measure and assess the effectiveness and distribution of benefits from conservation interventions such as the Velondriake community run MPA. The successful achievement of conservation goals ultimately rests with the local communities living in the protected area. Understanding their current perceptions and attitudes towards the marine environment on which their livelihood depends will allow an assessment of the effectiveness of the MPA once it has been established. It will be interesting to repeat this study once the MPA is in place and measure any changes in attitude and perception of the villages, particularly with regards to benefits the community receive as a result of the MPA.

A Socio-economic Context (summary from Epps 2007)

The average population size of the villages in the Commune is approximately 300. The three villages surveyed are considered large for the commune (Table 1). A mean of 5.6 people per household was recorded for the pooled data from all three study sites (Epps 2007). Population movement can provide an indication of people's perceptions of, and confidence in the state of local natural resources or market opportunities (Cinner & McClanahan 2006). 71% of all respondents in Andavadoaka originated from the village, while only 24% and 26% originated from Lamboara and Ampasilava respectively (Epps 2007). This migration pattern is dictated by the presence of better fish stocks, or active avoidance of the threat presented by a violent nomadic tribe known as the '*malaso*'.

The three villages show a pyramidal age structure typical of a rural area in a developing country, where the majority of the population is under the age of 18 (Epps 2007). In Andavadoaka 80% of the village is directly involved in fishing or fishery activities, and in Lamboara and Ampasilava this reaches 90%. On average, approximately 10% of the population in the three villages has no formal school education and there is limited access to schooling despite national legislation stating primary schooling is compulsory.

Table 1 Population and household numbers in the three monitored villages and surveys conducted.

	Population Size	No of Households	Average size of household	Range of household size	Number of surveys	% of households surveyed
Andavadoaka	1220	214	5.7	1-24	97	45
Lamboara	526	106	5.0	2-10	40	38
Ampasilava	321	63	6.0	1-11	33	52

The average weekly household expenditures for Andavadoaka, Lamboara and Ampasilava were approximately USD 18, 13 and 12 respectively (at the time of monitoring). As much as 74 % of this was spent on food. All three communities are almost entirely dependent on fishing for subsistence and income. In addition, the villages are extremely remote, with poor physical infrastructure, negligible access to electricity and no telecommunications. There is no public transport or terrestrial vehicular access to the villages, except by 4x4 vehicles from either Morombe or Toliara, the costs of which are prohibitively expensive for local communities. Communities depend on the sea for transport, using non-motorised traditional dugout canoes (pirogues), and as such are extremely isolated from other villages. This is particularly true during the cyclone season, when adverse sea conditions can prohibit sea travel between December and March each year. The region's terrestrial environment is semi-arid with an estimated precipitation of 350-400 mm/year. The hot, dry climate prohibits substantial agriculture and the region's aridity and isolation prevent business development and large-scale tourism. The large tidal regime, coupled with strong afternoon winds, dictates communities' fishing patterns.

Methodology

Survey area

This survey was carried out in three coastal villages in southwest Madagascar approximately 150km north of the regional capital of Toliara and approximately 50km south of the town of Morombe (Figure 2). The village of Andavadoaka is the largest village in the administrative commune of Befandefa. Lamboara is located on the northern shore of the mouth of the Baie de Fanemotra (also known as the Baie des Assassins), a large, shallow tidal mangrove habitat located approximately 12km south of Andavadoaka. Ampasilava is the smallest of the three SocMon sites, situated approximately 5km south of Andavadoaka, adjacent to a much smaller mangrove habitat.

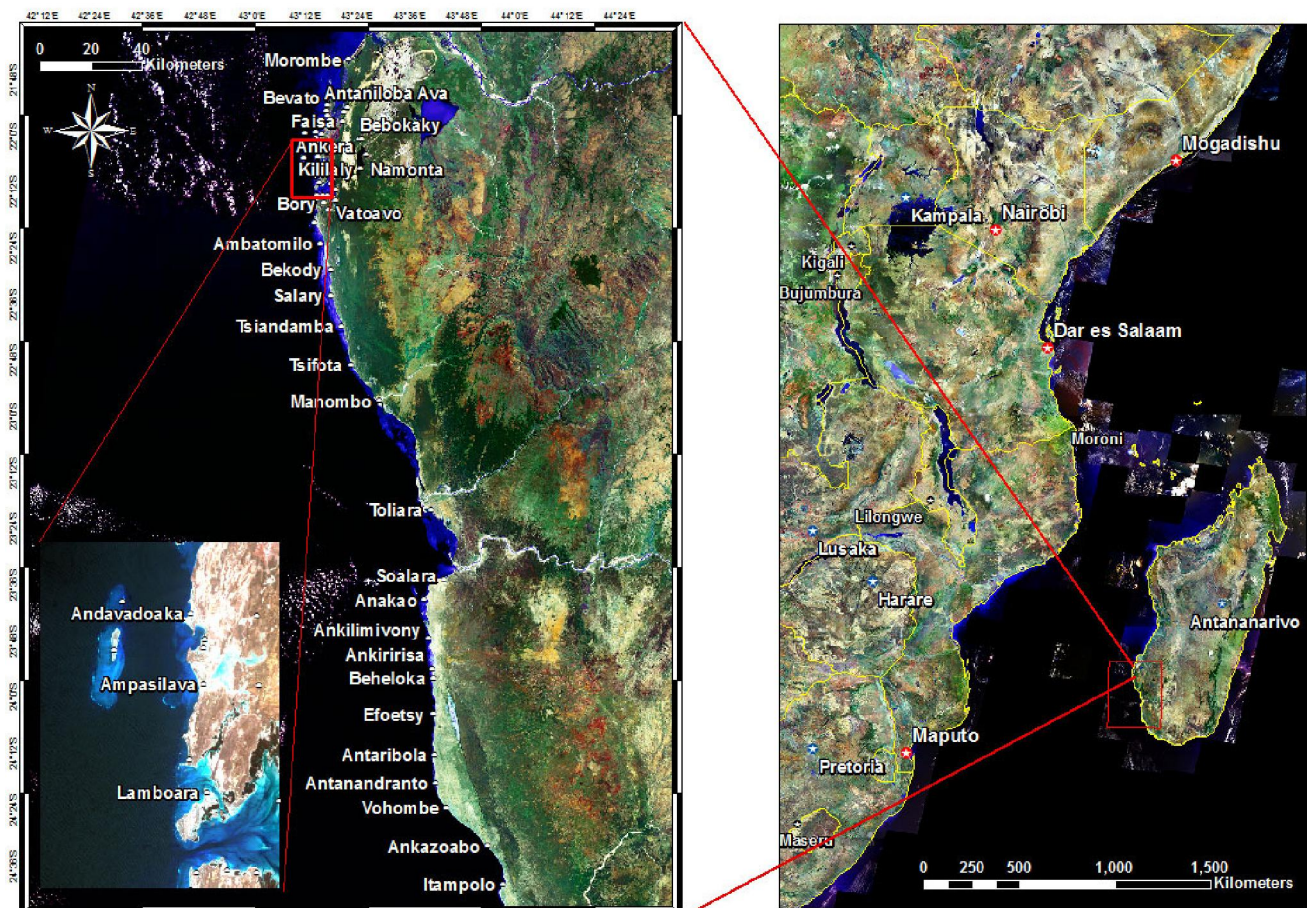


Figure 1 Map of the study area

Research Methodology

This report contains the findings of the second part of a full socioeconomic survey conducted in the three villages between April and July 2006. The first study summarised the demographic and socioeconomic status of the villages, marine activities conducted in the area and perceived community problems¹.

¹ The full report is available online at

http://www.blueventures.org/images/downloads/research/bv-research-report-2007-socmon-part1_compressed.pdf

As previously mentioned, this research on community attitudes and perceptions was part of a larger socioeconomic assessment using five research methodologies; field observations, key informant interviews (KIs), focus groups and a survey questionnaire. To assess community attitudes and perceptions a combination of the above research methods were used.

Key informants

Key informants such as community leaders were used to obtain information on local laws (*dinas*) and other community adopted rules. In contrast to the first socio-economic assessment, the second part did not only include KIs from the community, but also KIs from the Fisheries department in Toliara (Provincial Capital) and from KI the Ministries in Antananarivo.

The Survey

The main research method to investigate community attitudes and perceptions of coastal and marine resources was a survey questionnaire (see Appendix I). This survey looks at the perceived condition of marine and coastal resources, non-use values, success and failures of management initiatives and perceived level of participation in management decisions. Approximately every second household in each village were surveyed, totalling 170 households across all three villages. Probability sampling was used for the collection of qualitative data (survey questionnaire, Appendix I) through systematic sampling of every other household. The average duration of the survey was 17 minutes.

Focus Groups

Focus group interviews with 5-8 participants were conducted in each of the three villages on their perception and attitudes towards marine and coastal resources and the rules and regulations governing them. The main aim of the focus groups was to confirm the quantitative data obtained from the survey questionnaire.

Results and Discussion

Attitudes and Perceptions of the Condition of Marine Resources

Research relating to natural resource management underlines the importance of understanding and incorporating local perceptions into resource management initiatives (Pollnac *et al.* 1997, Pollnac 2000). It is fundamentally important to understand individual perceptions of factors influencing the state of coastal resources before we begin to involve people in community-based management efforts (Pollnac *et al.* 1997). Perceptions can be used to assess the relative value of the resources to the community. Thus respondents were asked to rate their perception of the state of a variety of marine and coastal resources as good, bad or neither good nor bad. They were also given the option of saying ‘I don’t know’ if they did not have an opinion on a particular marine resource.

Marine and coastal habitats

Respondents were asked how they perceived the state of three crucial habitats (coral reefs, mangroves, and seagrasses) upon which the majority of marine resources they utilise depend. Respondents were also asked to indicate the state of marine and coastal resources such as finfish, octopus, sea cucumber and seashells.

Coral Reefs

Blue Ventures has implemented a long-term reef monitoring programme in this area and the initial results show 8-12% hard coral cover on near shore barrier and fringing reef sites which are frequently fished (Nadon *et al.* 2005, Fenner 2006). The relatively low percentage of coral cover suggests that the reefs are vulnerable in this area. Because of the strong dependence on the fish and invertebrates by the communities nearly all of the respondents had a view about the state of the coral reefs, which supports their main livelihood. However, the majority of people in each village thought reefs were ‘neither bad nor good’ (Figure 2). Villages’ perception of the reefs as ‘not bad nor good’ indicates that management strategies need to consider coral reef sustainability to prevent declines in the available marine resources.

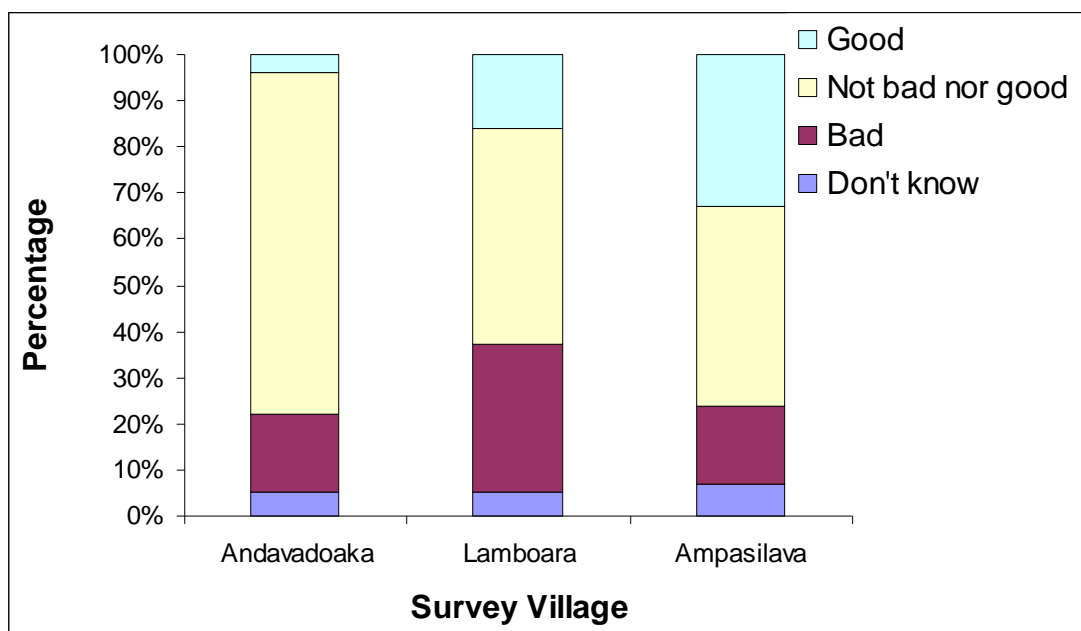


Figure 2 Perceived condition of coral reefs

Mangroves and seagrass

In contrast to coral reefs, a large number of respondents did not express an opinion on the state of the mangroves (Figure 3). This may be because these three villages, while being within walking distance of mangrove forests, were not able to see the linkages between mangrove forests and fish biomass captured from the fishing grounds. Lamboara is situated adjacent to the largest mangrove stand in the region so it might be hoped that their perception would be more reliable. This does not seem to be the case with over 30% of residents responding with ‘I don’t know’. It is also possible that the residents of all three villages feel the mangroves are not as important as other areas such as coral reefs. A degraded mangrove may still appear in reasonable health to the untrained eye, whereas it is obvious to the fishers that the reefs are in poor health when there are fewer fish. Similarly the state of the seagrass beds is perceived as generally good (Figure 4) and this may also be due to that this habitat is not directly used/harvested for food and other resources.

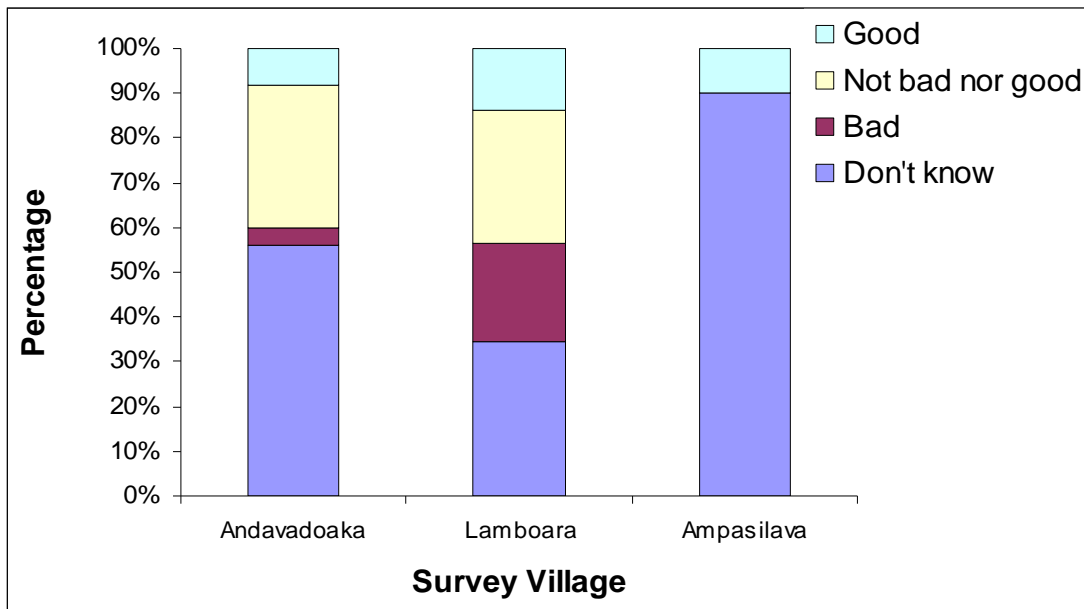


Figure 3 Perceived condition of mangroves

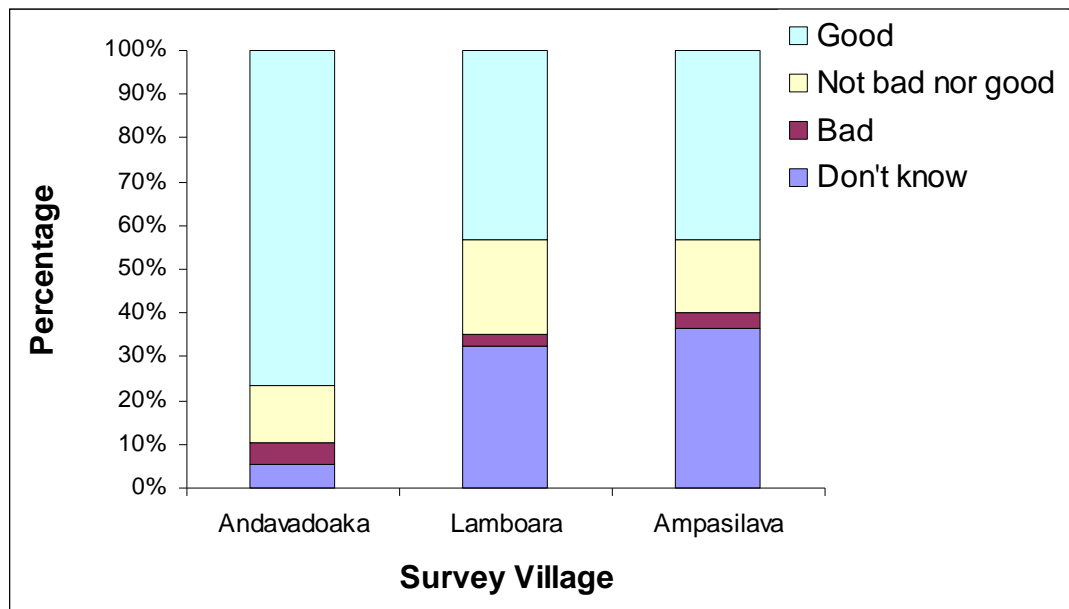


Figure 4 Perceived condition of seagrass

Finfish

The overharvesting of certain species of fish can drastically affect overall reef health and the sustainability of all fish stocks. Removal of herbivorous species allows algae to smother healthy reef, and the removal of predatory species can result in an increase in the density of key invertebrates, for example sea urchins (Roberts 1995). Results from Blue Ventures reef monitoring suggests that the relatively heavy fishing pressure on barrier reefs has not yet significantly affected their reef fish population (Nadon *et al.* 2005) and this is supported by the perceived state of fish stocks around the three survey villages (Figure 5). Previous traditional ecological knowledge (TEK) interviews revealed a consensus that there has been a drastic decline in fisheries resources in the area (Langley, 2006) which was supported by the results from the focus group interviews in this study (Epps 2007).

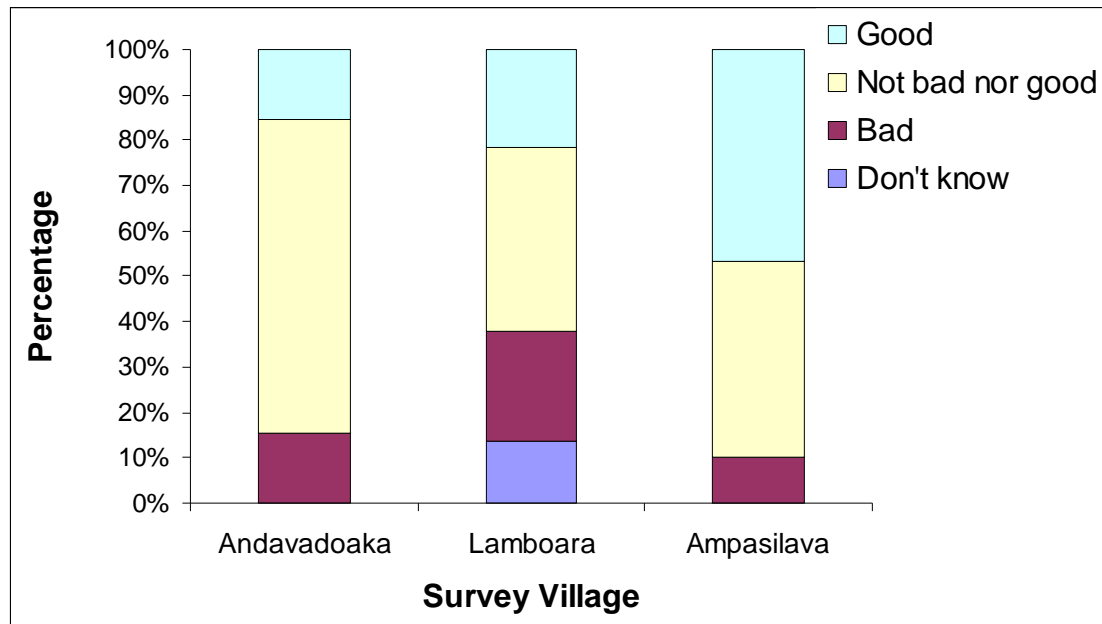


Figure 5 Perceived condition of fish stocks

Octopus

Octopus is the most commercially valuable marine resource in the region and 93% of the catch is exported for the international market (Epps 2007). Two commercial fish collection companies operate in the Andavadoaka region, Copefrito and Murex. They offer refrigeration at the point of collection within villages throughout the region, and in doing so provide access to more lucrative markets for local fishers (L'Haridon 2006). In order to ensure the sustainability of octopus stocks in the region, Blue Ventures has been working on the establishment of octopus no take zones since 2004 (Humber *et al.* 2006). Community meetings were held frequently to explain the value of no take zones (NTZ) to the fishermen and ensure community involvement and support of the project. As a result of these meetings awareness of octopus stocks is very high and every respondent in Andavadoaka gave an opinion (Figure 6). In Ampasilava and Lamboara only 3% of respondents gave a 'don't know' answer, suggesting that the octopus no take zone programme has been adequately publicised and explained in all three of the villages. It is interesting to note that in spite of the management measures put in place through the use of NTZs, a reasonably large percentage (38%) of respondents in Lamboara still perceive the state of this resource as bad. This suggests that the NTZ programme may not be yielding benefits to everyone yet.

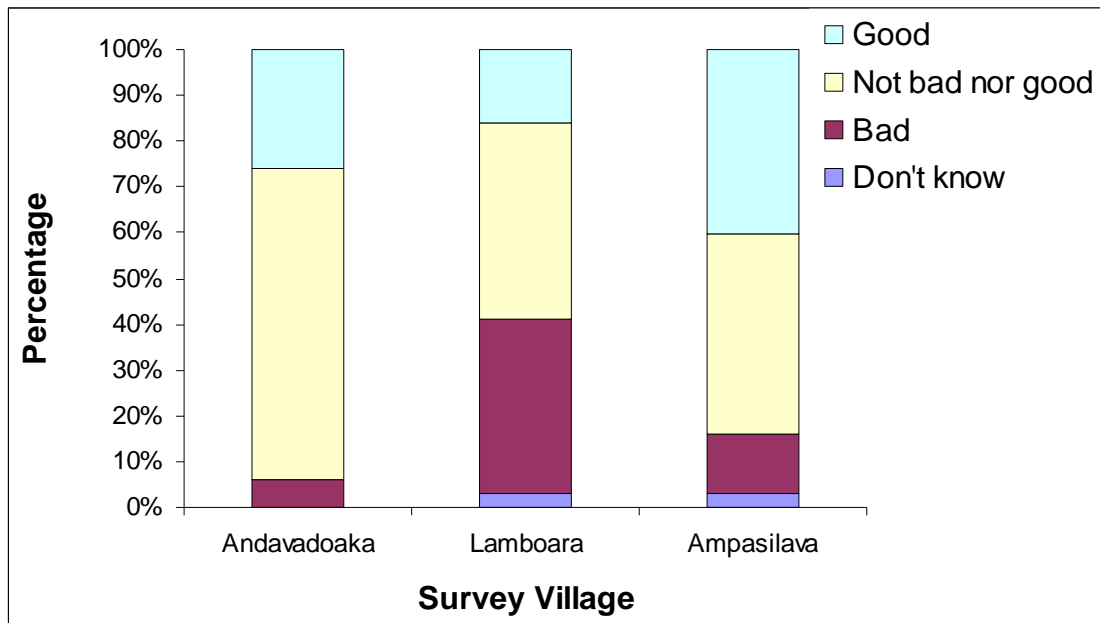


Figure 6 Perceived condition of octopus stocks

Sea Cucumbers

Sea cucumbers have been exported from Madagascar for the international market since the early 20th century (Conand & Mara 2000). Collectors are known to operate along the coast between Toliara and Morombe with most species of sea cucumber harvested by free diving or using SCUBA. Local fishers in Andavadoaka also harvest sea cucumbers when gleaning (Langley 2006). Recently local fishers have reported that sea cucumber numbers have decreased dramatically since collection began, primarily on the near shore reefs (Langley 2006) and this evidence is supported by the villages’ perception of the state of sea cucumber stocks in the area. All three villages thought that sea cucumbers were in a bad state, in particular Andavadoaka and Lamboara where respondents selected ‘bad’ 82% and 76% respectively (Figure 7).

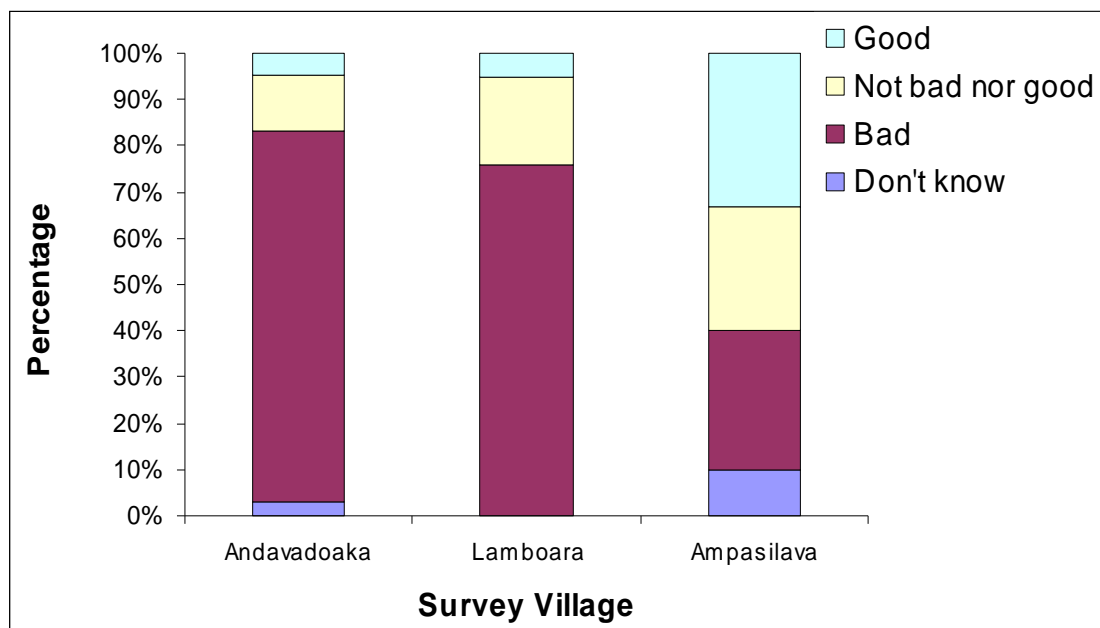


Figure 7 Perceived condition of sea cucumbers

Seashells

Lamboara has recently developed its market in *katra* or cowrie shells (*Cyprae spp.*). These are easily collected *en mass*, mainly by women and young children at low tides and bought by the epi-bar owner for as little as 300 MGA/kg (eq. 0.16 USD/kg) (Epps 2007). The majority of all three villages believe there are plentiful seashells (Figure 8). Lamboara gave the most negative responses and this is probably as a result of the recent growth in the exploitation of shells in this area due to the expanding market.

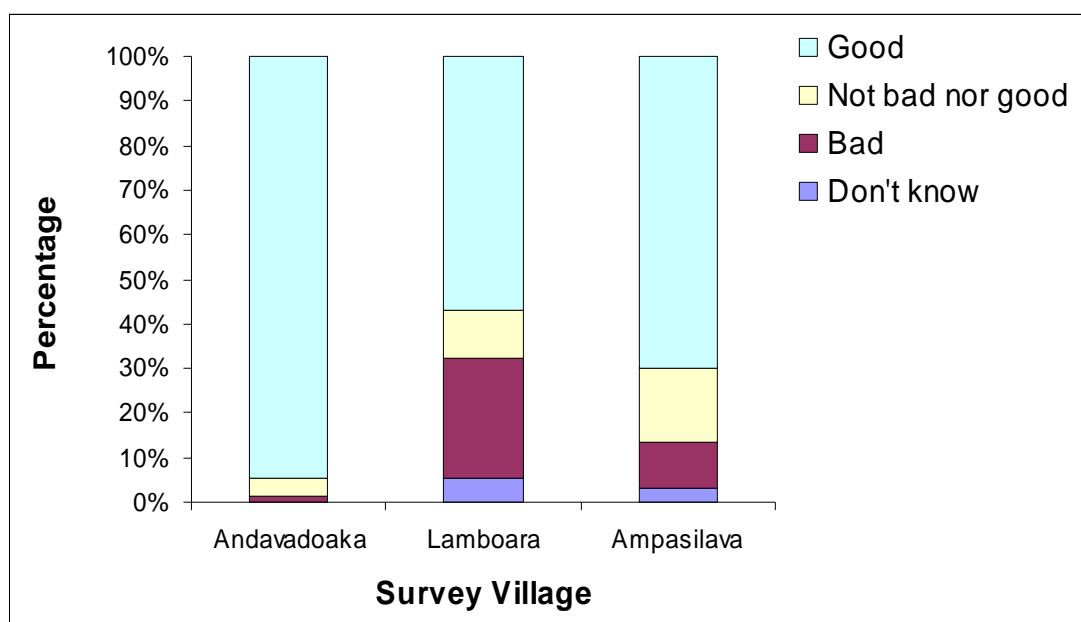


Figure 8 Perceived condition of seashells

Environmental awareness

Use and non-use values of marine and coastal resources

Non-use values refer to the value attached to a resource, independent of the direct use of it (O'Garra 2006). There are two main non-use values: bequest value, and existence value. While these may be commonly used values in the western world, in countries such as Madagascar where survival is directly dependent on the sustainability of marine resources, such abstract ideas may be difficult for local communities to grasp.

In order to assess a respondent's level of understanding of environmental processes and interactions, they were asked to state their level of agreement with the following statements:

- a Coral reefs are important to protect the land from storms
- b If we destroy the mangroves there will be less fish to catch
- c Coral reefs are only important if you fish or dive (existence value)
- d Fishing should be limited in some areas, even if people do not fish there, to allow fish and coral stocks to develop (existence value)
- e We need to limit coastal development to protect the environment for future generations (bequest value)
- f Large scale collection of seashells can damage the marine environment
- g Sea cucumbers have temporarily disappeared
- h Damaged coral can re-grow in 5 years

There were significant differences in the level of understanding across the three villages. The statements can be grouped into those related to basic marine ecology (a, c, g, h), and those which refer to a slightly more advanced understanding of the relationships between human action and environmental health (b, d, e, f). Figure 9 shows the responses to two basic marine ecology statements, and suggests that environmental awareness in these three villages is particularly high, possibly due to the presence of Blue Ventures Conservation, an international NGO working in the region.

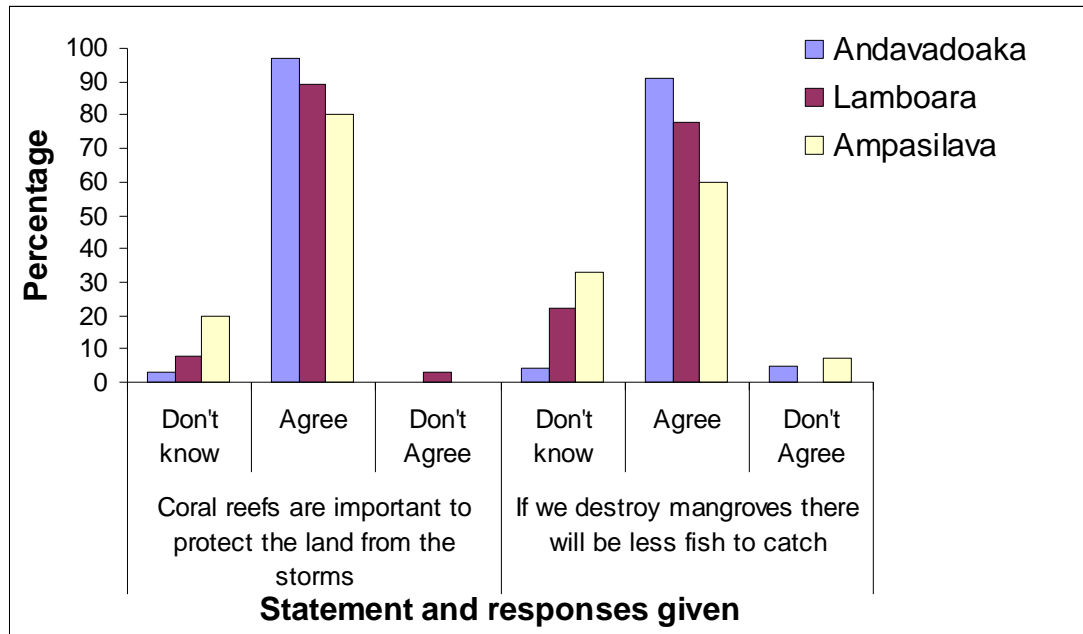


Figure 9 Respondent agreement with statements ‘a’ and ‘b’

Statements related to basic ecology produced more similar answers from the respondents. The slightly more complicated issues of ecosystem interaction generated larger divides in the responses given. In particular statements ‘e’ and ‘c’ seemed to generate some confusion with responses split between all three options. While these statements relate to the idea of ecosystem interaction, they are also assessing their understanding of non-use values. Statement ‘e’ is designed to demonstrate the bequest value of marine resources, conserving them for the enjoyment of future generations independent of one’s own or current use. Less than 20% of respondents in each village agreed with this bequest value statement suggesting they are not thinking in the long term, but are primarily concerned with their own survival (Figure 10).

Existence values relate to the value associated with the actual existence of an asset (in this case coral reefs) independent of one’s use of the asset (O’Garra 2006). Similarly to the assessment of the bequest value, the respondents in all three villages did not seem to understand the linkage between the existence of coral reefs and their survival, with over 50% of villages in all three communities responding with ‘don’t know’ (Figure 11). It is however encouraging to note that respondents seemed to agree with statement ‘d’, that some areas should be left un-fished to allow coral and fish stocks to develop. This may be related to the success of the octopus NTZs, which has made them aware of the benefits of NTZs and fishery closures.

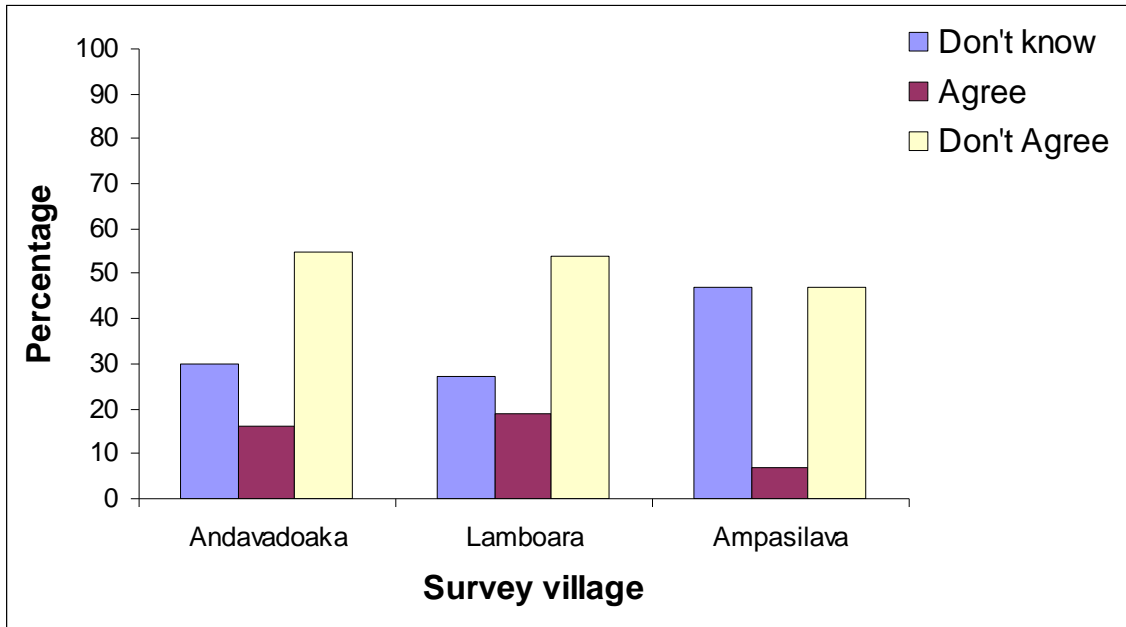


Figure 10 Assessment of non-use bequest values: Respondent agreement with statement 'e': We need to limit coastal development to protect the environment for future generations

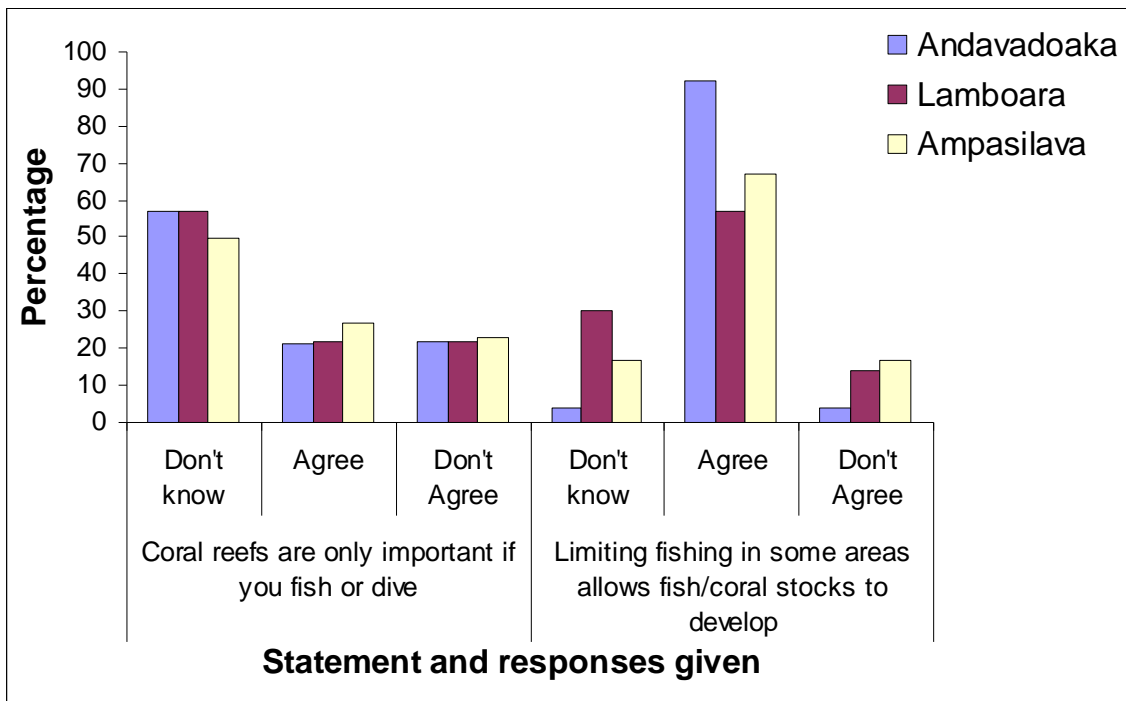


Figure 11 Assessment of non-use existence values: Respondent agreement with statements 'c' and 'd'

Statement 'f' (large scale collection of seashells can damage the marine environment) is the only statement to which the majority of respondents in each village disagree (Figure 12). The negative impacts of overharvesting of seashells had not been discussed with any of the villages at the time of surveying as this was a newly developed harvest species. Given the newly developed exploitation of shells, environmental awareness regarding the devastating ecological consequences of extracting up to ten

tonnes of shells during a period of 7 months needs to be addressed. Future environmental education programmes should include information regarding the collection of shells and the potential risks of overexploitation.

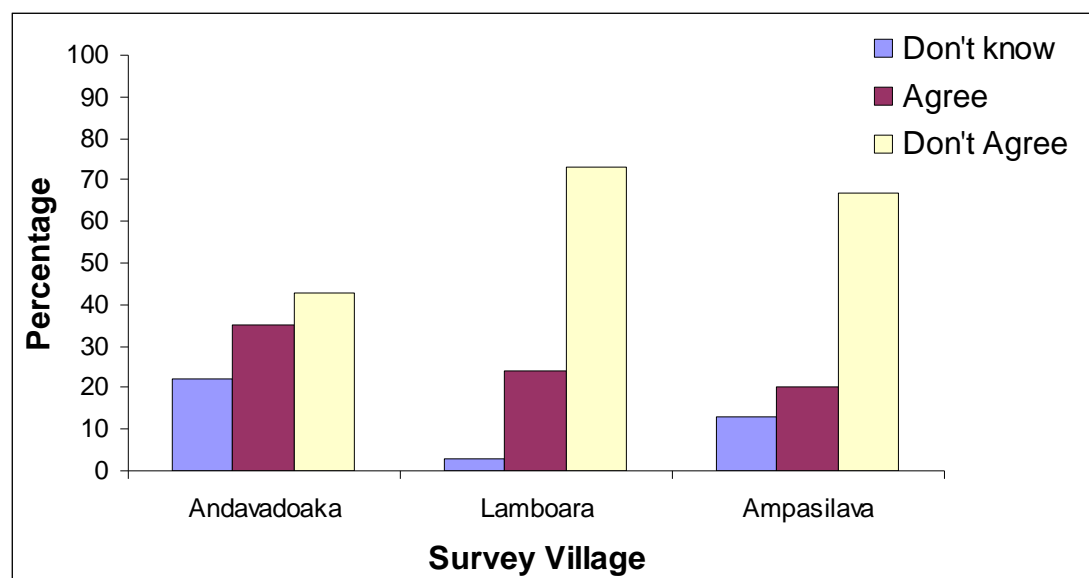


Figure 12 Respondent agreement with statement f: 'Large scale collection of shells can damage the marine environment'

There are still some fundamental knowledge gaps in the understanding of some basic aspects of marine ecology. The responses to statement 'g', that sea cucumbers have temporarily disappeared is indicative that the respondents have not made the link between their actions and the reduced sea cucumber numbers (Figure 13), assuming that they have 'temporarily disappeared' and that they will eventually return. Following over exploitation in response to high international demand, sea cucumber populations have been decimated in southwest Madagascar and significant reductions in numbers have been recorded around Ampasilava (Iida 2005). Fishers have begun night fishing by torchlight as numbers have decreased so much from day time fishing efforts (Langley 2006). Many fishers have now stopped actively fishing for sea cucumbers due to the collapse of the market; sea cucumbers had declined to such a low level that they could no longer support an export market. However, in some villages in the region fishers have now started to dive for them in deep water using unregulated and ill-kept SCUBA equipment with little regard for safe dive protocol, despite national laws banning this practise (see Figure 24 for more information on this).

It is also worth noting that the level of understanding appears to differ between the villages and there is some disparity in responses of the different villages which should be highlighted, in particular the response to statement 'h'. Figure 14 shows that the majority of respondents in both Ampasilava and Lamboara agreed with the statement that damaged corals can re-grow in five years (90% and 86% respectively). However, the majority of respondents from Andavadoaka (65%) responded 'don't know'. This suggests that while they are aware that coral may take longer than that to regenerate, they are not truly aware of the time scale. This gap in knowledge may be attributed to the confusion caused by environmental awareness raising efforts from conservation organisations working in the area promoting sustainable management, which are suggesting that marine and coastal habitats and their resources can recover.

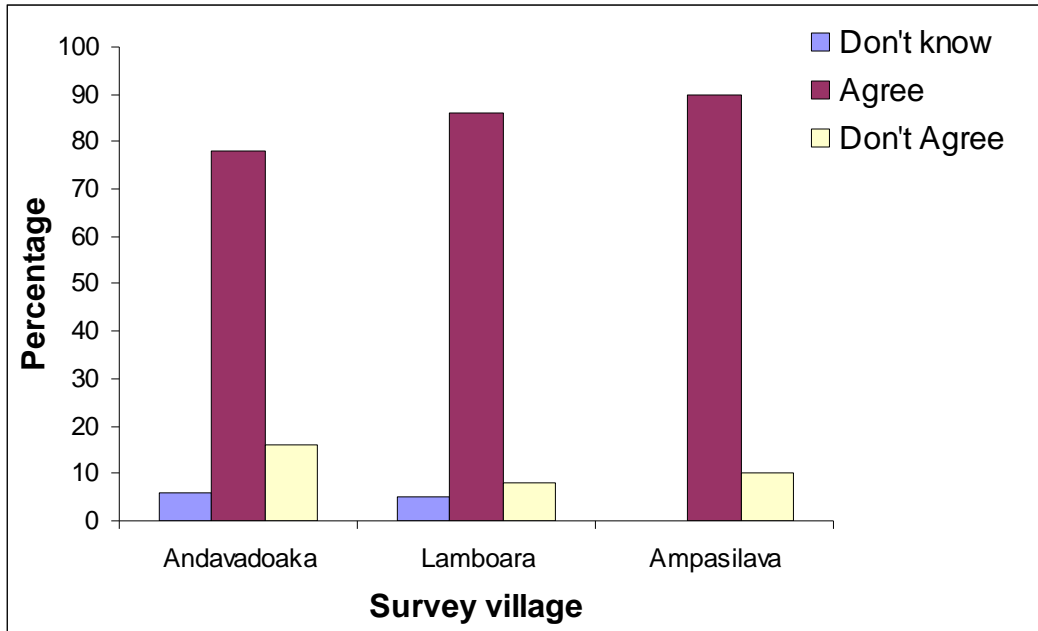


Figure 13 Respondent agreement with statement 'g': Sea cucumbers have temporarily disappeared

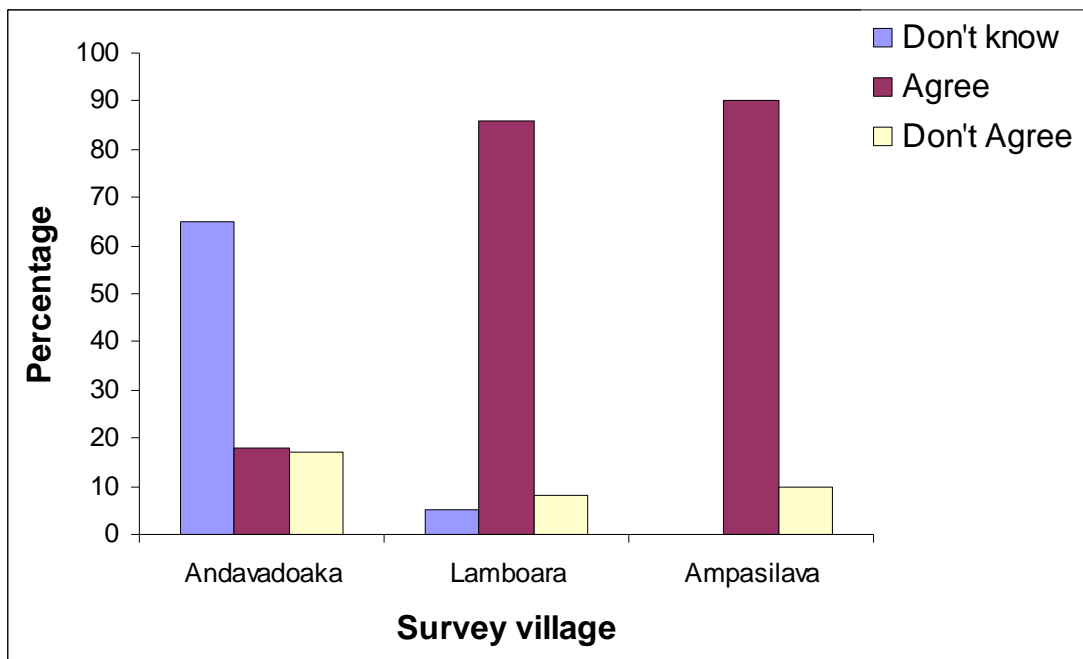


Figure 14 Respondent agreement with statement 'h': Damaged coral can re-grow in 5 years

Community involvement in management decisions

Community members were asked to assess what they felt their level of involvement was in local management decisions. This produced mixed results as the figures show that both Lamboara and Ampasilava felt less involved than the residents of Andavadoaka, and that Ampasilava in particular was unhappy with the current level of involvement. This may be because Andavadoaka is the largest community, and management decisions are often discussed with the elders and local leaders here before

being communicated to the smaller, neighbouring villages. Representatives of all villages are invited to attend these meetings, but there is still a clear lack of dissemination of the information discussed at the meetings to the smaller communities.

Management decisions to date have primarily been related to the development of the octopus NTZ and the initial steps towards the establishment of a community run marine protected area (MPA). This involved using a participatory mapping process to identify the key areas for the MPA. The majority of the meetings have been held in Andavadoaka as it has the only suitable meeting place which is large enough for all the participants. Figure 15 shows how the respondents from Andavadoaka perceived their level of involvement in local management decision, and suggests that while 44% reported no involvement the majority were involved in some way. In Lamboara, a similar number of respondents stated they had been involved in management decisions (Figure 16). In Ampasilava over three quarters of respondents (77%) felt that they had no involvement in local management decisions (Figure 17).

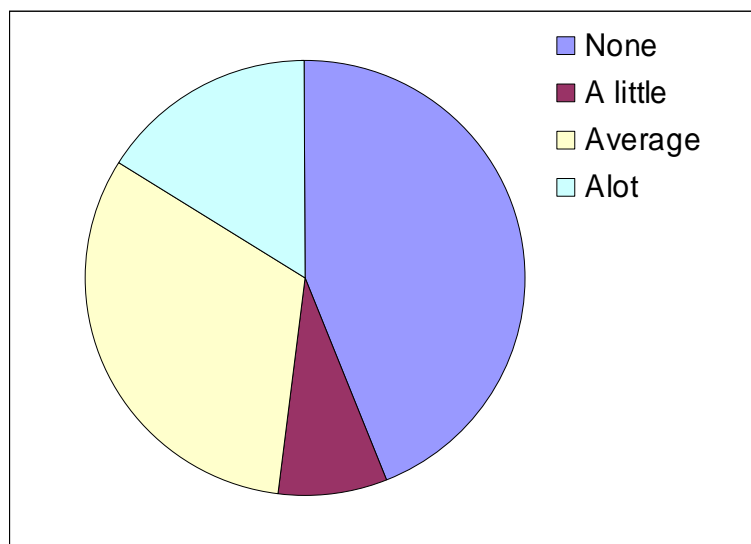


Figure 15 Perception of the level of participation in management decisions: Andavadoaka

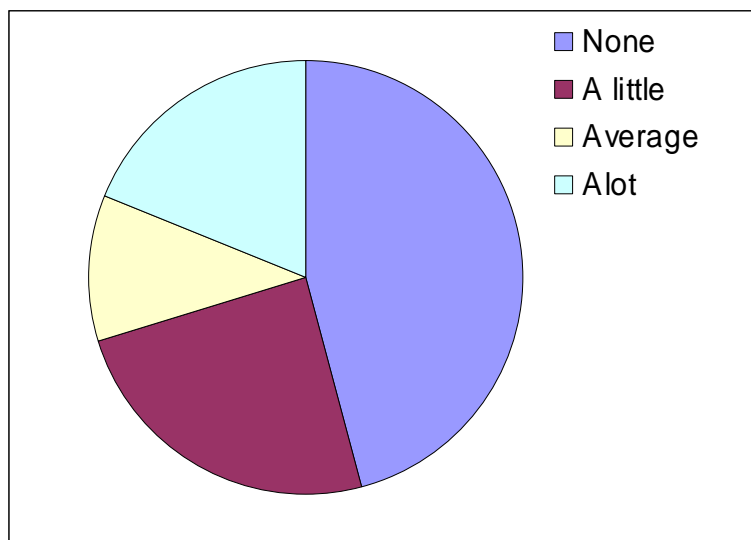


Figure 16 Perception of the level of participation in management decisions: Lamboara

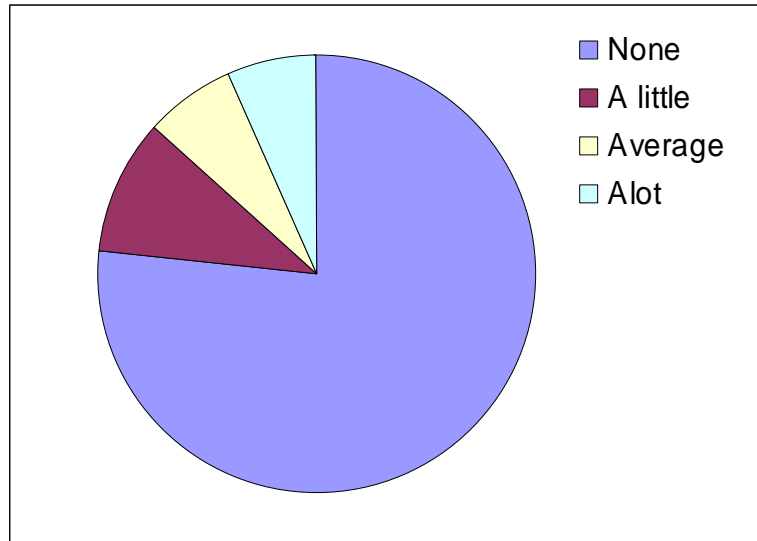


Figure 17 Perception of the level of participation in management decisions: Ampasilava

It is also important to consider whether the respondents were satisfied with their level of involvement in decision-making processes in order to adapt future management strategies to enhance or maintain community involvement. The respondents from Ampasilava were least satisfied with their level of involvement suggesting that they would like to be consulted more widely by the coastal managers in the area (Figure 18). The majority of respondents from Andavadoaka were content with their level of involvement which indicates that some members of the community do not want to be involved in management decisions, and are happy for others to take on that responsibility.

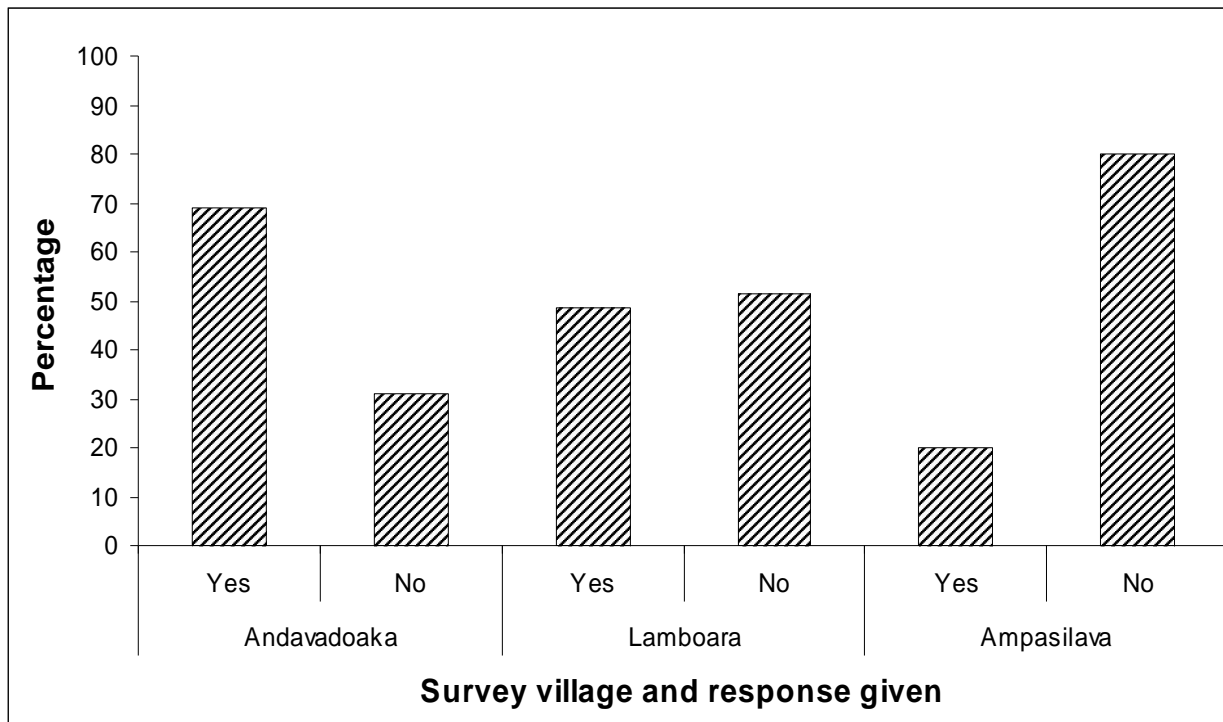


Figure 18 Satisfaction with the level of participation in local management decisions

Awareness and perceived compliance of rules and regulations

In small subsistence coastal communities, national rules put in place by the national government often lack monitoring, surveillance and enforcement, and as a consequence are often not adhered to by the communities. However, regional or local marine tenure regulations frequently exist and are often adhered to more strongly than national laws (Cinner 2005). This appears to be the case in SW Madagascar, where localised control of marine resources may aid long-term sustainability more than national regulations. In order to assess these differences, respondents were asked to state their awareness of existing rules and regulations, compliance by their community and whether they were being enforced. The following list of rules and regulations applicable to marine and coastal resources was derived through interviews with key informants (KI) supplemented by a literature review.

Octopus Fishing

1. NTZs (Local)
2. Minimum catch size for octopus 350g (National)
3. Seasonal closure (National)

Fishing gear and practices, and minimum catching/landing sizes

4. Use of beach seine net (National)
5. Use of poison (Iaro) for fishing (National)
6. Destruction of coral during fishing (Local and national)
7. Fishing using SCUBA equipment (National)
8. Minimum catch size for sea cucumber (fresh and dried) (National)
9. Limits to net size (2 finger minimum) (National)
10. Ban on mosquito net use (National)

Lobster fishing

11. Annual national closure (National)

Sardines

12. Annual closure (National)

Turtle fishing

13. National ban on turtle fishing (National)

Forest/timber

14. Authorisation for forest exploitation and compensatory payments (Local)

Respondents were asked about their perception of the awareness of the abovementioned rules and regulations, whether there was compliance to these and whether they were being enforced. It is evident that management initiatives relating to the highly valuable commercial crop of octopus have been well publicised in the region, as in all three villages, percentages for awareness, compliance and enforcement of the octopus reserves, minimum catch and landing size and octopus no take zones was primarily over 90% (Figure 19).

Lobster and sardine closures (Figures 20 and 21) in comparison with octopus regulations have not been publicised in the region and less awareness and perceived compliance was shown with these. Awareness of these rules and regulations were still reasonably high in all three villages (over 70%) but there is significant deviation in the responses given.

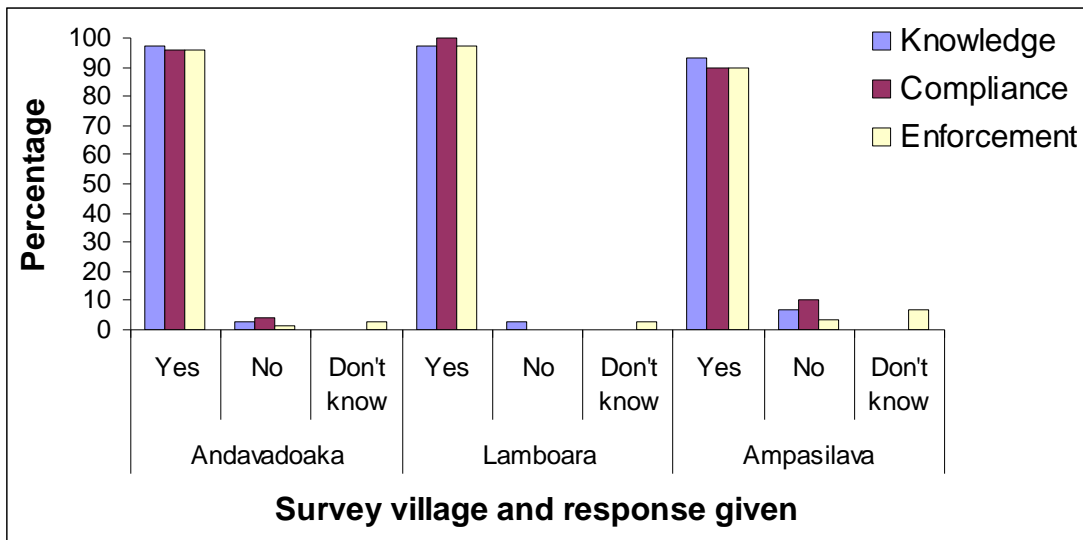


Figure 19 Knowledge, compliance and enforcement of octopus no take zone fishing closures

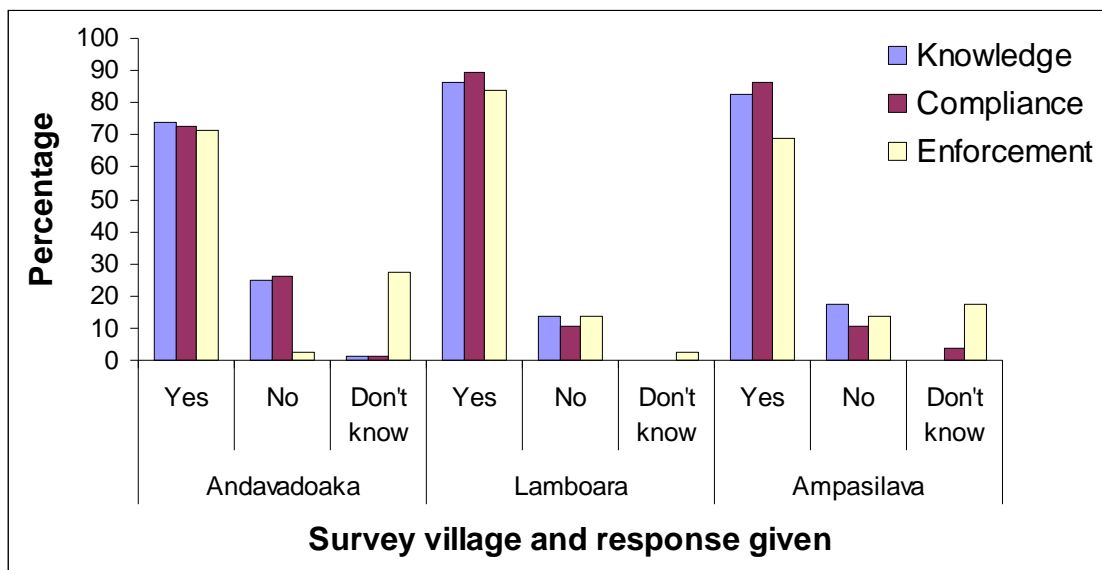


Figure 20 Knowledge, compliance and enforcement of langoustine fishing closures

The majority of respondents were aware of the ban on using seine nets from the beach (Figure 22). However, the results suggest that this practise is still occasionally being used, particularly in Lamboara and Andavadoaka. Similarly, nearly all respondents (99%) were aware of the ban on using ‘laro’ a poison derived from plant materials to catch fish and nearly all believed that there was compliance with this regulation (99%).

National fishery regulations state that it is forbidden to take and damage corals thus making destructive fishing practises illegal. Village awareness of rules relating to damaging corals while fishing is reassuringly high, particularly in Ampasilava where compliance is 100% (Figure 23). Despite this, a third of respondents in Andavadoaka and Lamboara stated that the law was not enforced (32% and 38% respectively). It is possible that environmental education programmes initiated by Blue Ventures have aided compliance with this rule.

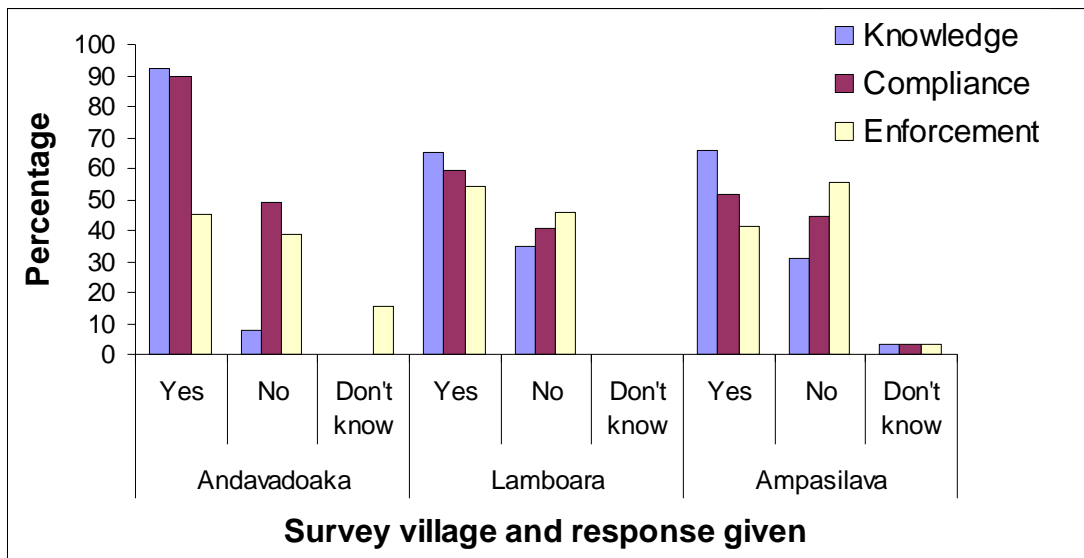


Figure 21 Knowledge, compliance and enforcement of sardine fishing closures

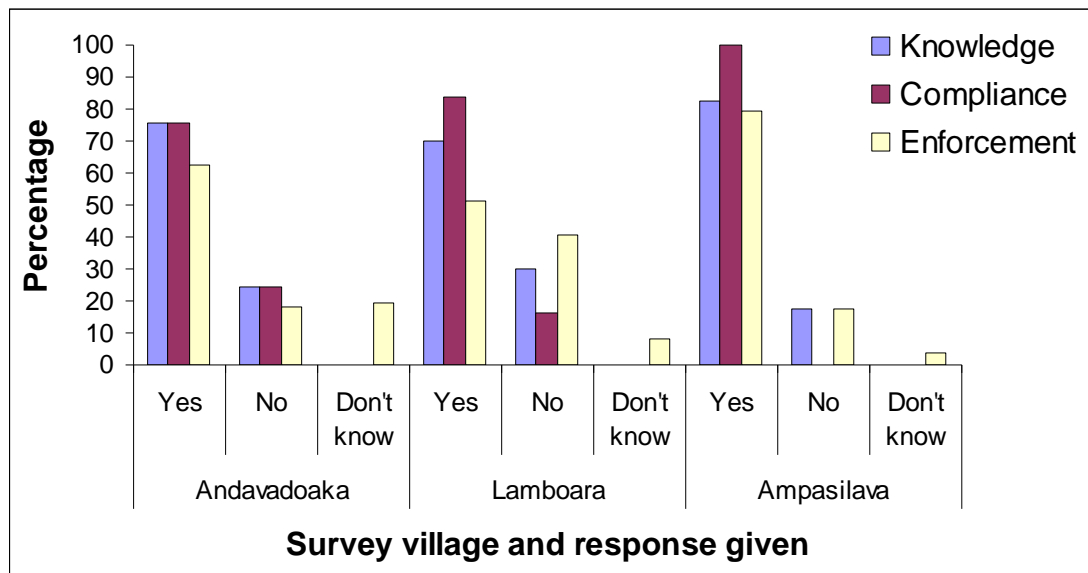


Figure 22 Knowledge, compliance and enforcement of beach seine netting

There still appears to be a slight lack of awareness of the ban on fishing using SCUBA equipment (Figure 24). This is a safety regulation as the SCUBA equipment used is often poorly maintained and incomplete, and several serious cases of decompression sickness have occurred following bad dive protocols. The practise of using SCUBA is primarily used by “outsiders” for sea cucumber fishing as the shallow regions have been overfished. The national ban helps to reduce fishing pressure in deep water areas and allows species to regenerate at depths beyond the reach of free diving fishermen. This may create natural spill over effects with adults spawning in deep water areas and the juveniles settling in shallower water within reach of the fishermen. Many people are aware of the dangers of unregulated SCUBA use. However illnesses resulting from diving are often attributed to traditional beliefs and bad spirits rather than being

associated with diving so there are cultural barriers to understanding the environmental and personal effects of the untrained use of SCUBA.

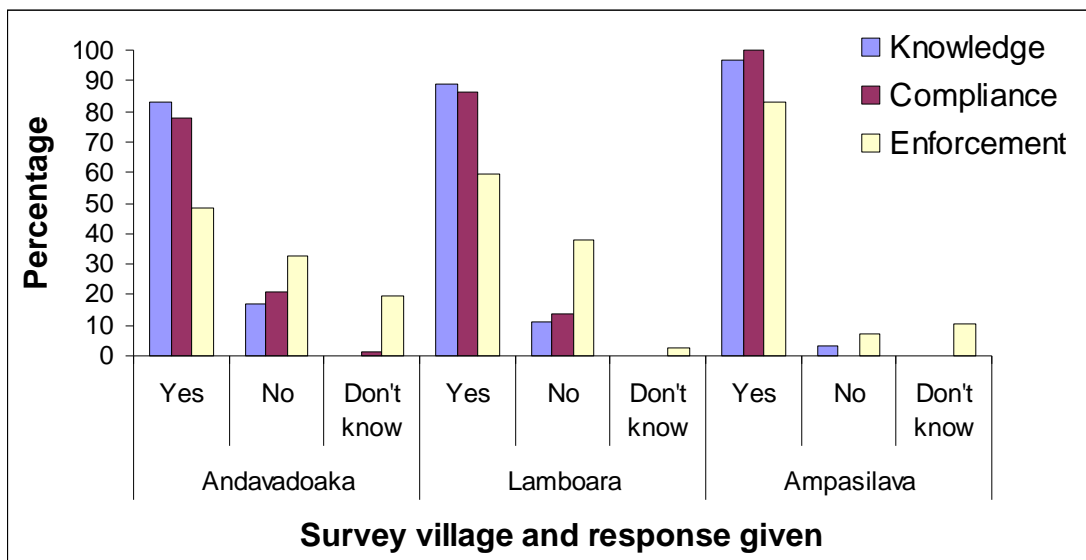


Figure 23 Knowledge compliance and enforcement of laws relating to destructive coral fishing

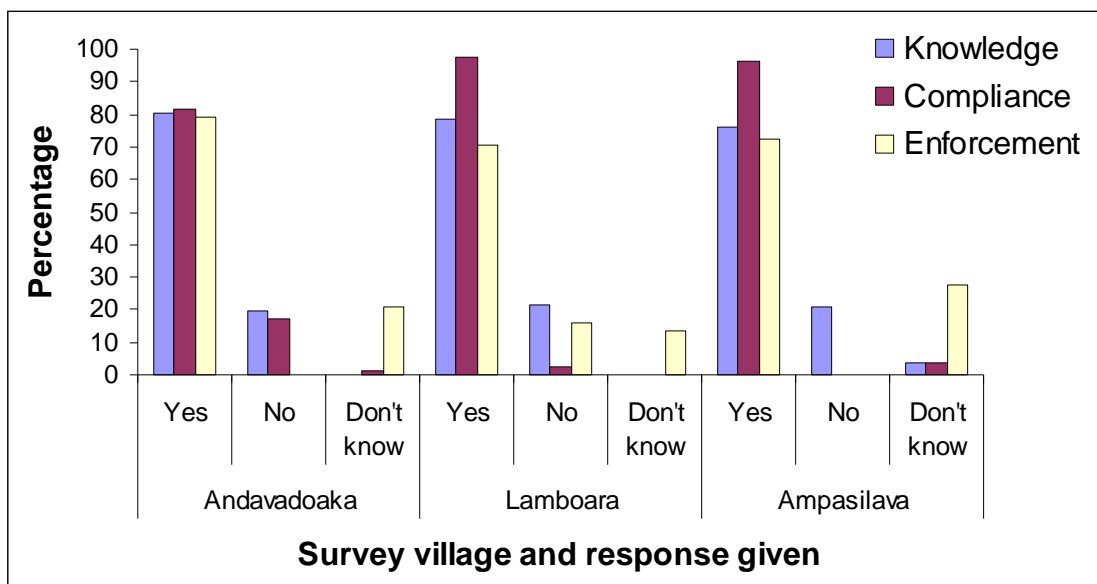


Figure 24 Knowledge, compliance and enforcement of rules relating to fishing with SCUBA equipment

There are some distinct differences between the three villages, where generally Lamboara and Ampasilava have substantially less knowledge and compliance of laws than Andavadoaka. The difference is most prominent on national rules and regulations relating to minimum catch size of sea cucumbers, minimum net size and the ban on the use of mosquito nets.

The sea cucumber fisheries in the region have been dramatically exploited in recent years and the minimum catch size for sea cucumbers was brought in to reduce stock declines. Nearly 100% of the

respondents from Andavadoaka were aware of the minimum catch size, but this declines to 84% in Lamboara and 69% in Ampasilava suggesting that the law has not been communicated well between the villages (Figure 25).

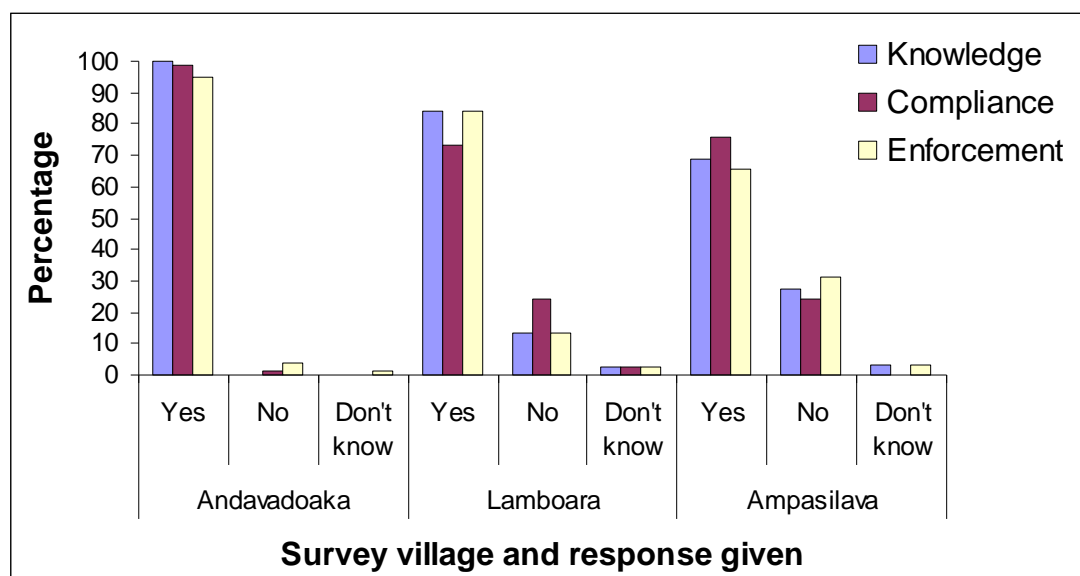


Figure 25 Knowledge, compliance and enforcement of minimum catch size for sea cucumbers

A minimum net size of 2 ‘tondro’ (equivalent to approximately 2cm) is a national rule applying to all fisheries. This is a pre-colonial law established in 1922 to reduce fishing of juvenile fish. Andavadoaka is 100% aware of this rule and 97% believed that there was compliance (Figure 26). In Lamboara the compliance levels were as low as 43%. Andavadoaka is the largest and most developed of the three villages and may be able to exploit other marine resources seasonally when juvenile fish are abundant thus obeying the minimum net size regulation. The ignorance of this law by the smaller communities indicates that it has either been poorly communicated, and they are genuinely unaware of it, or the decline in fish stocks has forced them to fish smaller juvenile fish using smaller mesh sizes for survival.

Similarly there are slightly lower levels of perceived compliance in the two smaller villages in response to the use of mosquito nets for fishing, although generally this is quite high in all three villages (Figure 27). Local fishermen reported declines in fish numbers following the introduction of ‘jahoto’, a seine net with mosquito net size mesh (Harding *et al.* 2006). Fishers’ awareness of the decline in fish stocks following the use of very fine mesh nets may explain why awareness that this is now illegal is greater than for the minimum net size law.

The level of awareness and perceived compliance with rules on turtle fishing ban was significantly lower (Figure 28). This is particularly alarming as there is a global ban on turtle fishing and all of the 5 species of sea turtles found in the waters around Madagascar are listed on the IUCN red list. Madagascar is a signatory to the CITES convention which bans trade in endangered animal products, and legislation was brought in to protect all species of sea turtle from exploitation in 1923 (Okemwa *et al.* 2004). However, fishers in the Andavadoaka region are not exporting their turtle catch, rather they see it as a source of protein and income through local sales, so the enforcement and policing of national laws is difficult. There are also cultural issues surrounding turtles, as they are considered a ‘gift from god’ among the Vezo. There are a number of traditional ‘fady’ laws surrounding their capture and subsequent death and the value of a turtle catch to the fisher may far outweigh the risks of being caught (Astuti 1995). However, it is worth noting that turtle catches in the three survey villages are a rare occurrence, and turtle

catches are often a result of by-catch rather than targeted fishing. Nonetheless, Blue Ventures has developed a specific shark and turtle monitoring project to focus on these fisheries and increase local awareness of the importance of these species to the marine environment.

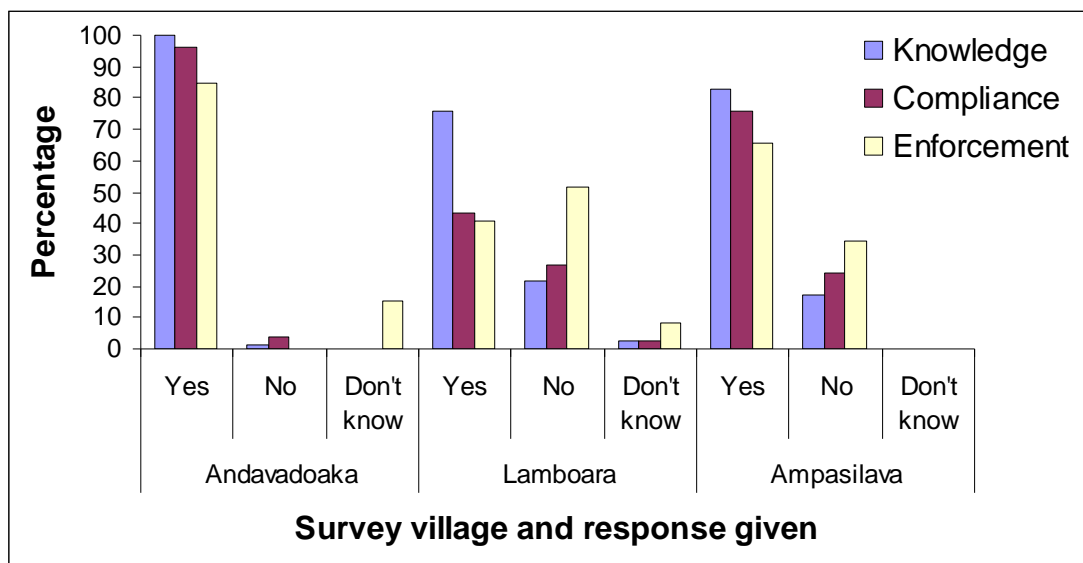


Figure 26 Knowledge, compliance and enforcement of minimum net size regulations

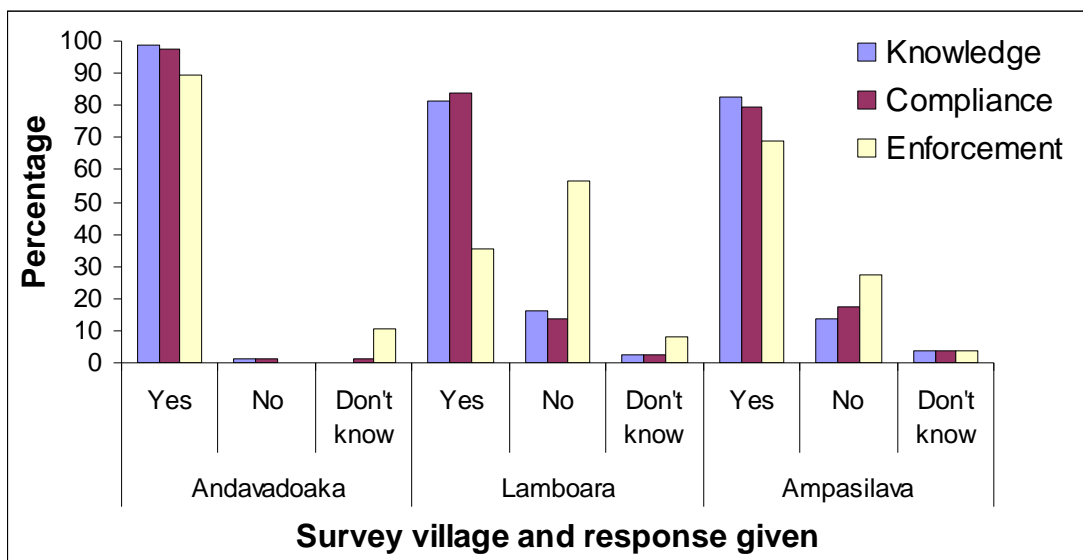


Figure 27 Knowledge, compliance and enforcement of the ban on mosquito nets

In early 2006 a law aiming to protect areas of forest within the Commune of Befandefa was implemented. This law includes mangrove forest and states that: before any tree is cut for fuel, people must apply for a permit from the mayor and pay a small fee. A forest guard is employed to enforce this rule and anyone caught removing wood without a permit is fined. General awareness of this law in the three villages was fairly low ranging from 77% in Andavadoaka to 28% in Ampasilava and levels of perceived compliance and enforcement were also low in Lamboara and Ampasilava (Figure 29). This was a relatively new law at the time of survey, and the level of awareness, perceived compliance and enforcement may increase

over time. However, it is apparent that awareness of the value of mangrove forests to the marine ecosystem needs to be raised within the communities, and this law needs to be more widely publicised.

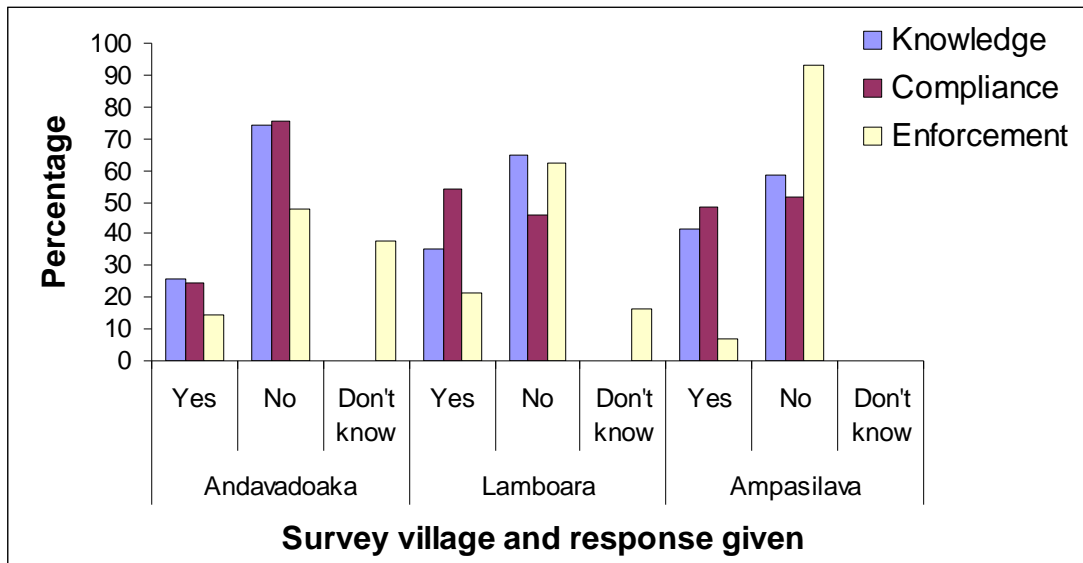


Figure 28 Knowledge, compliance and enforcement of fishing regulations related to turtles

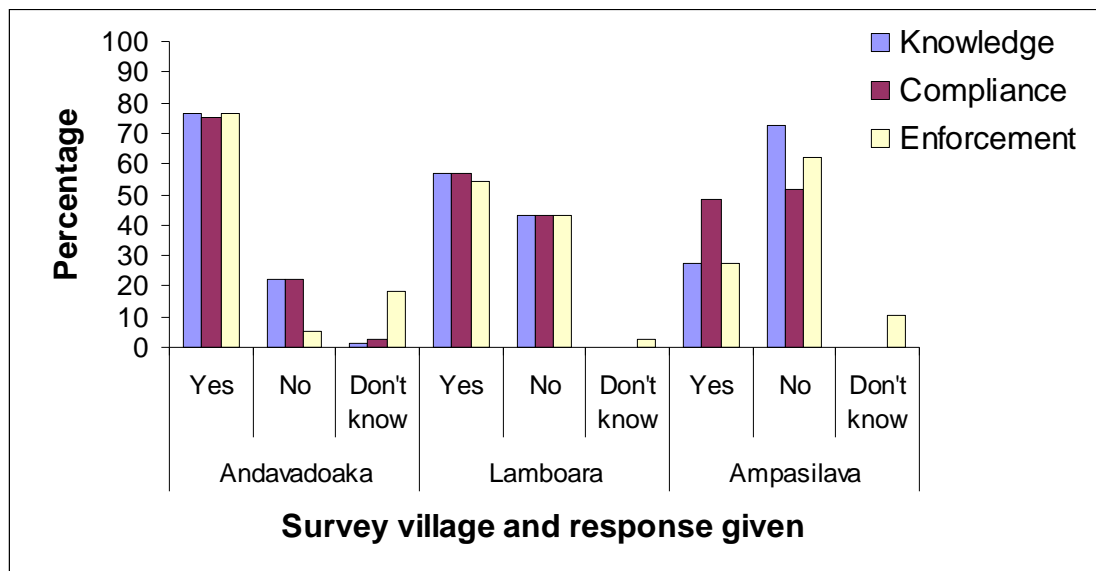


Figure 29 Knowledge, compliance and enforcement of forest compensatory payments

Conclusions

Factors influencing attitudes and perceptions of marine and coastal resources

Developing an understanding of how local communities perceive natural marine resources allows resource managers to adapt and refine management strategies to reflect the needs and desires of the different stakeholders. However, it is also important to recognise that communities may not have a single perception of the marine environment, and socioeconomic factors will influence how individuals within a community perceive their resources (Cinner & Pollnac 2004), rather perceptions will vary according to the specific usage of the villages and the individual respondents. If a respondent is an octopus fisher, they are more likely to have an opinion on the state of this resource, compared to a street vendor selling nuts and fruit. Considering that almost all households are engaged in fishing activities either as a primary or secondary income, the latter is unlikely, but the type of fishing activity may also dictate the attitude and perception of a particular resource. The results presented in this study compared villages as a whole and did not distinguish responses by demographics such as primary and secondary occupations. The difference in perception amongst the various age groups should also be considered when developing awareness raising programmes of marine and coastal management interventions.

Gender aspects

Gender is another important factor determining the attitude and perception of marine and coastal resources. Most women interviewed in this study said that they mainly got their information from their husbands. It is predominantly the men who attend the village meetings, while the women are left behind to cook and look after the smaller children. Observations and discussions with women during the course of this study revealed that women often showed more concern for future generations and their children's future employment opportunities as fishing resources diminish. Furthermore, the resource use patterns and the attitudes that govern these vary significantly between men and women. These differences need to be considered when developing marine and coastal management interventions.

Education

The residents of Andavadoaka may be considered the 'richest' in terms of material wealth. They also have the best access to schooling and education which is coupled with a higher level of environmental awareness. There is also a positive correlation between the presence of Blue Ventures in Andavadoaka and the higher levels of understanding of marine and coastal environmental processes in this village. However, knowledge gaps for all three villages are documented, underlining the need for further training and capacity building workshops to raise awareness in all three communities.

Proximity

Proximity to a particular resource or habitat, as well as the usage of this resource will determine a respondent's attitude to and value of the resource. The lack of direct usage of a resource or distance, such as a mangrove forest, appears to reduce respondents' awareness and perceived value of this resource.

Dependence

The level of dependence on a particular resource or habitat significantly determines respondent attitude and perception of that resource. When respondents failed to see the interrelationship between habitats and resources, such as between coral reefs, seagrasses, mangroves and fish biomass, the value or awareness of the resource decreased. It is therefore crucial to invest in raising the awareness of the functioning of ecosystems and the linkages between the direct and indirect benefits.

Involvement in management decisions

Gauging attitudes and perception is extremely difficult. Community perception of their participation in management decision in two of the three villages is at an acceptable level. This is crucial for the longevity of the MPA. If communities are unsatisfied with any aspect of management and feeling excluded from the decisions, they are more likely to break rules and jeopardise the sustainability of the marine resources. It is also worth noting that a portion of the residents of Andavadoaka and Lamboara stated that they were not involved in the management decisions for coastal management initiatives, but that they are satisfied with this. The reason could either be that they have no stake in the fishery or other resource, or that they have not correctly understood the question. However, respondents were asked to repeat or explain how they interpreted this particular question owing to the complexity of this question and to ensure a reasonable level of understanding had been reached.

Very few respondents in Ampasilava (the smallest community) stated that they had a high level of involvement, and at present Ampasilava is not satisfied with its level of involvement. This highlights a gap in the decision-making process which needs to be further investigated to ensure full level engagement by all villages. It might be necessary to increase awareness-raising and encourage members of this village to actively participate in the dialogues with neighbouring communities in an informal, communal forum. Committee management meetings appear to be a successful way of disseminating information amongst the villages in the Commune, and these results indicate the need to adopt a fully consultative approach.

Awareness and compliance of rules and regulations

The high level of awareness of rules and regulations and their enforcement is owed to the demonstrated success of the octopus NTZs. This will assist successful replication to encompass other fisheries and ensure community support and involvement in the resulting network of NTZs. This illustrates that demonstration is a major factor in influencing communities' awareness, attitudes and perceptions, as well as compliance of community conservation initiatives.

It is important to understand the level of comprehension of the communities of both national and local laws. In this survey we have not taken into account small *fady* laws relating to isolated areas. Rather we focused on national laws which have the potential to impact quite heavily on the condition of the marine resources in the areas. There are mixed levels of understanding between the villages and between the different rules and regulations. National laws are poorly enforced in small coastal communities such as those surveyed. It is therefore encouraging that a high number of laws were perceived to be abided to. In particular the national octopus laws are well known in the region due to the success of the first NTZs in the region. The benefits from the NTZs have allowed villages' to develop a level of trust with external stakeholders such as Blue Ventures Conservation and are therefore more likely to be receptive to other coastal management initiatives introduced.

Recommendations

Resource Management Initiatives

The analysis of the communities' attitudes and perceptions of the marine resources needs to be carefully considered by coastal managers in the development of resource management initiatives. The effectiveness of management strategies ultimately depends on the varied levels of understanding of specific groups within the communities. Differences between the villages helps resource managers to design village specific approaches, taking into account the likely sacrifice made by each village to enable a particular management strategy to work.

Socioeconomic surveys and interactions with the communities indicate that many fishers and other community members could not see the benefits of an MPA. It is therefore tremendously important that communities fully understand the benefits to be derived from the management and conservation measures which have been instigated. This also underlines the importance of the integration of socio-economic and demographic data into the management of resources.

The results of this study emphasise the need for a dynamic adaptive management system to enable communities to manage their resources within multiple social and ecological baselines. Results from this and similar studies should be shared with all stakeholders. All new management interventions should be developed in consultation with all stakeholders to avoid conflicts of interests.

It is crucial that the management of marine protected areas in the region is made with the full co-operation and continuous support of the local communities. If stakeholders are involved in the development of new management strategies there is a higher likelihood of successful implementation. Recommendations for change should be made diplomatically, and adjustments to current fishing practises should be integrated in small increments to ensure they function effectively.

Livelihood diversification

Alternative and/or supplementary livelihoods to fishing and resource exploitation need to be developed in conjunction with an MCPA. Without livelihood diversification it is unlikely to succeed in discouraging people away from traditional marine and coastal exploitation patterns. However, diversification needs to be very carefully selected and tested to ensure that it does not increase pressures or have negative impacts elsewhere, such as tourism development, or result in social conflicts. The development of alternative livelihoods in the past has resulted in increased household revenues which enables the purchase of more sophisticated fishing gear increasing the exploitation on scarce resources or outcompeting traditional fishing methods. Furthermore, development of livelihood opportunities has to be integrated into the overall social and cultural context.

Coral Reef Conservation Needs

General recommendations for the management of the coastal zone and its resources include annual or biannual coral reef monitoring to assess the effect of the proposed MPA on marine habitats and resources. This should be tied in with a second SocMon survey to assess changes in understanding of environmental issues and perceptions of resource health following the implementation of the MPA. Potential alternative sources of income for local fishers need to be further investigated and put in place if viable, e.g. seaweed farming (*Eucheuma*), sea cucumber farming (*Holothuria scabra*) and income through tourism (local tour guides).

Fisheries management practices should be considered and incorporated into the multiple zoning scheme for the MPA. Fishing practices such as beach seine netting need to be controlled or stopped completely and awareness needs to be raised of the rules and regulations pertaining to this and other destructive fishing practises. This is particularly important for the rules which had low levels of awareness and compliance in this survey.

Coupled with these direct fisheries management strategies, the capacity for local communities to manage their own MPAs and fishing cooperatives needs to be increased through appropriate training schemes and workshops. The Velondriake Committee will serve as a meeting point for education and management decisions and the Committee is responsible for the dissemination of new strategies to all villages within Velondriake. It is hoped that this would increase the communities' involvement with management decisions and enhance the success rate of new initiatives.

It is likely that a combination of full and partial protection of marine areas at Andavadoaka will be the most acceptable solution for stakeholders and project partners. A zoning scheme incorporating permanent no-take areas with limited fishing (gear or time restrictions) and open access areas is recommended. The details of position and designation will need to be discussed in depth with the fishing communities involved and factors such as existing fishing grounds, local customs and taboos ('fadys') all need to be taken into account. It is very important that the final management plan for the region is a combination of conservation recommendations and the wishes of the local stakeholders. It is also critical that the local communities completely understand why conservation measures are being put in place, fully support the idea of an MPA and are completely involved in the designation and management processes.

Capacity building

In order to increase the capacity for SocMon surveying in the Western Indian Ocean region, CORDIO held a 'training of trainers' workshop in the Seychelles in 2006 to help build capacity in the respective countries, or village districts. The workshop also increased the number of resource persons available for site-based training. The capacity for local communities to manage their own MPAs and fishing cooperatives needs to be coupled with fisheries management strategies and, through increased training, including 'training of trainers' sessions and skill transfer. The Velondriake Committee will serve as a meeting point for education and management decisions and the Committee is responsible for the dissemination of new strategies to all villages within Velondriake. However, there are currently a limited number of trainers in the region, so a training workshop will dramatically increase the capacity for SocMon in the whole of the WIO region. This will help to enable the expansion of the SocMon project to include other coastal regions in Madagascar thereby creating a network.

Improvements to the surveying method

Qualitative research involves asking simple questions and getting complex answers. The interpretation of qualitative data can be subjective, so conclusions made from this report should be verified where possible with quantitative evidence. This can be done by comparing for example, villager perception of a marine resource with Blue Ventures reef monitoring statistics. Research methods and questionnaires should be revised and adopted to changing conditions. This can be done with the help of key informants prior to starting the planning and design of the questionnaires and interview questions before each round of monitoring. This is an important aspect since resource use patterns change with socioeconomic development. Hence it is necessary to do a full demographic survey every other year to look at occupational structures. Resources being exploited may also change and new species may enter the local, national and global markets which will be missed if the same monitoring is applied without being

adapted. It may be useful to encourage more interaction during the interview process through the development of materials or visual aids to increase participation. Allowing participants the chance to comment anonymously may also affect results.

Dissemination Strategy

All research results need to be communicated through active discussions at informal meetings due to the relatively low literacy rate among the elder segment of the populations in this commune. Small, interactive meetings with key stakeholders will be the best way to disseminate results and new management strategies to the community. These sessions will enable the community in question to ask questions, express their views, and propose ideas to add or change the current management strategy in an informal setting. Community feedback is extremely valuable in determining what additional information is needed and will help guide the design of future socioeconomic assessments.

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Appendix

Appendix 1 SocMon questionnaire

QUESTIONNAIRE 2

Nom enquêteur:

Village:

Durée:

Date:

Nom enquêté:

N° Questionnaire:

1. INFORMATION DEMOGRAPHIQUE (S2, 3, 7,10)

Sexe	Age	Langue Maternelle	Langue Officiel O/N	Française O/N	Sources de revenus		
					Primaire	Secondaire	Troisième

2. ATTITUDES ET PERCEPTIONS (S19 Perceptions des conditions des ressources)

2.1 Comment décrivez-vous des états actuels de chacune des ressources suivantes (en utilisant l'échelle de bon (3), ni bon ni mauvais (2), mauvais (1) ne sait pas (0) ?

Mangroves _____; récifs coralliens _____; l'herbiers _____; poissons _____; poulpes _____; requins _____; tortue _____; coquillages _____; concombre de mer _____;

2.2 Valeurs non destinées a la vente et a l'usage (S28)

Indiquez le degré de votre accord avec les déclarations suivantes: (d'accord (1), en désaccord (2))

- _____ a) les récifs sont importants pour protéger la terre des vagues de tempête
- _____ b) si nous coupions les mangroves, nous n'aurons plus aucun poisson à attraper
- _____ c) les récifs coralliens sont seulement importants si vous faites de la pêche ou de la plongée (valeur de non-usage d'existence)
- _____ d) la pêche devrait être limitée dans certaines zones même si personne ne pêche jamais dans ces zones juste pour permettre aux poissons et au corail de se développez (valeur d'existence)
- _____ e) nous devrions limiter le développement dans quelques zones côtières de sorte que les futures générations puissent disposer d'environnements naturels (valeur de legs)
- _____ f) La collecte massive de *Katra (conus sp)* pourra entraîner des dangers pour l'environnement marin ?
- _____ g) vous pensez que les concombre de mer sont disparu temporairement ?
- _____ h) Les coraux détruits pourront renaître dans 5 ans ?

2.3 Participation a la prise de décisions (S17)

i, Votre participation a la prise de décisions locale (ex réserves) sur la gestion côtière ? _____ ;
(0=aucune, 1= peu, 2= moyen, 3=beaucoup),

ii, Satisfaction avec votre niveau de la participation ? _____ ;

2.4 CONNAISSANCES DES REGLES ET REGLEMENTS (S21)

Règles et réglementations	Connaissance O/N	Conformité O/N	Mise en application/ imposé O/N
1) Réserves aux poulpes (L)			
2) Taille minimale de poulpe 350g (N)			
3) Fermeture de poulpe (N)			
4) Senne de plage (AN)			
5) Laro (poison) (AN)			
6) Renversement de coraux (AL)			
7) Plongée en bouteille (N)			
8) Taille minimale de CdM (frais et sec) (N)			
9) Maille minimale (2doigts) (N)			
10) Filet moustiquaire (N)			
11) Fermeture de Langouste (N)			
12) Fermeture de Geba (N)			
13) Pêche de tortue (N)			
14) Autorisation d'exploitation de foret et droit a payée (L)			

L= locale

N= nationale

A= avisée

2.5 Succès dans la gestion côtière (S26)

Quelles sont les 2 choses qui ont marché selon vous pour la gestion côtière dans la communauté ?

_____ ; _____

2.6 Défis dans la gestion côtière (S27)

Quelles sont les 2 choses qui n'ont pas bien marché selon vous pour la gestion côtière dans la communauté ?

_____ ; _____