

TNC Raja Ampat Marine Protected Area Perception Monitoring Trend Analysis



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The Nature Conservancy, Indonesia Marine Program

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As always, all errors, omissions or opinions remain the responsibility of the authors.

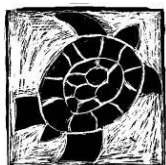


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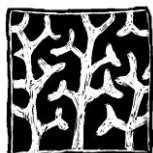
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EXECUTIVE SUMMARY

Indonesia's Raja Ampat regency encompasses over 4 million hectares of land and sea and is regarded as the global epicentre of coral reef diversity. The Nature Conservancy (TNC) is supporting the local government in designing management and zoning plans for two marine protected areas (MPAs) that were formally established in December 2006: Kofiau and Misool.

To better understand village characteristics and local knowledge and attitudes, TNC has conducted three perception monitoring surveys in the 13 villages near the two MPAs. There were 5,422 people in the 13 villages in 2004. Random samples of a statistically valid portion of the population were done for both households and individuals. The three surveys were similar but not identical and designed with input from technical experts. All surveys were conducted by trained local enumerators, and all have a Confidence Interval of 95% or greater at the survey level. At the village level, the Confidence Intervals range from 82% to 88% and village-level results should be treated with caution.

The first two surveys were before the establishment of the MPAs, in May 2005 and in August 2006, and the third one was in May 2010. While the latest survey was after the official establishment of the MPA, a new management regime of the areas has yet to be implemented. Most of the TNC focus in Raja Ampat to date has been on outreach and awareness, and providing technical input to the design of the MPAs.

The findings are summarized below. See the main report for details or the conclusions for a fuller summary.

Socioeconomic trends

More than half the population in the TNC area of Raja Ampat are under the age of 20. This has significant implications for the TNC Raja Ampat team, especially for education and outreach.

Most of the population has lived in their village for five years or more (92%) and were born in the village where they live (65%). Immigrants to the area come mostly from within Raja Ampat, other parts of Papua, Maluku and Sulawesi. There is a rough split between Christians and Moslems (53% and 47%), but this belies that the villages are largely segregated by religion.

The average household has 5.2 members compared to the Indonesia average of 4.3 members. The average age of the household head was 44 years. Between 3% and 6% of households are female-headed.

For education, 98% have at least attended primary school and 20% have also attended secondary school.

Household wealth increased between 2005 and 2010 with a slightly greater number of houses now having brick, concrete or stone floors and walls. Electrification increased from 38% of homes in 2005 to 68% in 2010. Television ownership increased from 20% to 44% over the same period. Owning a motorboat has increased from 32% in 2005 to 65% in 2010. Rowboat ownership has remained at roughly 70%.

Kofia and Misool differ in primary household livelihoods. In Kofiau, the average household depended primarily on farming in 2010 (65%). In Misool, it was more balanced with roughly a third of households depending on employment (mostly at the local pearl farm), a third depending on fishing, and a third depending on farming, with 10% depending on other occupations such as owning small-businesses.

Occupations have also changed. If we look at individuals' first occupation, there has been a decline in farming and an increase in fishing and labour or employment. If second occupations are included, approximately 30% of the active population fished in both Kofiau and Misool in 2005. Five years later, we find this increased to 49% in Kofiau and 37% in Misool. All villages save two showed an increase in fishing as a combined primary and secondary occupation between 2005 and 2010.

Unemployment in both locations has held steady from 2005 to 2010, with about 20% of the male population and 50% of the female population saying they have had no income generating activities in recent months. There were some villages, however, where (male) unemployment was over 35% in 2010 (Fafanlap, Gamta and Folley).

Environmental perceptions

Coral reef conditions around the villages were perceived to be “good” by 70% of respondents in 2010, and 49% said the condition of the reefs has improved compared to ten years ago (versus 17% who said it had declined). The results for the mangrove conditions around the villages were similar. This suggests that the marine ecosystems in the area are reasonably healthy.

Yet respondents also noted an increased concern for environmental problems from 2005 to 2010. Blast fishing and cyanide fishing are consistently seen as two main problems. Outside fishers and the people themselves were viewed as the primary cause of these problems. Perhaps most importantly, relatively few people believe that the environmental threats can be addressed by the villagers themselves.

There is some variation in the environmental threats between the villages. In the 2010 survey, cyanide fishing is mainly mentioned in Gamta and Tolobi, fish traps in Kapatcal, and the stealing of marine resources and compressor diving in Folley.

Familiarity with Marine Protected Areas

Since 2005, support for demarcating and protecting a part of the coastal area has risen to an average of 68% while opposition has stayed at around 5%, with not sure/don't know comprising the remainder. Almost everyone thinks their family and their communities would benefit from a protected area (94%). Furthermore, 78% of respondents are now familiar with the idea of an MPA compared to 20% in 2005. Yet more people in 2010 think fishing is prohibited everywhere in an MPA than in 2005 (33% versus 21%). Such negative and counter-factual views may reduce local support and participation in an MPA. This was a particular problem in Fafanlap, Tomolol, Yellu and Lilinta.

Knowledge about illegal fishing techniques and activities

While overall awareness about illegal fishing techniques has improved greatly, considerable confusion continues about the legality of long lines, fish traps (*bubu* and *sero*), gill and lift nets, and catching sharks, crabs and lobsters. Usaha Jaya is a particular trouble spot with a majority of people thinking trawling and traditional poison are allowed and 40% thinking cyanide fishing is allowed.

There are also misperceptions about what is not permitted in an MPA. For example, while catching crabs and reef gleaning are allowed, more than half the people think they are not.

Uncertainty about what is illegal does not mean it is prevalent, so control activities certainly should not be based on these results alone, but clearing up the confusion of what is legal and illegal should be an important goal for the outreach activities.

When respondents were asked if they agree or disagree with the statement “People who protect the environment care more about fish than people,” in 2005, roughly as many people agreed as disagreed. Five years later, this hadn’t changed for the overall survey, but this hides rising agreement in some villages and declining agreement in others. In Biga, Lilinta, Deer and Harapan Jaya, more than half the respondents agreed with the statement in 2010. This suggests a growing opposition in some villages to environmental concerns.

Radio is the best media to reach people, but only about 25% listen to it regularly. Television is the second best media with about 24% watching regularly. Both vary greatly by village. Dibalal, Fafanlap and Usaha Jaya have the lowest audience levels for radio and television. Overall, the dominant source of information about the marine environment was friends, family or neighbours (43%). Local opinion leaders appear to be key to information dissemination.

Conclusion

The analysis of the three survey rounds has provided an enormous amount of results, a very small part of which could be presented in this executive summary. To facilitate the use of these results, an Excel-based tool has been developed that allows the close-up investigation of the results for a number of the most important questions. It is hoped that both the analysis presented in this report and the use of the Excel tool can provide insights into how previous outreach work has changed views and provide leads to where further improvements might be attained.

Finally, a caution is warranted. Statistical relationships and trends should always be placed in the local context and should not be the sole source of information upon which to build actions. The quality of the 2005 and 2010 surveys was high, but there were still a small number of responses to some questions and this increases the margin of error considerably.

1 INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The Nature Conservancy's Indonesia Marine Program (TNC-IMP) has established marine conservation programs in a number of extremely bio-diverse areas in Indonesia from Southeast Sulawesi to West Papua. In these areas, TNC works with local fishing communities, government agencies and other stakeholders to stop the deterioration of marine ecosystems caused by over-fishing, destructive fishing practices, and various other threats. The establishment of 'marine protected areas' (MPAs) has been identified as a key mechanism globally in managing marine resources, conserving marine biodiversity, enabling sustainable fisheries production, and enhancing reef resilience against the effects of climate change (Widodo *et al.*, 2009).

One of the areas where MPAs have been established is in the Raja Ampat islands in West Papua province. These islands encompass over 4 million hectares of land and sea off the north-western tip of Papua and are regarded as the global epicentre of coral reef diversity. It is estimated that this area is home to over 75 percent of the world's known coral species. A total of 553 scleractinian corals are known from Raja Ampat (Veron *et al.*, 2009). This region also harbours one of the world's richest coral reef fish faunas; the area has at least 1,320 species, surpassing fish diversities recorded in Milne Bay Province, Papua New Guinea (1,109 species) and Maumere Bay, Flores, Indonesia (1,111 species) (Donnelly *et al.*, 2003; Allen and Erdmann 2009). Overall, reefs in Raja Ampat are in very good health. Reefs do not appear to have suffered from the serious detrimental bleaching events that caused extensive mortality to other reefs in the region in 1998. However, blast and cyanide fishing, as well as the overexploitation of larger carnivores (sharks and groupers), are still common. In addition, the unrestricted access to and unregulated use of resources by migrant populations leaves residents feeling powerless and disenfranchised. In turn, they often overexploit the remaining resources.

TNC started its field presence in the Raja Ampat Islands in 2003 after the head of Raja Ampat district issued a letter inviting the organization to help manage the district's marine resources (Widodo *et al.*, 2009). In December 2006, 6 new MPAs were declared by the government of Raja Ampat, and formalised through Bupati Decree no. 66/2007. Together with other organisations such as Conservation International (CI), and COREMAP, TNC is supporting local governments in designing zoning and management plans for these MPAs. TNC has direct engagement with local communities in supporting two of these MPAs, one around the islands Kofiau and Boo, and one in Southeast Misool (see Figure 1). These MPAs are referred to as Kofiau and Misool in the remainder of this text.



Figure 1. Map of the Raja Ampat MPAs.

Being aware of the perceptions of local communities regarding the establishment of the MPAs and associated conservation efforts can provide valuable information for MPA managers. This information allows managers to better focus their efforts, adaptively manage concerns that may arise within communities, better target conservation goals, and measure changing perceptions among the local population. To assess trends in community perceptions of resource status, resource use and MPA management, TNC has conducted perception monitoring in the two MPAs where it provides technical support. TNC has so far conducted three phases of perception monitoring surveys. The first two occurred before the establishment of the MPAs, in May 2005 and in August 2006, and the last one after, in May 2010. While the latest survey was after the official establishment of the MPA, a new management regime of the areas has yet to be implemented. Most of the TNC focus in Raja Ampat to date has been on outreach, awareness and education, on improving patrolling and on providing technical advice for the design of the MPAs.

The purpose of this report is to highlight trends in the measured perceptions, and look at differences in these perceptions between the different villages that took part in the surveys. The larger aim of the report is to allow the managers of the Raja Ampat MPAs to determine how effective their outreach efforts have been and to focus future attention where it is needed most.

1.2 METHODOLOGY

The Raja Ampat perception monitoring protocol, which includes the structured questionnaire, the interviewer selection procedure, sampling procedure and interview procedure, is an adaptation of the MPA monitoring standard developed by Bunce and Pomeroy (2003). John Hopkins University

provided technical input for the localisation of the protocol. The protocol is used in three other TNC sites in Indonesia, and by partner organisations, CI and WWF-Indonesia in their marine conservation work in the Bird's Head Seascape. The latest version of the protocol was updated by TNC and partners during a workshop in Bali in April 2009.

The questionnaire was split into a household section and an individual section. For the individual section, the aim was to interview one male and one female respondent in each of the randomly selected households, although this was not possible in all households. Respondents had to be between 15 and 59 years old (determined to be the economically productive age range), and were selected randomly from a list of all eligible household members, drawn up as part of the household interview.

Out of the 20 villages on Misool and Kofiau, 13 target villages were selected based on three criteria: (a) the villages were close to the MPA; (b) the majority of population utilized marine resource for their livelihoods; and (c) the villages had received environmental education and awareness activities from the TNC Raja Ampat Program. The aim was to interview 30 households (60 individuals) in each village, although this target was not always achieved. Table 1 below lists the villages and indicates how many households and individuals were interviewed in the different surveys. The 2006 household data for Usaha Jaya are missing.

Table 1. Survey overview.

Village	Island	Household interviews			Individual interviews		
		2005	2006	2010	2005	2006	2010
Folley	Misool	30	27	30	54	45	46
Usaha Jaya	Misool	30	N/A	29	55	47	54
Tomolol	Misool	30	27	30	61	54	55
Yellu	Misool	19	17	30	30	28	54
Harapan Jaya	Misool	29	25	24	52	38	44
Kapatcol	Misool	18	17	17	33	32	29
Lilinta	Misool	29	29	30	53	47	48
Biga	Misool	30	22	29	54	42	52
Gamta	Misool	19	16	21	28	30	24
Fafanlap	Misool	22	9	30	40	10	49
Deer	Kofiau	29	27	30	53	42	56
Dibalal	Kofiau	30	29	30	58	51	50
Tolobi	Kofiau	16	30	30	28	56	53
Total		331	275	360	599	522	614

A comparison between the perceptions or situations in the different survey was complicated by the fact that some questions changed between the different phases. Whenever this is the case, it is mentioned in the discussion of the particular question. The 2006 data in particular has a number of anomalies and caution should be taken when reading the 2006 results.

2 HOUSEHOLD SECTION

2.1 GENERAL HOUSEHOLD INFORMATION

Table 2 provides general information about the interviewed households. The majority of households were male-headed in all monitoring phases. The average household size was approximately 5 members which is slightly higher than the Indonesian average of 4.3 members.

Table 2. General household characteristics.

	2005	2006	2010
Household section			
Female-headed households	6%	6%	3%
Average age of the household head	42	41	44
Age range on the household head	19-87	19-75	20-95
Average size of the household	5.2	4.7	5.2

Figure 2 shows the age distribution of the study area. Almost half the population was below the age of 20 in 2010, indicating that the population in Raja Ampat is below their peak consumption years, which may place more pressure on existing marine resources. It also suggests that there is an opportunity to focus outreach efforts towards this younger generation as part of their education¹.

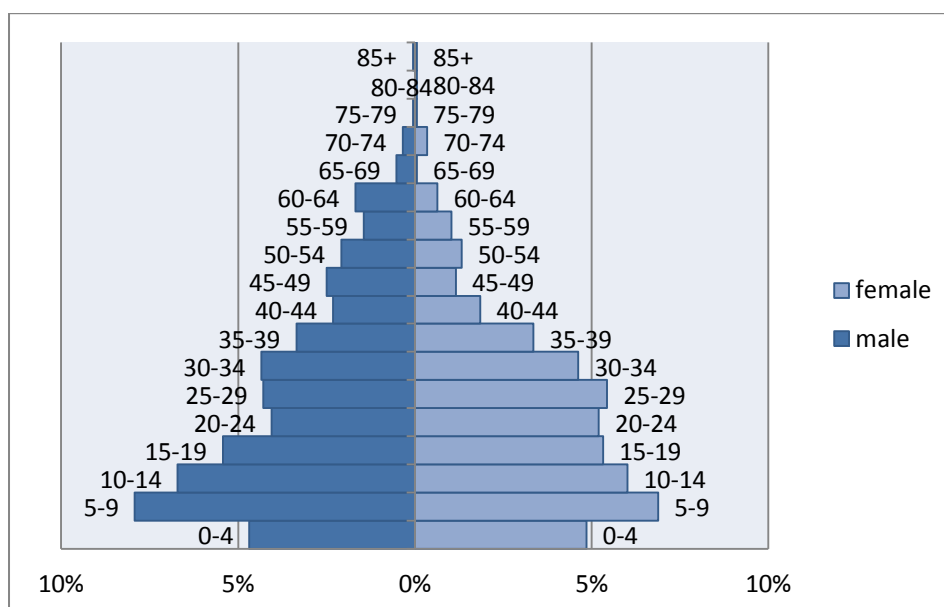


Figure 2. Age distribution in 2010.

¹ The age distribution was similar in the 2005 and 2006 survey rounds.

2.2 HOUSING AND ASSETS

The majority of the household dwellings in all survey phases have wooden or concrete floors. The walls are mostly made of wood, but brick or concrete walls are common as well. Housing conditions seem to have improved slightly from 2005 to 2010. In 2006 and 2010, concrete or tile flooring is a little more predominant, and so are brick or concrete walls. Fewer households have earth floors in 2010.² Changes in housing walls and floors are good proxies for changes in wealth, and the results here suggest that wealth in the study area between 2005 and 2010 has somewhat improved.

At village level, Biga, Dibalal and Fafanlap have brick, concrete or stone floors and walls the least often, while these better building materials are most common in Folley and Harapan Jaya (see Figure 81 and Figure 82 in the detailed village level information of **Error! Reference source not found.**). The only statistically significant improvement in flooring and wall materials occur in Tomolol, Yellu and Kapatcol (Table 3, and Figure 81 and Figure 82). The increase in welfare in the first two is probably related to the presence of a pearl farm.

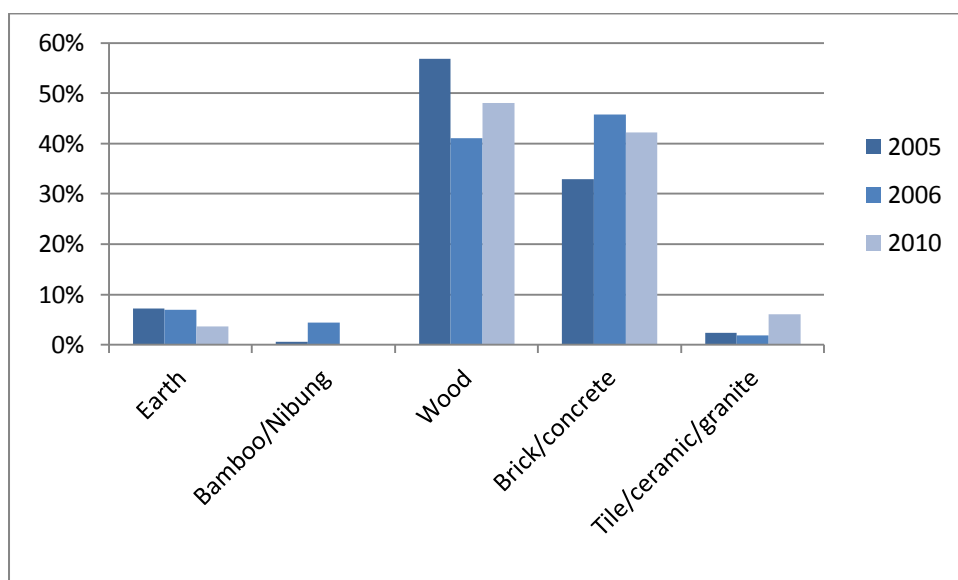


Figure 3. Floor of the household dwelling.

² To test whether changes were statistically significant the categories were divided into two groups: Earth, Bamboo and Wood in one group, and Brick/concrete and Stone in the other group. The shift between the groups is significant at the 1% level for floors ($\text{Chi}^2=11.929$; $p=0.001$) and at the 5% level for walls ($\text{Chi}^2=4.152$; $p=0.05$).

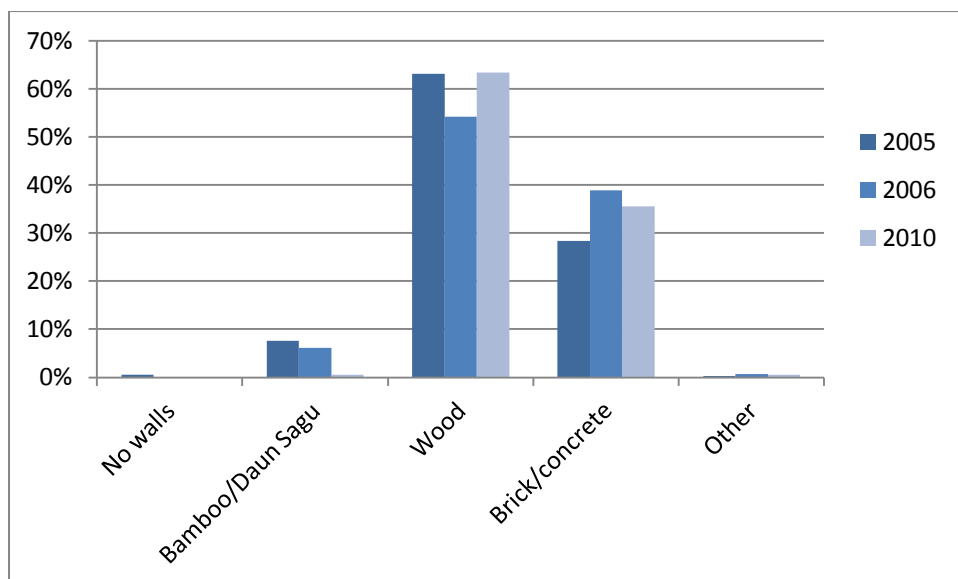


Figure 4. Walls of the dwelling.

An increasingly large portion of the households in the area have electricity in the house. This is true for most villages (Figure 85). Most villages show an improvement from 2005 to 2006, and again from 2006 to 2010. In some villages (Yellu and Lilinta) access to electricity seems to decrease in the latter period, but only in Tomolol is the 2010 access to electricity lower than in 2005. Usaha Jaya and Kapatcol show the biggest increase, being the villages with the lowest access in 2005 and having the highest in 2010.

While also improving, access to running water in the household is only available to a small minority. The peak in 2006 remains unexplained, although a slight difference in the wording of the question may have caused people to understand the question differently in the different phases

The proportion of villagers owning a radio has not changed between 2005 and 2010. The peak in 2006 is seen in most villages (see Figure 87 in the appendices), but remains unexplained. The share of households with a television, on the other hand, seems to have steadily increased from 2005 to 2010, with televisions even outnumbering radios in 2010. Again, this is true for most villages (see Figure 88). In Lilinta and Yellu the biggest increase took place, and only in Fafanlap do we find lower television ownership in 2010 than in 2005.

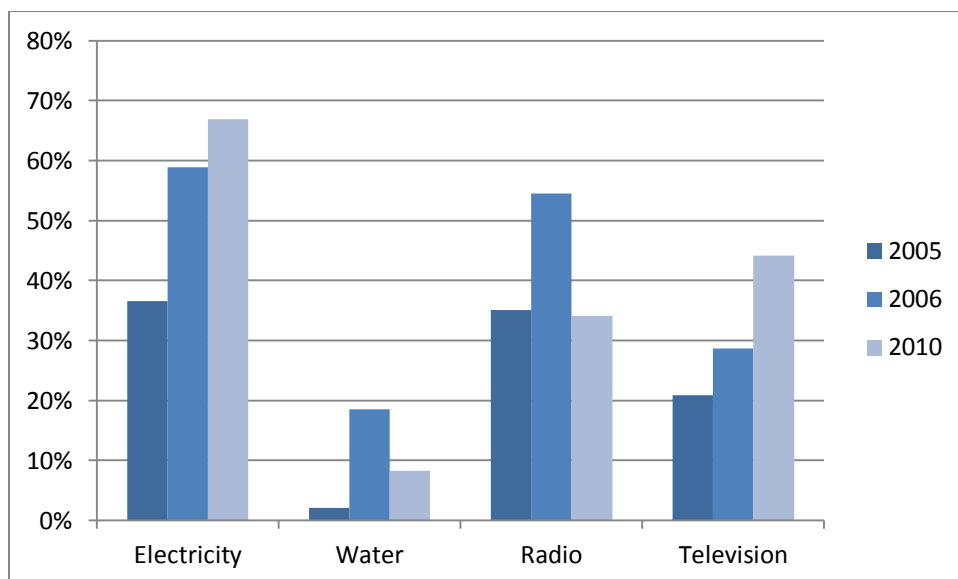


Figure 5. Household access to amenities and assets.

For coastal and island communities it is no surprise that boats are much more commonly owned than land-based vehicles. Almost three quarters of all households own a row boat, and overall this has not changed much over the three surveys. There is a big difference between Misool and Kofiau, with around 90 percent of people on Kofiau owning a rowboat, compared to around 65 percent on Misool.³ This is not surprising considering that most people in the Kofiau MPA live on small islands, reserving Kofiau itself for farming. Therefore, even farmers need a boat to get to their fields.

Generally, owning a motorboat has also become very common, though this was not yet the case in 2005.⁴ Ownership of a motorboat has increased in both Misool and Kofiau, but the increase has been larger in the latter MPA, where more than three quarters of the households owned one in 2010.⁵ At village level, the biggest increases in motorboat ownership are found in Dibalal, Tolobi, Biga and Fafanlap (see Figure 90). While ownership in Tomolol also seems to have increased strongly, the change is not statistically significant. Land modes of transportation such as bicycles, motorcycles or cars are only very infrequently owned, and there is not much variation in this across the villages. This is likely due to the archipelagic nature of Raja Ampat, where land modes of transportation are of little use given there are no roads connecting villages.

³ This difference is statistically significant at the 1% level ($\alpha < 0.01$) ($\text{Chi}^2 = 24.545$; $p < 0.01$).

⁴ A motorboat includes a boat with either an inboard or outboard motor, as well as a ketinting, or “long-tail” boat. The way of asking about a motorboat has changed slightly across the three surveys. The 2005 and more so in 2006 questionnaires differentiated between different kinds of motorboats, which were combined in the 2010 version of the questionnaire. In theory, this should not have influenced the results presented here.

⁵ The difference between Misool and Kofiau in 2010 is statistically significant at the 1% level ($\text{Chi}^2 = 7.939$; $p < 0.01$). In 2005, there was no statistically significant difference ($\text{Chi}^2 = 0.038$; $p = 0.89$).

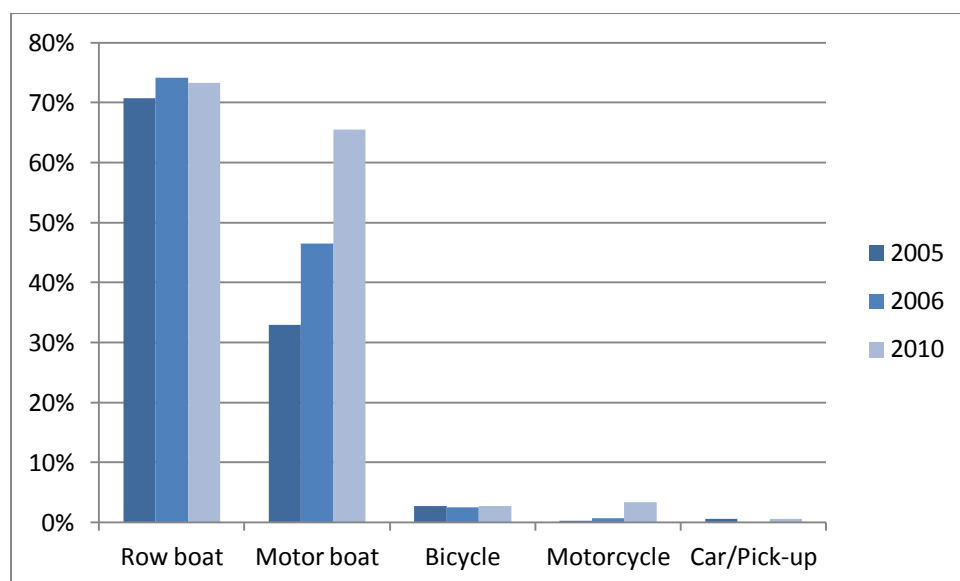


Figure 6. Means of transport owned by the household.

An overall look at changes in amenities and assets between 2005 and 2010 finds that there are no villages that outperformed the others on all counts (Table 3). We do see that the three Kofiau villages are rarely among the three highest in any category. Even for motor boat ownership, where, overall, Kofiau showed a larger increase than Misool, its villages are not among the top three.

The larger welfare improvements in Misool could be in part linked to better employment opportunities there, as discussed below. However, some caution is warranted as only a few of the changes are statistically significant.

Table 3. Overview of (absolute) changes in amenities and assets between 2005 and 2010 at village level.

	2005-2010							
	Floor [†]	Wall [†]	Water	Electricity	Radio	TV	Motorboat	
Folley	13%	18%	7%	30% *	7%	27% *	30%	
Usaha Jaya	19%	8%	0%	32% *	-2%	45% *	32%	*
Tomolol	33% *	14%	10%	-7%	-27% *	-3%	67%	
Yellu	27% *	27% *	10%	2%	12%	39% *	16%	
Harapan	10%	13%	6%	29% *	10%	40% *	16%	
Kapatcol	30% *	18%	-6%	66% *	1%	18%	31%	*
Lilinta	19%	15%	27% *	43% *	30% *	46% *	-9%	
Biga	3%	3%	10%	80% *	18%	11%	77%	*
Gamta	-15%	-20%	10%	40% *	6%	27%	-20%	
Fafanlap	6%	-3%	5%	10%	-14%	-8%	71%	*
Deer	4%	13%	-7%	39% *	-5%	49% *	55%	
Dibalal	13%	0%	7%	20%	-20%	-3%	67%	*
Tolobi	9%	-23%	0%	22%	-27% *	8%	65%	*

The changes in this table are absolute. For example, in Folley 57% of households had concrete or stone flooring in 2005, while 70% did in 2010, resulting in a 13% increase. The three villages with the biggest increases are highlighted in (light) green. The three with the lowest are highlighted in (darker) red.

[†] The increase in the portion of households with brick, concrete or stone flooring or walls

* Statistically significant at the 10% level ($p < 0.1$).

2.3 OCCUPATION

In the 2005 and 2010 rounds of perception monitoring, respondents were asked what the main livelihood activities of the household were.⁶ Figure 7 and Figure 8 show the main activities separately for the Misool and Kofiau villages. A number of interesting differences between the islands are visible. First, farming is much more important than fishing in Kofiau, while in Misool approximately the same portions the households rely on fishing and farming. This is true in both 2005 and in 2010. Second, labour or employment is more important in Misool than in Kofiau. In 2010, it was the most often mentioned occupation in Misool. In 2009, the pearl farm on Misool increased its wages, which meant more villagers started working there. This could in part explain the rise in employment. Some doubt exists whether all respondents understood that subsistence fishing and farming were considered occupations. This means the percentages presented for these categories may be too low.

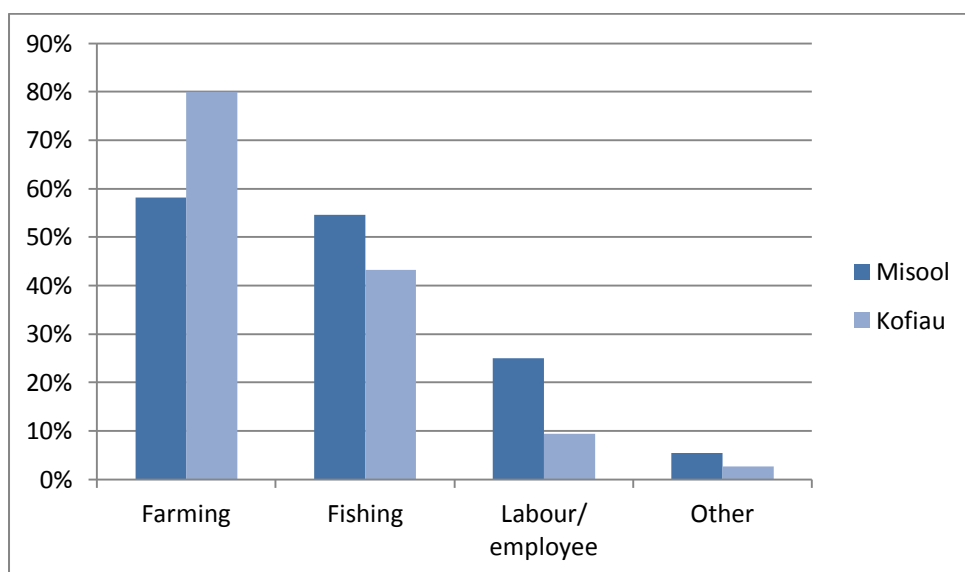


Figure 7. Livelihood activities of the household in 2005. Separated by MPA.

⁶ This question was not part of the 2006 round. As multiple answers were possible in 2005, but only one answer could be given in 2010, the results are shown in separate figures.

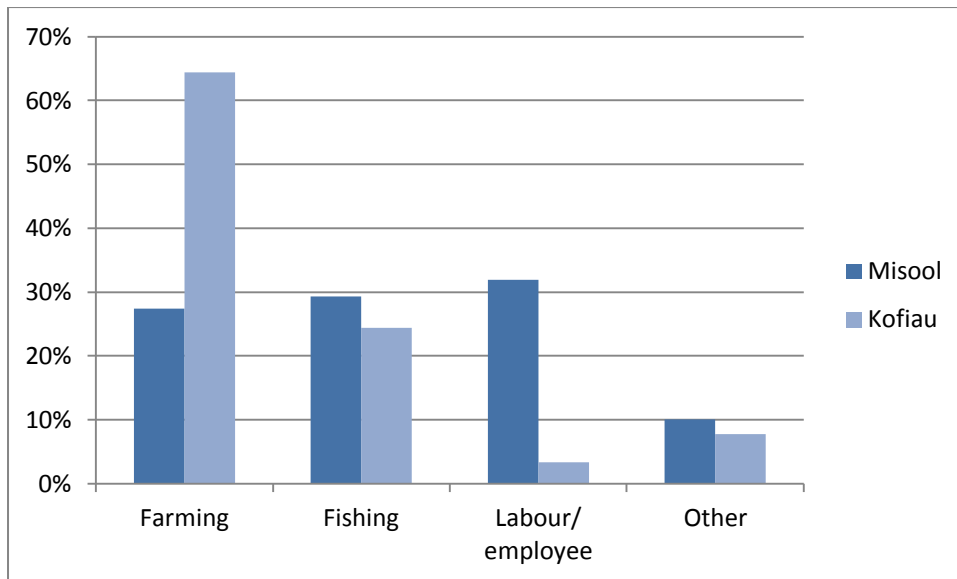


Figure 8. Livelihood activities of the household in 2010. Separated by MPA.

3 INDIVIDUAL SECTION

3.1 SAMPLE AND GENERAL RESPONDENT INFORMATION

To check the robustness of the individual data, confidence intervals were determined. For the overall survey in 2010 there is a 96% confidence interval (Table 4).⁷ This means that had the survey been repeated (in 2010), there would have been a 96% probability that the results would have been the same. At the village level, the confidence intervals range from 82 to 88%, which means they are below the generally accepted 95% norm for robustness, so some care should be taken when interpreting the data.

Table 4. Confidence intervals at village level in 2010.

Village	2004 Population	2010 sample size	Confidence interval
Folley	351	46	87%
Usaha Jaya	246	54	88%
Tomolol	372	55	88%
Yellu	427	54	88%
Harapan Jaya	310	44	86%
Kapatcol	160	29	84%
Lilinta	426	48	87%
Biga	356	52	87%
Gamta	124	24	82%
Fafanlap	667	49	87%
Deer	813	56	87%
Dibalal	634	50	87%
Tolobi	536	53	87%
Total	5422	614	96%

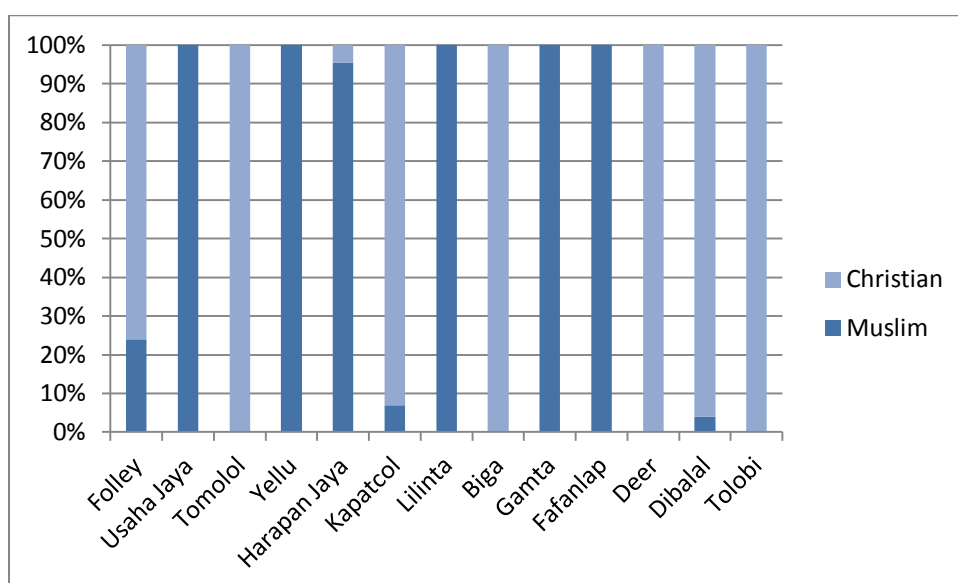
The goal to split the individual sample evenly between men and women was reached in all phases, as can be seen in Tabel 5.

Most respondents were married. The different religions showed a rough balance between Muslim and Christian. However, the villages are either completely or almost completely Christian or Muslim (see Figure 9). The only exception is Folley, but even there the Islamic minority makes up less than a quarter of the respondents.

⁷ Confidence interval = $1.96\sqrt{((\text{population size}-\text{sample size})/(4*\text{population size}*\text{sample size}))}$.

Table 5. General respondent information.

	2005	2006	2010
Proportion of female respondents	50%	48%	50%
Average age of the respondents	33	34	34
Age range of the respondents	15-59	15-59	15-59
<i>Marital status of the respondents</i>			
Single	13%	Na	12%
Married	83%	Na	86%
Separated/divorced/widow(er)	4%	Na	2%
<i>Religion of the respondent</i>			
Muslim	47%	41%	47%
Christian	53%	59%	53%

**Figure 9.** Religion at village level in 2010.

Ethnicity and migration

Most respondents stated they belong to indigenous Raja Ampat ethnic groups (see Figure 10), mostly Matbat and Matlou, although the latter group was not mentioned in 2005 or 2006. The second largest group of respondents are the Beser from Biak on the Papuan mainland. The third largest group in the surveys were from Maluku, with those from Seram being the most common. The fourth largest group are from Sulawesi of Buton or Bugis ethnicity. See Table 10 in the appendices for a detailed overview of respondents' ethnic background in 2010.

In most of the villages on Misool, people of Raja Ampat descent form the biggest group (see Figure 91 in the appendices). In Harapan Jaya and Yellu, people of Maluku descent form the largest group.⁸ In all three Kofiau villages, Deer, Dibalal and Tolobi, the majority has Beser roots. Folley has the largest group of Sulawesi descendents.

⁸ In the 2006 survey, Maluku groups were also the largest in Gamta and Fafanlap, but in Fafanlap there were only 10 respondents in 2006.

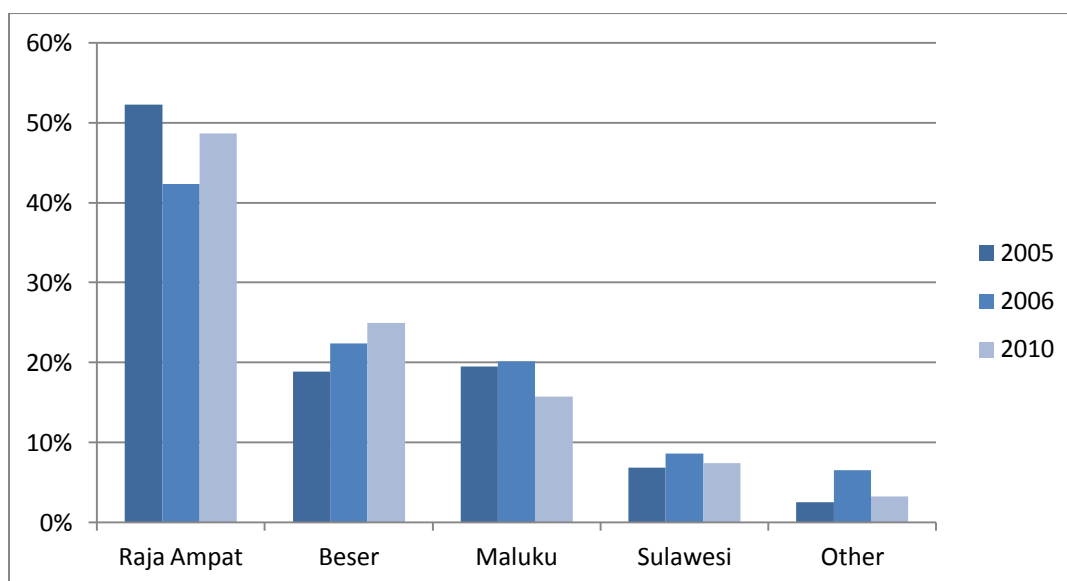


Figure 10. Ethnicity of community members surveyed in Misool and Kofiau MPAs.

Migrant groups from Biak, Maluku and Sulawesi had already established communities in Raja Ampat by the 18th century (McKenna et al., 2002). Many who claimed to belong to these groups have lived their whole lives on the island (Table 6). This is also true for most villages, the exceptions in 2010 being Folley, Usaha Jaya, Harapan Jaya and Kapatcol. In all of these villages save Kapatcol, the portion of respondents not born in the village has increased at a statistically significant level between 2005 and 2010, which indicates that these might be the villages facing the highest immigration.⁹ However, even for these villages, the vast majority (>80%) of people not born in the village indicated they already have been there for more than 5 years, so most migration has not occurred recently. Recent immigrants mostly come from the same areas as the predominant existing groups: from within Raja Ampat, from other parts of Papua, Maluku and Sulawesi.

Table 6. Proportion of village-born respondents and village history of immigrants.

	2005	2006	2010
Proportion of the respondents born in the village	71%	63%	65%
<i>Years lived in the village by newcomer respondents</i>			
Less than 1 year	7%	4%	3%
Between 1 and 3 years	6%	5%	3%
Between 3 and 5 years	6%	4%	2%
More than 5 years	82%	88%	92%

Education

In all survey phases, 98% of respondents in Raja Ampat have had some schooling. Almost 70 percent of these only went to – but not necessarily finished – primary school. Around 20 percent moved on to junior high, while senior high or higher education is mentioned by a minority only (Figure 11).

⁹ Folley (Chi²=5.284; p=0.025), Usaha Jaya (Chi²=9.893; p=0.002), Harapan Jaya (Chi²=5.206; p=0.029).

Compared to 2005 (and 2006) more respondents seem to have gone to senior high or beyond, and these differences are statistically significant at the five percent level.¹⁰ Education levels are higher in Misool than in Kofiau. In 2005, about a third of the respondents in Misool went beyond primary school, while only a fifth in Kofiau did. In 2010, the difference is bigger still, as levels in Misool improved to 40 percent, while no change was observed for Kofiau.¹¹ At village level, Yellu and Harapan Jaya have the largest proportion of people who have attained an education level higher than primary school, while Tomolol, Dibalal and Tolobi have the smallest (see Figure 92).

Literacy levels correspond with education levels: the vast majority of respondents say they can easily read and understand a letter or newspaper.

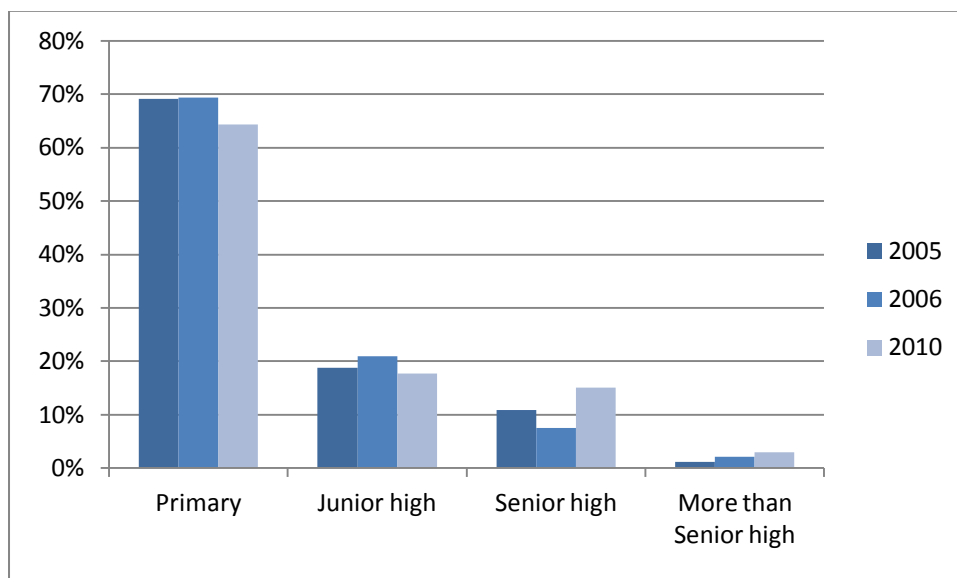


Figure 11. Education level attained.

Occupation

On average, around two thirds of respondents had a job or were involved in an income generating activity during the last 12 (2005 and 2006 surveys) or 6 (2010 survey) months.¹² As mentioned in the Household Section, it is not clear that everyone considered subsistence farming or fishing a job, which may have influenced the results presented here.

If we look at men and women separately, roughly 80 percent of men had worked recently, while only about half of the women had. The reasons for not working also differ depending on the sex of the respondent and on the survey phase as well. For women, the most common answer across all phases is that someone else provides for them or they are housewives. In 2010, many women indicate to be

¹⁰ Senior high: $\chi^2=4.459$; $p=0.035$. Higher education: $\chi^2=4.720$; $p=0.03$.

¹¹ The differences between the MPAs are statistically significant at the 5% level in 2005 and at the 1% level in 2010 ($\chi^2= 4.828$; $p=0.033$ and $\chi^2=19.631$; $p<0.01$ for the respective years).

¹² In 2005 only respondents with more than one occupation answered this question, leading to missing answers for roughly 50% of respondents in that phase. The position of this question in relation to the question about the type of work the respondent did was changed during the second survey. In the third survey (2010), respondents were asked about the last six instead of 12 months. Therefore, caution should be exercised when interpreting differences between the surveys.

looking for work or still being in school. These answers are also given in the earlier monitoring phases, but not as often. In 2005, many women say they were sick or had a disability. The latter is a common answer for men in 2005, as well, but not in later surveys, when most say they were looking for work or were still in school, or, in 2006, it was not the season for work.¹³

Table 7. Job or income generating activity in recent months?

	2005		2006		2010	
	Male	Female	Male	Female	Male	Female
Yes	82%	44%	85%	44%	80%	53%
No	18%	56%	15%	56%	20%	47%

The work situation differs between the villages (Figure 12). Fafanlap and Gamta show the highest proportion of men who did not have paying work in 2010. Gamta also has the highest proportion of non-working women. In contrast, in Biga, almost all men and women had a job or were generating income. Kapatcol also scores well on both men and women working, while the biggest difference between men and women is found in Dibalal. Similar, though not exactly the same results are found in 2005, while 2006 shows a different pattern. As the questions were not the same across all phases, we do not show figures for the other surveys at the village level.

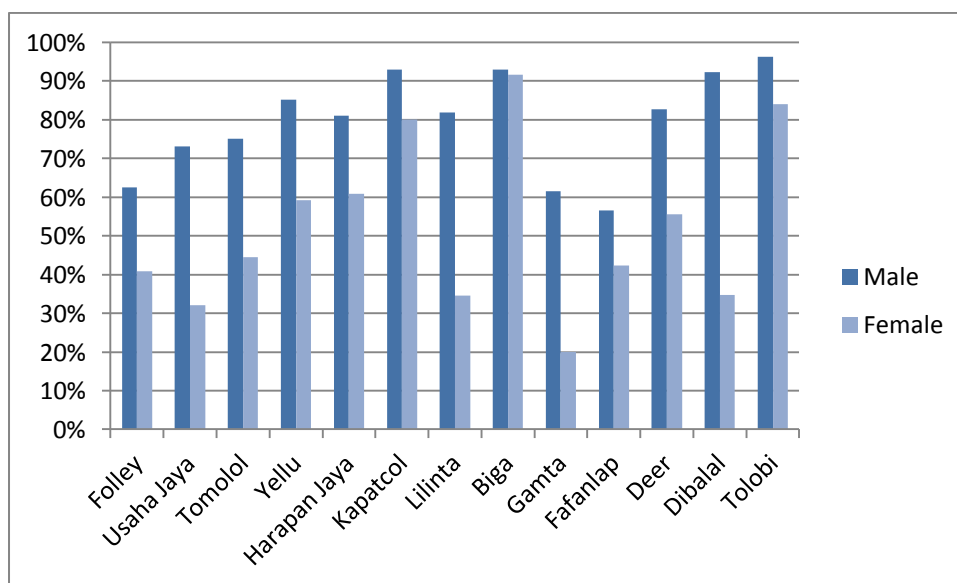


Figure 12. Job at village level in 2010.

Looking at the respondents who did work, we see the same differences between Misool and Kofiau as we did in the Household Section. Farming is more important in Kofiau and labour employment is in Misool (Figure 13 and Figure 14). We also see a similar drop in the proportion of farmers in both areas. In Misool this drop coincides with a rise in employment and fishing, while in Kofiau the rise in

¹³ The latter answer, which is the most common answer in 2006, indicates that this question was perhaps not fully understood, as the respondent was asked about the last 12 months, not about their situation at the moment of the interview.

employment is absent, but fishing does increase. As discussed in the Household Section, the increase in labour or employment in Misool is probably caused in part by the pearl farm located there.

The relatively low number of fishers does not completely reflect the importance of fishing in these areas. If we include people who mention fishing as a second occupation, we find that in 2005 approximately 30 percent of the active population is involved in fishing. The numbers for Misool and Kofiau do not differ much in 2005, but do diverge later. In 2006, 39 percent of respondents in Misool and 62 percent of those in Kofiau say they fish. In 2010, the proportions are a little closer together (37% and 49% for Misool and Kofiau, respectively).

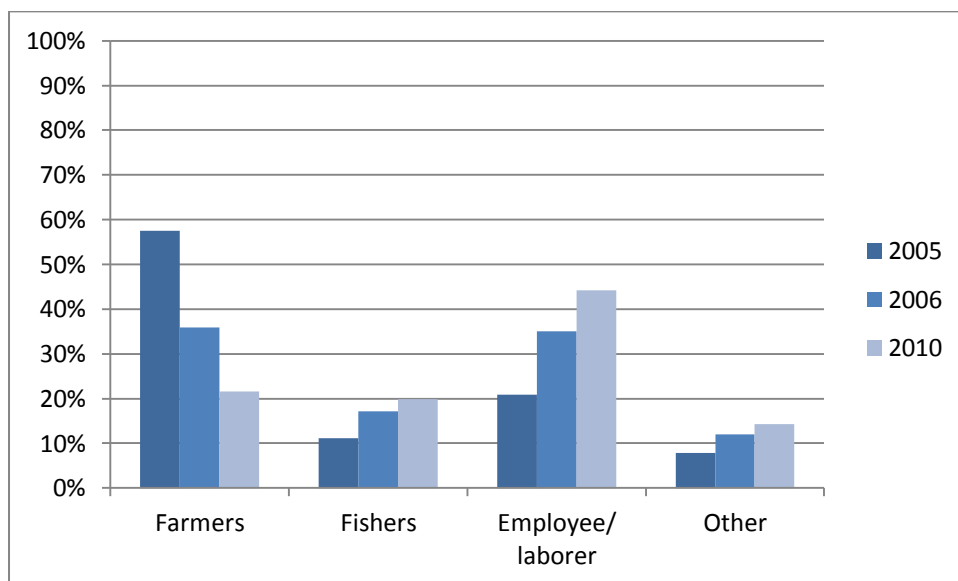


Figure 13. Main occupation of the respondent in Misool.

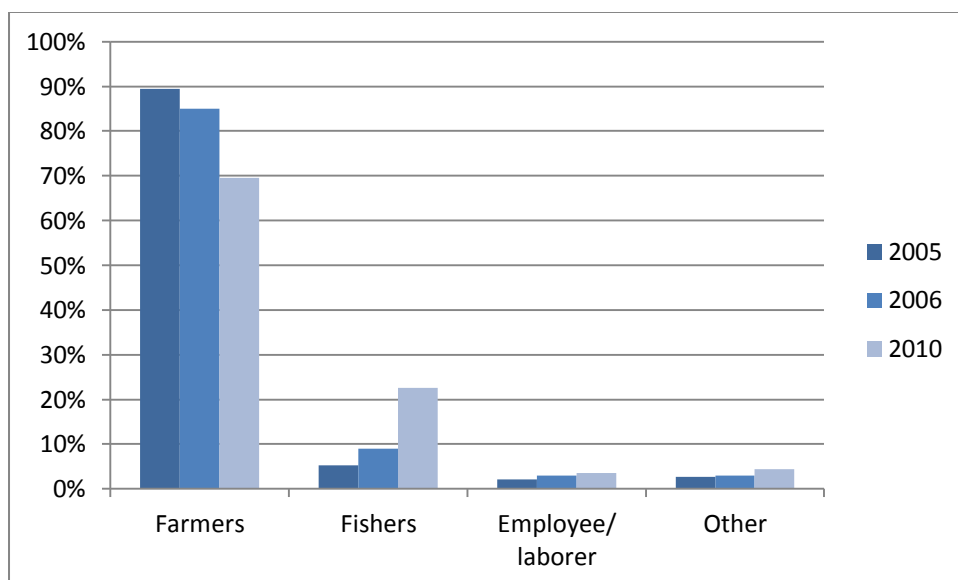


Figure 14. Main occupation of the respondent in Kofia.

The changing importance of fishing at village level

Looking at Figure 15. Proportion of working people with main or second occupation fishing, at village level we see that in 2010 Fafanlap, Lilinta and Deer have the highest percentage of fishers, while Folley, Gamta and Tomolol have the lowest percentage. In all these villages, the percentage of fishers is statistically different (higher or lower) from the overall percentage at the 10 percent level or less, except in Gamta for which the number of respondents was very low.

The biggest increase in fishing dependence occurred in Biga, Fafanlap and Dibalal. All these differences are statistically significant at the 10 percent level or less. There are also three villages where fishing became less important (Lilinta, Folley and Kapatcol), but these differences were not statistically significant. The results suggest that the increases in people fishing are not uniform, and some villages had large increases and some villages had modest decreases.

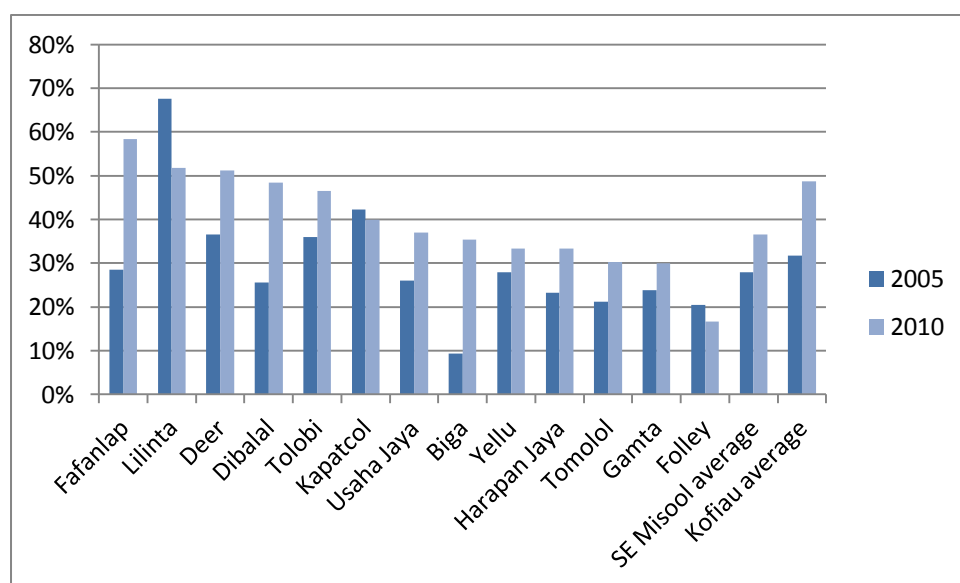


Figure 15. Proportion of working people with main or second occupation fishing, at village level.

3.2 ENVIRONMENTAL PERCEPTIONS

Condition of coral reefs and mangroves

People in 2010 generally agree that coral reefs have an important function as a protection against storms and waves, are important for the livelihoods of future generations, and that fishing around coral reefs should be regulated.¹⁴ At least 90 percent of the respondents are in accordance with each of these three statements. At village level, there are no great differences. In Usaha Jaya, and to a lesser extent, in Yellu there are a few more people who do not know or disagree with the statements, but even there they are a small minority.

¹⁴ These statements were not part of the 2005 and 2006 survey.

A large proportion of the people find the coral reefs to be in good condition (Figure 16).¹⁵ The increase in that proportion from 2005 to 2010 comes from a reduction in people who do not know or are unsure in 2005. The ratio of good to bad views does not change significantly, as the percentage of those who think the reefs are in a poor condition has slightly increased as well.¹⁶

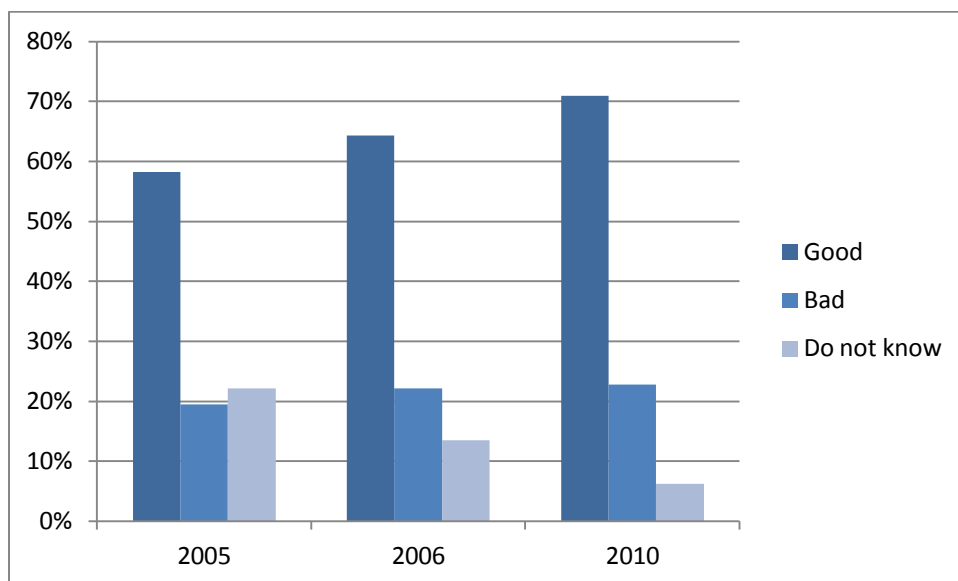


Figure 16. Perceived condition of the coral reefs around the village.

It, therefore, seems that the overall condition of the reef has not changed much. However, if we look at the village level, we find big differences, with the ratio of good to bad views – excluding the “don’t knows” – increasing in some villages, and falling in others (Figure 17). In 2005, the three Kofiau villages have the highest proportion of people that see the reef condition as bad. In two of these, Tolobi and Deer, views are much more positive in 2010. Biga shows the biggest positive shift of the Misool villages, while in Gamta, Folley and Yellu views have become more negative. However, even in Folley, which has the worst ratio of good to bad views in 2010, more than half still perceive the reefs to be in good condition (see Figure 95 in the appendices). Some of the villages at the extreme ends have few observations, however, so some caution should be used when interpreting the village-specific results.¹⁷

It is not clear what has driven these changes in perception. It could be that the increased attention on the coral reef during the establishment of the MPAs had an influence, but then a more even shift would be expected. It would be interesting to study the results of biosurveys of the coral reefs to see if they match the changes in perceptions.

¹⁵ The answer categories for 2005 and 2006 have been adapted to match 2010. In the earlier phases people could rate reef condition on a four point scale, from very good to very bad. As can be seen in Widodo *et al.* (2009), these extreme options are selected by a relatively small proportion of respondents.

¹⁶ The differences between the survey phases are statistically significant at the 1% level, but only if the shift in “don’t knows” is included ($\chi^2=63.597$; $p<0.001$). If this is excluded the changes are not statistically significant.

¹⁷ In Tolobi, Gamta, Yellu and Harapan Jaya the abovementioned results are based on fewer than 30 observations in 2005 and/or 2010.

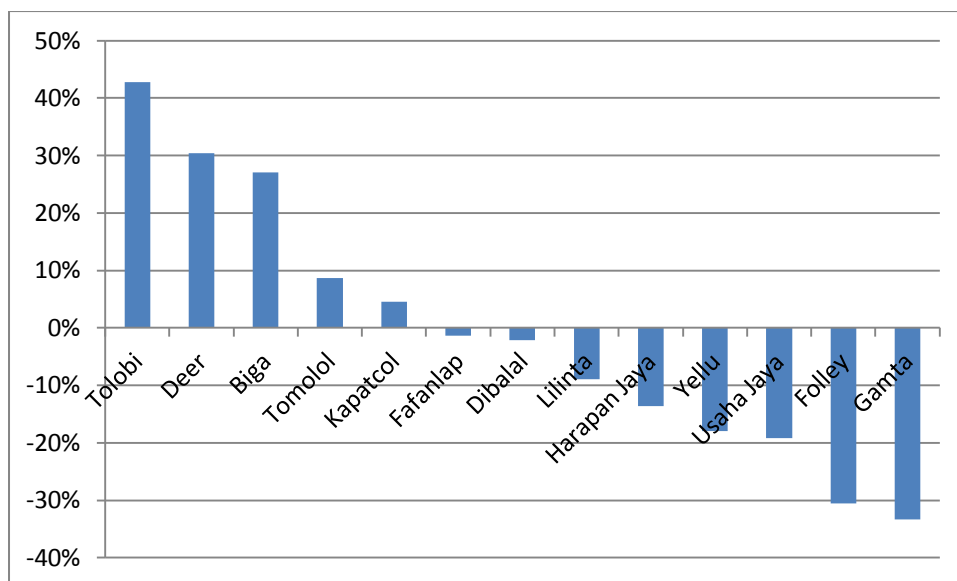


Figure 17. Change in the proportion of good to bad views of the coral reef between 2005 and 2010¹⁸.

Respondents in 2010 were also directly asked about how they felt the condition of the coral reefs had changed in the past 10 years. Here again people are generally positive, with almost 50 percent of people seeing an improvement compared to 17 percent who see a deterioration. The situation in the villages is presented in Figure 18. In Tolobi, Tomolol and Dibalal the percentage of people who see improvements in coral condition are largest. Kapatcol, Folley and Usaha Jaya have the largest percentage of people with negative views.¹⁹

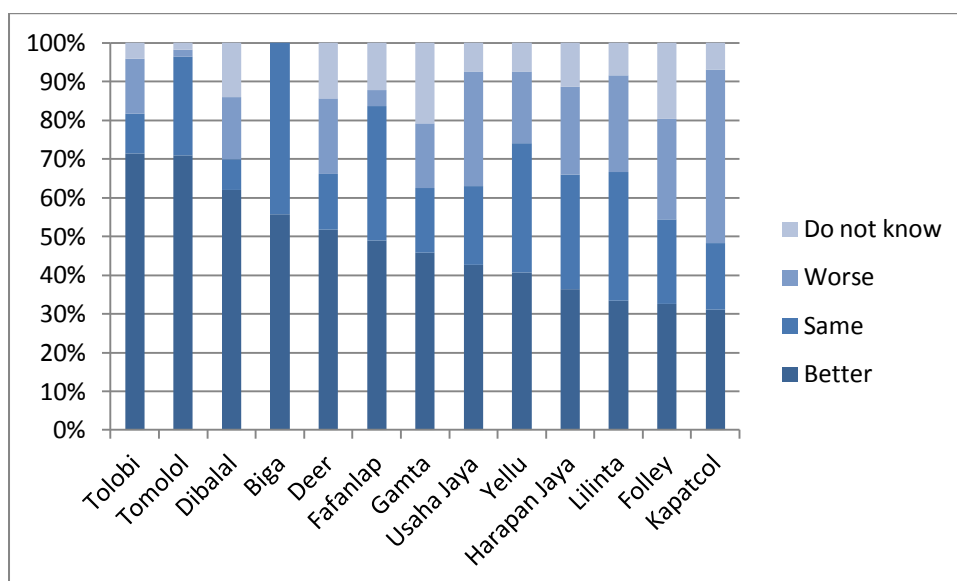


Figure 18. Perceived changes in coral reef condition in 2010 compared to ten years ago, at village level.

¹⁸ The change reflects the absolute change in the proportion of good to bad views. For example, in Tolobi in 2005, after excluding the don't know answers, 28% of respondents thought the reefs were in a good condition, compared to 72% who thought they were in a bad condition. In 2010, 61% of respondents thought their condition was good, and 39% thought it was bad. The absolute change in the proportion of good to bad views is (61-28=) 43%.

¹⁹ For Kapatcol and Gamta this is based on fewer than 30 observations.

Similar to coral reefs, mangroves are also widely seen as offering storm protection. More than 90 percent of respondents in 2010 agree with this statement. Dibalal is the only village where an important proportion of the population is not in full agreement: 30 percent says not to know or not to be sure.

Perceptions about the condition of mangrove forests around the villages also follow the same pattern as those about coral reefs. There is a large proportion (even larger than for coral reefs) of people who think the mangroves are in good condition (Figure 19).²⁰ Again the slight increase in positive perceptions comes mainly from people who in previous survey rounds did not know.²¹

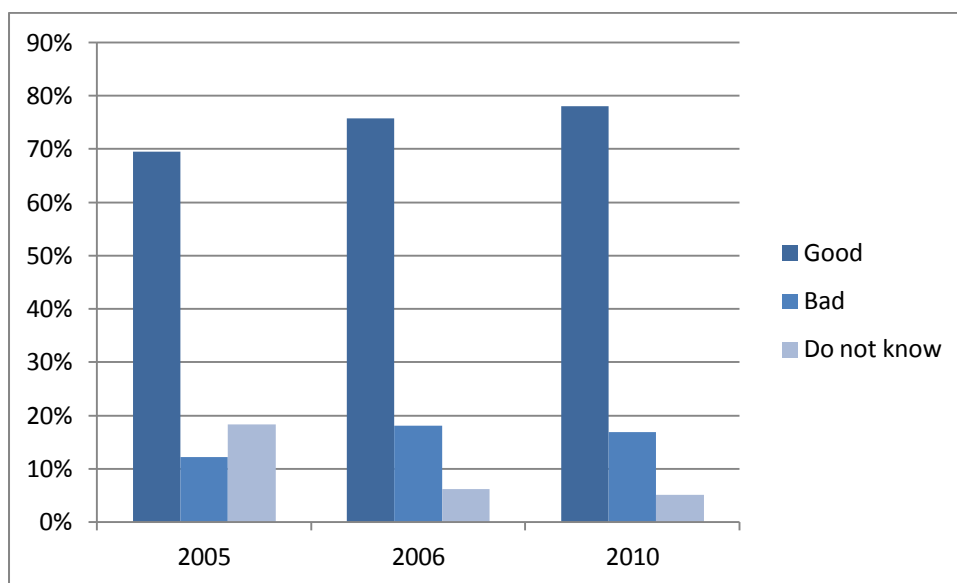


Figure 19. Perceived condition of the mangrove forests around the villages.

The picture at village level is again divided, but the changes in perceptions are opposite for a number of villages (Figure 20). In Deer, where one of the biggest positive perception changes took place for coral reefs, shows a change for the worse when it comes to mangrove perceptions. Folley follows the opposite pattern, a relatively big negative change of perception for coral reefs and positive change for mangroves. In Dibalal negative perception changes for coral reefs also go together with a positive change in perceptions about mangrove forests.²² However, it should be remembered that even in Yellu, where perceptions deteriorated most, there are still 50 percent more people who hold a positive perception than a negative one (see Figure 96 in the appendices for an overview of perceptions in 2010 at the different villages).

²⁰ Again the answer categories for 2005 and 2006 were adapted to match 2010: very good and good were joined in good, and very bad and bad in bad.

²¹ The differences between the phases are generally not statistically significant once the “don’t know” answers are excluded. The only exception is the change from 2005 to 2006, which is significant at the 10% level, but the change between 2005 and 2010 is not.

²² The villages where the number of observations were below 30 are: Gamta, Yellu, Kapatcol and Tolobi.

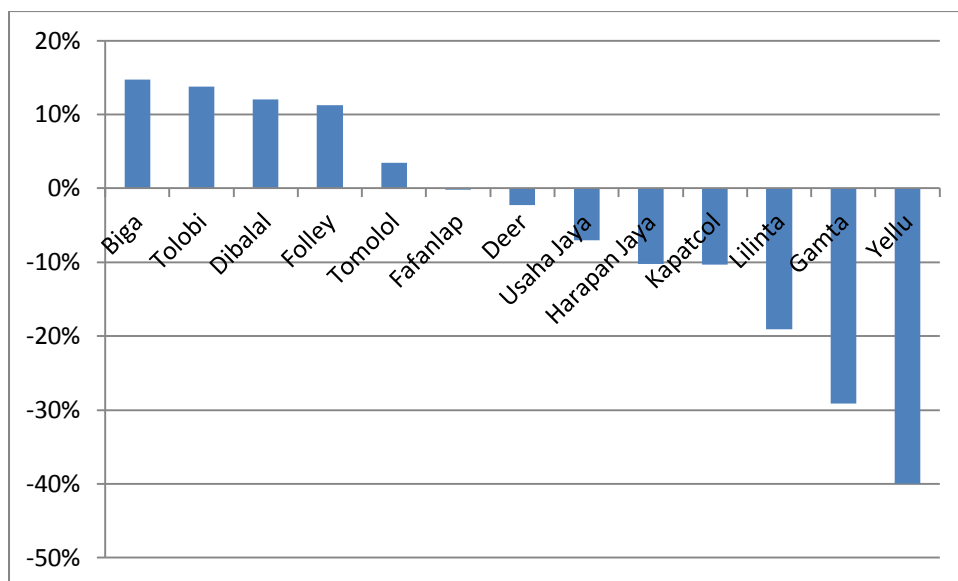


Figure 20. Change in the ratio of good to bad views of mangrove forests between 2005 and 2010

Perceptions on how the condition of mangrove forests is compared to ten years ago are positive. Almost 50 percent sees improvements against 11 percent who see a deterioration. At village level, in Tolobi, Deer and Tomolol respondents most often see a positive change, while in Yellu, Folley and Kapatcol people most often see a deterioration (Figure 21).²³

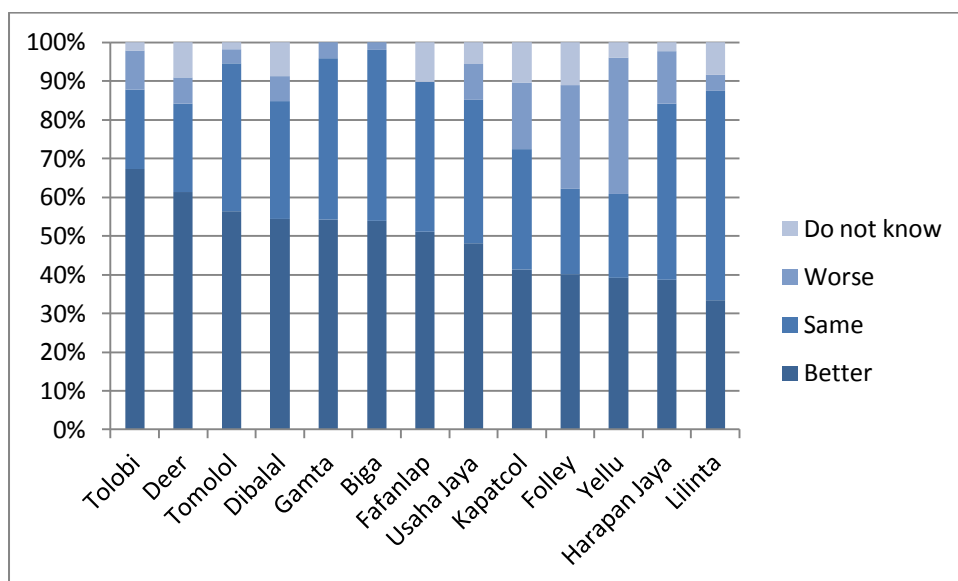


Figure 21. Perceived changes in mangrove condition in 2010 compared to ten years ago, at village level

²³ Observations in Gamta and Kapatcol again are below 30.

Environmental problems

There were two set of questions related to environmental problems in the questionnaire. First, a number of problems were presented to the respondents, and they were asked to evaluate the severity on a scale from one to three.²⁴ In another section of the questionnaire, respondents were asked an open question about the main environmental problem(s) in their coastal areas.

Some of the problems presented in 2005 and 2010 were similar, but in 2010 a longer list of problems was presented to the respondents. In 2006, this question was not asked.

Perceptions appear to have changed considerably for the issues that were asked about in both 2005 and 2010 (Figure 22). First of all, a much larger proportion of the population seems knowledgeable about the problems. The share of respondents who do not know or are not sure how serious the problems are has gone down from an average of 41 percent in 2005 to just eight percent in 2010. This is assumed to be due to the outreach efforts by TNC about the state of and threats to the marine environment during the establishment of the Kofiau and SE Misool MPAs.²⁵ A second shift is that larger proportions of villagers qualify these problems as more serious: in 2010, 77 percent judge these to be major problems compared to 30 percent in 2005.²⁶ The proportion of respondents who do not think there is a problem has also gone down considerably.

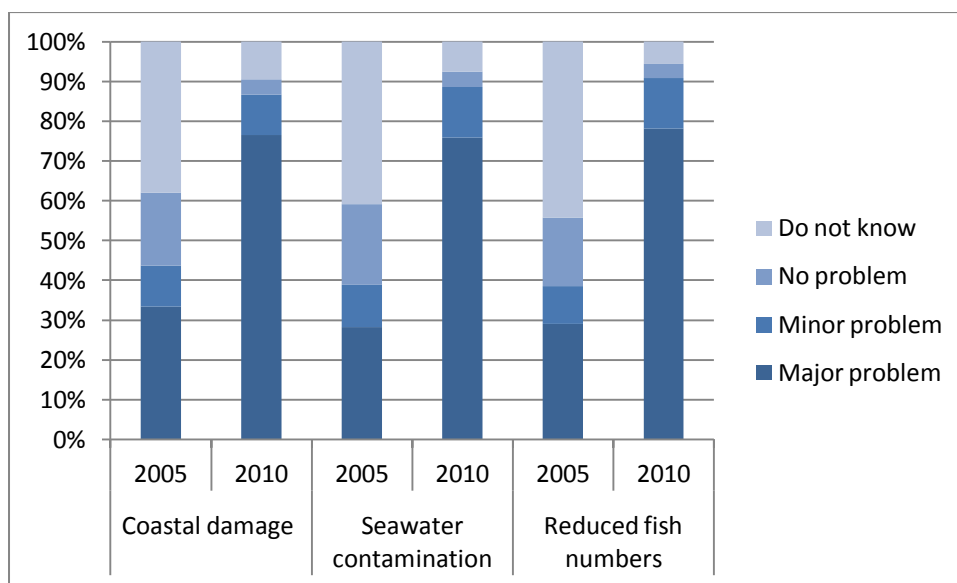


Figure 22. Environmental problem evaluation: 2005 and 2010 comparison.

The other thing one notices when looking at Figure 22 is the uniformity of the percentages for the different problems within the two survey phases. This raises the question whether these responses reflect the perceptions about the different problems, or measure a more general environmental

²⁴ Major problem =1, minor problem=2, no problem =3.

²⁵ In general, the proportion of respondents choosing the “don’t know/not sure” answer in 2005 is very high for almost all questions. This could simply reflect a higher familiarity with the issues, but it might also be that these answers partly reflect unwillingness to be interviewed or uneasiness with saying no.

²⁶ The changes for all three problems are significant at the 1% level. The statistical significance remains if the “don’t know” answers are excluded, showing that the ratio of people who think there is a problem to those who think there is none, has also changed.

awareness. If we look at all problems that were presented in 2010, we find a bit more diversity in the percentages (Figure 23).

Outside fishers seem to generate most concern, while fewer respondents qualify coastal development, the leasing of marine areas to outsiders and the loss of traditional resource management as major problems.

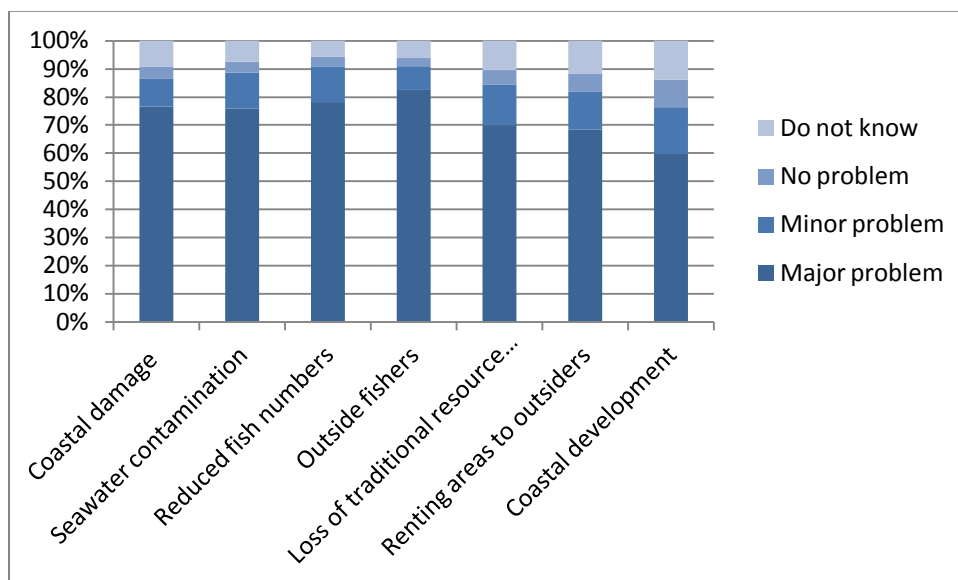


Figure 23. Environmental problem evaluation: 2010.

Perceptions differ substantially between the villages. In 2005, Deer consistently has the highest percentage of (most) concerned people, but, while concern increased there as well, is not among the “most concerned” villages in 2010. Folley, Usaha Jaya, Dibalal and Tolobi also have larger than average percentage of people who are more concerned about these problems in 2005. The latter two villages are also among the “highest scores” in 2010. Yellu, Lilita and Gamta have the largest percentage of people who do not see the problem in 2005, and while Yellu and Lilita still trail the pack in 2010, Gamta is among the “most concerned” villages. To give an idea, Figure 93 and Figure 94 in the appendices show the village perceptions about the problem of coastal damage in 2005 and 2010, respectively. The graphs are representative of the other problems as well.

Looking at the three problems together, the biggest changes between 2005 and 2010 in the perceptions of their problems have occurred in Gamta, Fafanlap and Biga. People in Usaha Jaya, Deer and Folley, on the other hand, have changed their view the least (Figure 24). Kapatcol shows the smallest change when it comes to the problem of coastal damage.²⁷

The villages that showed more concern in 2005 generally changed their views least, as expected. On the other hand, Yellu and Lilita, which had relatively few respondents who were concerned in 2005, are not among the three villages where the biggest changes took place.

²⁷ The results for both Gamta and Kapatcol are based on a low number of observations in 2010 (<30), and as their values lie in the extreme range, caution should be exercised in interpreting these values.

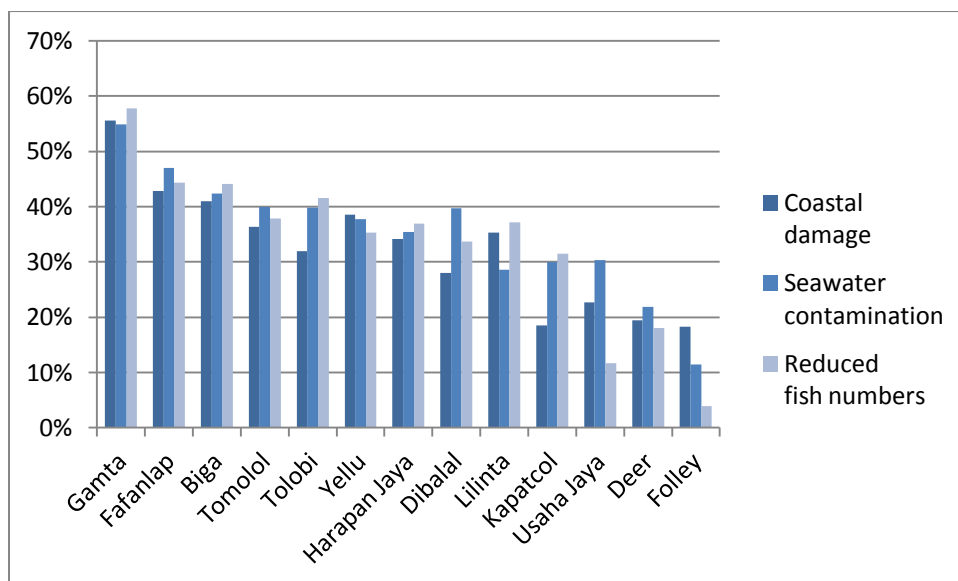


Figure 24. Change in perceived coastal problems at village level²⁸.

Next, we discuss the response to the open question: “*What is the problem facing the coastal and marine environment around your village?*” Because the format of the question differed across the surveys, we cannot make a direct comparison, but by studying Figure 25 for 2010 and Figure 26 for 2005 and 2006, we see that the same problems are prominent in all surveys.²⁹

Blast fishing or dynamite fishing is the problem that is mentioned most often. Second is cyanide fishing (in 2005 with a compressor and air hose), and overfishing is the third most common answer. Compressor diving was mentioned separately from cyanide fishing in 2010, but only by relatively few respondents. The most important problems in the “other” category are deforestation and using fish traps in 2005, coral mining and seawater contamination in 2006 and coral mining and the stealing of marine resources (by outsiders) in 2010.³⁰

In 2010, there is no correlation between the time someone has lived in a village and whether he or she mentions blast and/or cyanide fishing as the main problem. When comparing villages, a relationship between the percentage of new arrivals in the village (those living less there than three years), and the percentage of respondents who mention these problems could not be detected either.

If we compare the problems that were presented to people with the problems that people mention themselves when asked in an open question, two things stand out. First, when asked openly, people

²⁸ These changes represent the relative change between 2005 and 2010 in the mean score on this variable, excluding the “don’t knows”. No problem was coded as 1, Minor problem as 2, and Major problem as 3. The arithmetic mean was taken in 2005 and 2010, and the relative change in the mean was then inverted to allow an increase in concern to show up as a positive change (e.g., if the mean in 2005 for a particular problem in a particular village is 1.5 and in 2010 the mean is 1.2, the inverse relative change is $-(1.2 - 1.5)/1.5 = 20\%$). The order of the villages in the graph is based on the average change for the three problems. Statistical significance was tested by means of Pearson Chi², and all changes were found to be significant at, at least, the 10% level, except for Coastal damage and Seawater contamination in Folley and Reduced fish numbers in Usaha Jaya.

²⁹ In 2010, only 1 option was recorded, while in previous rounds respondents could mention several.

³⁰ In Widodo *et al.* (2009) high percentages of respondents see immigration and high population as problems in 2006 (17 and 18%, respectively), but this was not found when analyzing the same data for this study. Instead, both problems are found to be mentioned by less than 1%. Potentially, the difference could come from the category “other”, but since that category has a percentage of roughly 20% in total, this seems unlikely.

generally mention causes rather than outcomes. Second, for the presented problems in 2010, the percentage of respondents who do not see the problem is below 10 percent for all problems. However, for the open question, we see that 25 percent says there are no big problems. The percentage of people who say they do not know is also much larger in the open question. This is surprising, as the open question came after the presented problems. Why these differences occur is not clear, but it means the finding here should be treated with caution.³¹

Looking at the village level in 2010, one notices a few things. First, in Folley, blast fishing is mentioned much less frequently, and people are more worried about compressor diving and the stealing of marine resources. Compressor diving is only mentioned as a problem in two other villages, Dibalal and Tomolol. Using fish traps is only mentioned in Kapatcol. Cyanide fishing seems particularly problematic in Tolobi, and less so elsewhere. Finally, overfishing is not mentioned at all in Kapatcol, Lilinta, Biga, Gamta and Tolobi. This may help in the targeting of threats.

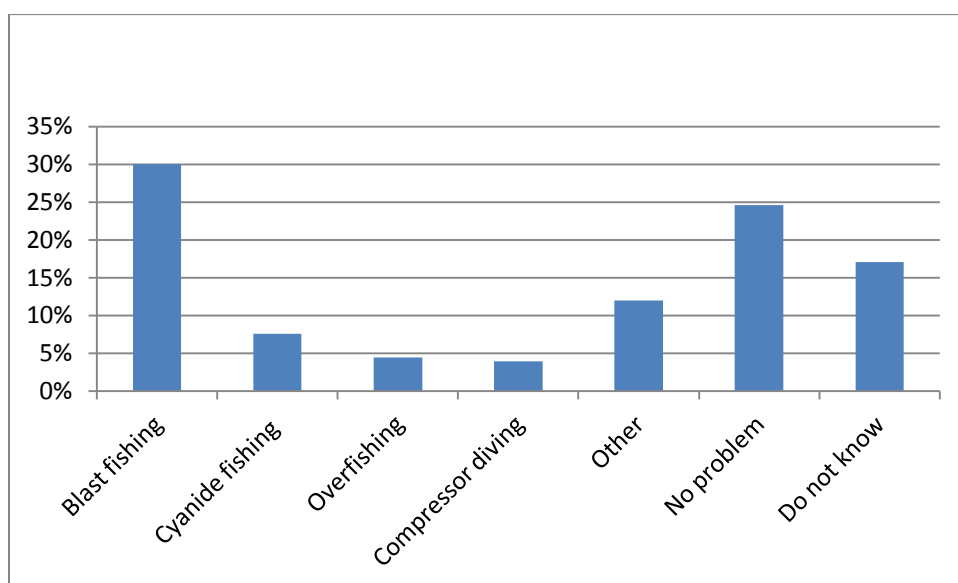


Figure 25. Stated marine and coastal problems in 2010.

³¹ In the 2005 round of perception monitoring, the percentage of “don’t knows” differs as well between presented problems and open question, but this time in the more expected manner; the percentage in the open question is smaller. The percentages of people who do not see big problems are in line for both questions in 2005. They make up about 20% in both questions.

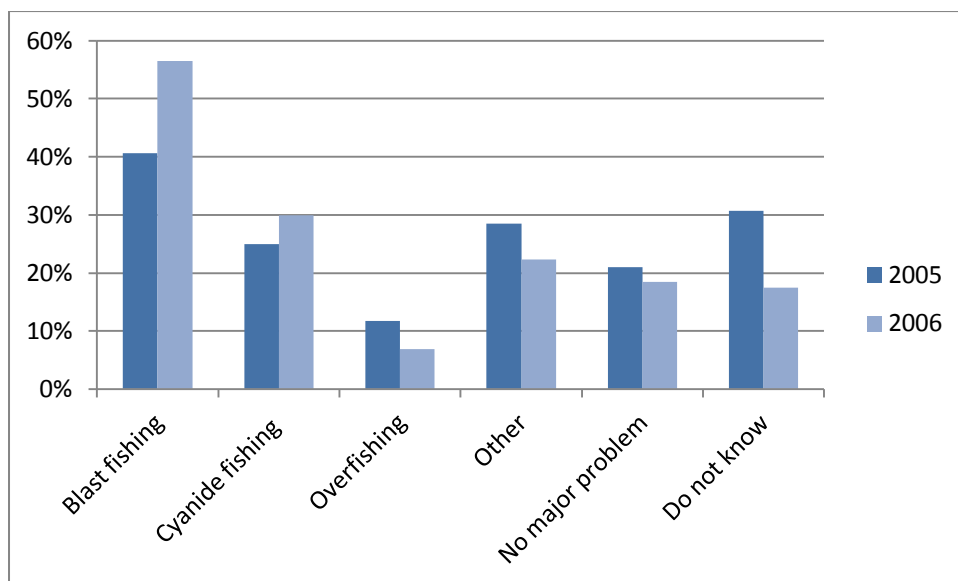


Figure 26. Stated marine and coastal problems in 2005 and 2006.

Environmental problem creator and solver

Respondents were also asked who was most responsible for creating the marine and coastal problem(s) (so mostly blast fishing and cyanide fishing). The responses from the different phases are not directly comparable, as the wording of the questions and answer options were different. In 2005, respondents mainly see themselves and their neighbours as the creator of the problem (Figure 27). Private business is also mentioned as an important creator together with fishers and the village head.³² In 2006, fishers jump out as the most important group, but in that year the wording used was “outside fishers”. “Outsiders”, whether fishers or otherwise, are also the most important group in 2010. In 2010, the Head of the Regency (*Bupati*) is blamed for the problems as well, while he was only marginally mentioned in the earlier rounds.

At village level in 2010, notable differences exist in Usaha Jaya, where outsiders are not mentioned at all, and in Yellu, where they are mentioned less frequently and where people blame their own village most often. The *Bupati* is most frequently blamed in Tomolol, Yellu, and Deer, and also in Gamta and Fafanlap, but in the last two villages the number of observations is very low.

³² The specification of the “other” category in 2005 and 2006 was not available for this study.

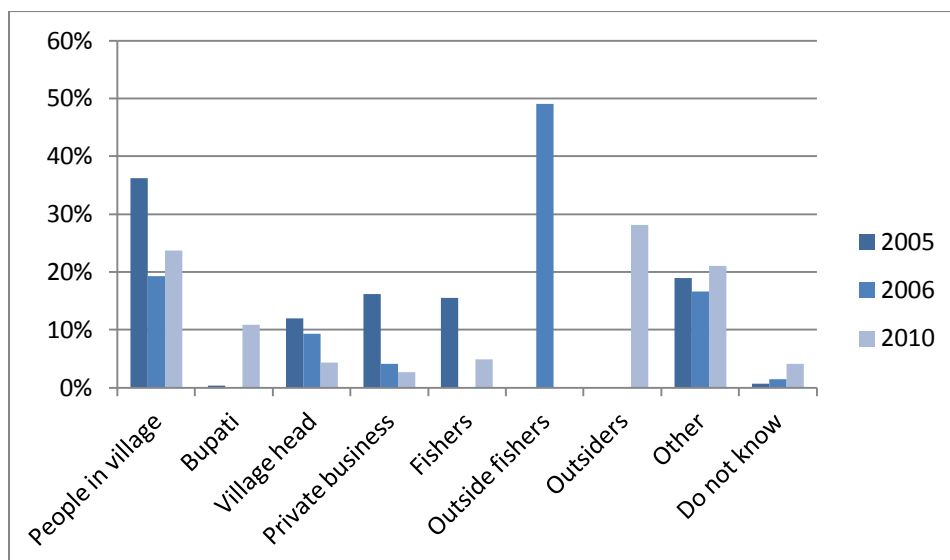


Figure 27. Cause of the marine and coastal problems.

It does not appear as though the people in the Misool and Kofiau MPAs feel that the ones causing the problem are also the ones capable of solving them. While the people in the villages themselves were held responsible for the main problems by at least a fifth of respondents, less than 10 percent of those asked feel they are also the ones who can do something about it (Figure 28). The percentage does seem to be climbing, but even in 2010 it is only 8 percent. Instead, an important role is assigned to the village head and to law enforcement agencies. There is a little increase for NGOs in 2006, but not in 2010.

There is no village in 2010 in which the village head is omitted from the list of problem solvers. The faith in law enforcement is especially high in Folley and Tolobi. The Bupati is seen as most capable in Deer, and in Tomolol and Yellu he is valued as high as the village head. These were also the villages where he was blamed a lot.

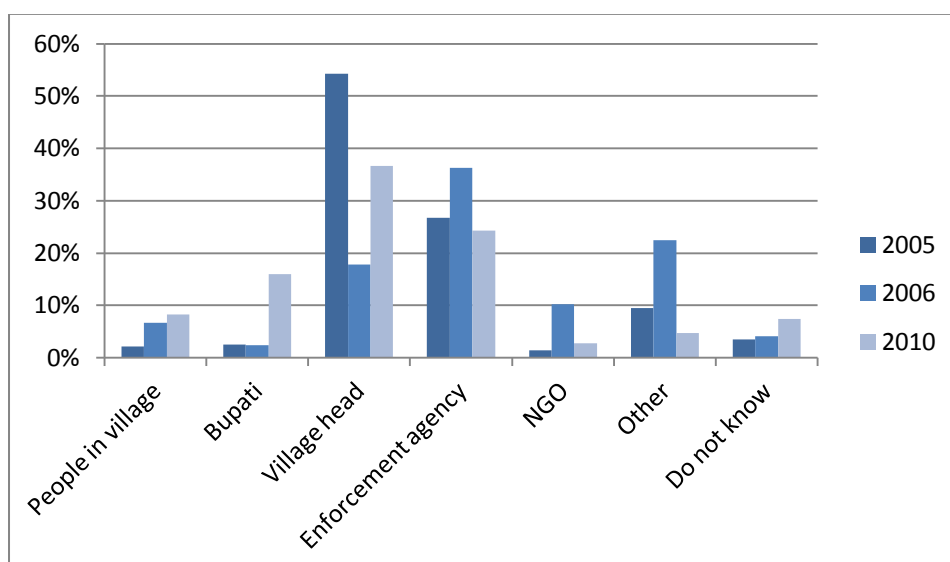


Figure 28. Most capable institution to solve the marine and coastal problems.

Besides asking for the most capable institution to solve the marine and coastal problems, a question about who was responsible for doing this was added in 2010. Figure 29 provides a comparison of the

answers to both questions. The church/mosque and NGOs have no responsibility but is seen as able by a few people. The village head also scores lower on responsibility than capability. Law enforcement, the *Bupati* and people themselves score higher.

The people who answered this question mostly appear optimistic that those responsible will act (do something). Seventy-one percent believe this is very likely. Only six percent think it is unlikely.³³ Those who believe it is likely live in Deer and Usaha Jaya. Relatively more respondents who believe it is unlikely live in Folley and Yellu, but they are still in the minority.

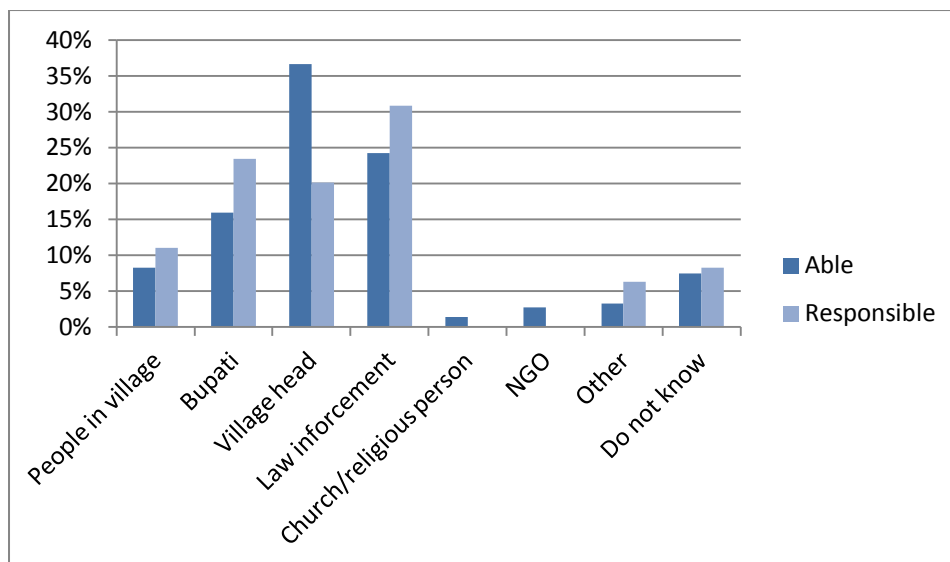


Figure 29. Able and responsible for solving marine and coastal problems in 2010.

Environmental statements

As part of the environmental perception section in the survey, a number of statements were put to respondents and they were asked whether they agreed or not. The statements from the 2010 survey are presented in Table 8. The table also indicates whether the statement was put to respondents in the earlier survey phases.

Table 8. Environmental perception statements.

No.	Statement	Comparing with earlier phases
1	<i>The coral reefs around my village don't need special protection</i>	Not in 2006, different in 2005
2	<i>The mangroves around my village don't need special protection</i>	Not in 2006, different in 2005
3	<i>Most people in my village don't care about protecting the environment</i>	Same in all phases
4	<i>I as an individual can do many things to the protect marine environment and coastal resources around my village</i>	Same in all phases

³³ In 2005, respondents were asked this question as well, but then for the question about capable institutions. The responses are similarly optimistic.

5	<i>Working collaboratively, the people in my village can do many things to protect the marine environment and coastal resources</i>	Same in all phases
6	<i>Damaging our coastal environment now will make our lives more difficult in the future</i>	Same in all phases
7	<i>People who worry about protecting the sea and coastal areas care more about fish than they care about people</i>	Not in 2006
8	<i>People who destroy the natural environment should be punished</i>	Not in 2006
9	<i>People who capture protected species should be punished</i>	Not in 2006

The first two statements were substantially different in 2005 (the addition was made that they did not need protection because they were already in a fine condition), so caution should be exercised when comparing the results for both years.

In 2010, small majorities of respondents disagree with the statements. Figure 99 and Figure 100 in the appendices provide information about the responses at village level, which show considerable variation. For coral reefs, the villages where most people disagree, and therefore do think protection is necessary, are Tolobi, Kapatcol and Folley. Deer, Gamta and Biga have the fewest people who see the need for protection.

A reason for not needing protection could be that the reefs and mangroves are currently perceived to be in a good condition, but there is no statistically significant correlation between their perceived condition and the response to the protection statements.³⁴ This means that a number of people said, for example, that the reefs are in bad condition but did not agree that the reefs need to be protected. Another reason for agreeing with the statements could be that the respondent did not like the idea of protection for fear it would deteriorate his or her livelihood. However, there is no correlation either between the answers to these statements and the answer to the question whether it is a good idea to demarcate and protect an area of the coast (see the following section on MPAs). It is therefore not clear which underlying motivation drove the responses to these statements, and how to interpret them.

³⁴ This was tested on the 2010 data, using Pearson's correlation coefficient and excluding "don't know" answers. Using the 2005 data, the same was tested, and similar results were found, which is even more surprising as the 2005 question specifically states that the condition of reefs and mangroves are good and *therefore* do not need protection.

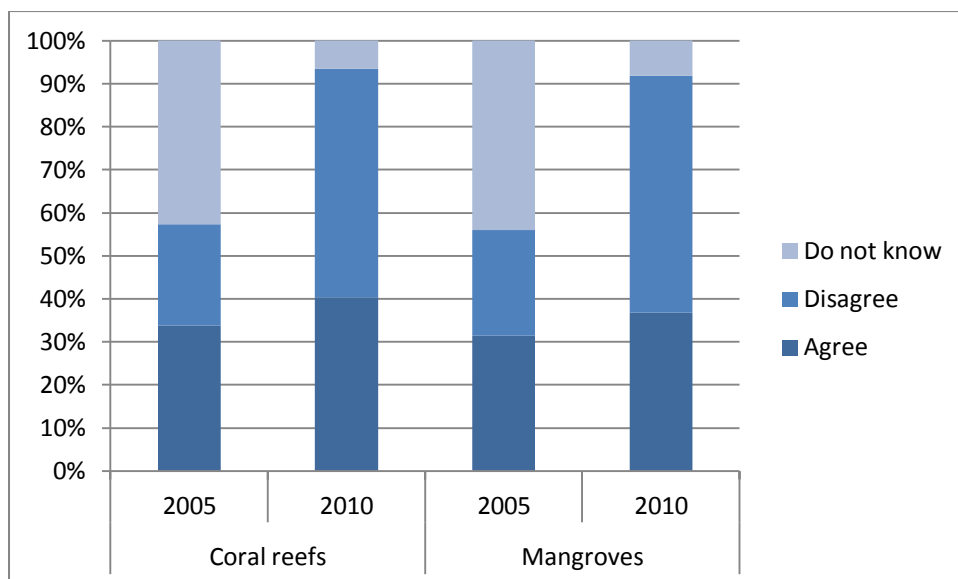


Figure 30. "Coral reefs/mangroves don't need protection!"

On the statement that people in the village do not care about the environment, in 2005, a majority does not know or was not sure, but this group was much smaller in later surveys. In 2005, the group that agrees was of similar size to the one that disagrees. In 2006 and 2010, the percentage of respondents who disagree (those who think village people *do* care about the environment) was substantially larger, so people have become more positive.³⁵

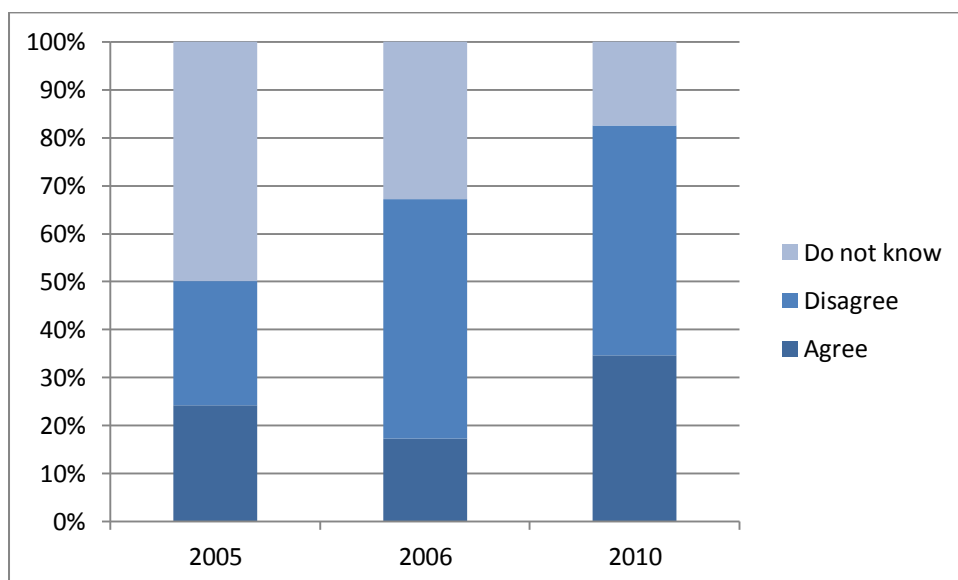


Figure 31. "Most people in this village don't care about the environment!"

The response at the village level in 2010 is presented in Figure 32. Kapacol, Tolobi and Folley are most positive about the views in their village (they disagree with the statement most often), while Gamta, Biga and Yellu are most negative.

³⁵ The differences between the phases are all statistically significant at the 1% level if the "don't know" answers are included. If they are excluded, the difference between 2005 and 2010 is significant at the 10% level, while the other differences (2005-2006 and 2006-2010) remain significant at the 1% level.

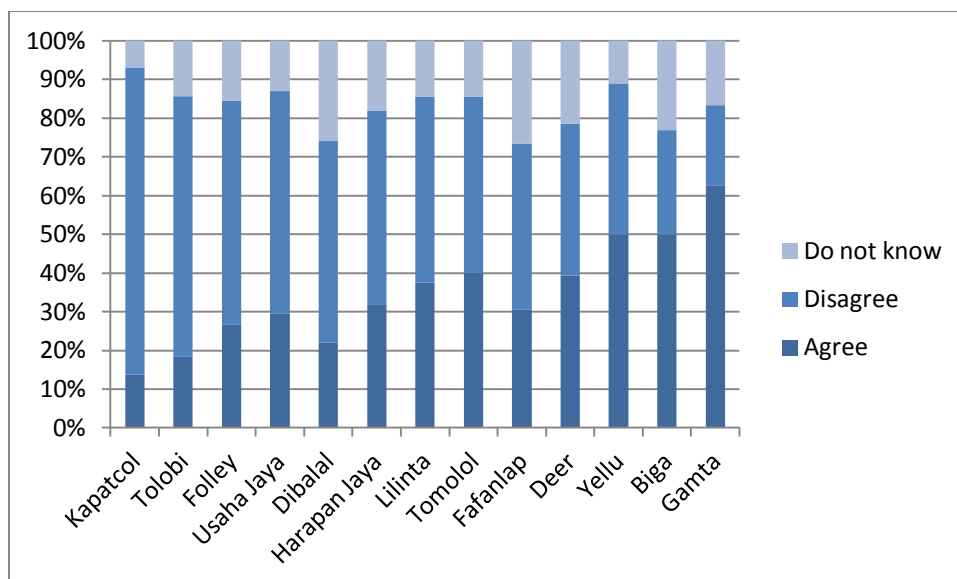


Figure 32. "Most people in this village don't care about the environment!" (Village level results for 2010)³⁶.

The reactions to this statement have changed differently in different villages. Between 2005 and 2010, in Tolobi, Kapatcol and Folley, the biggest positive changes have taken place (fewer people agree with the statement). Yellu, Harapan Jaya and Biga are the villages where agreement with the statement has risen most, and therefore, where more people feel that their village members do not care.

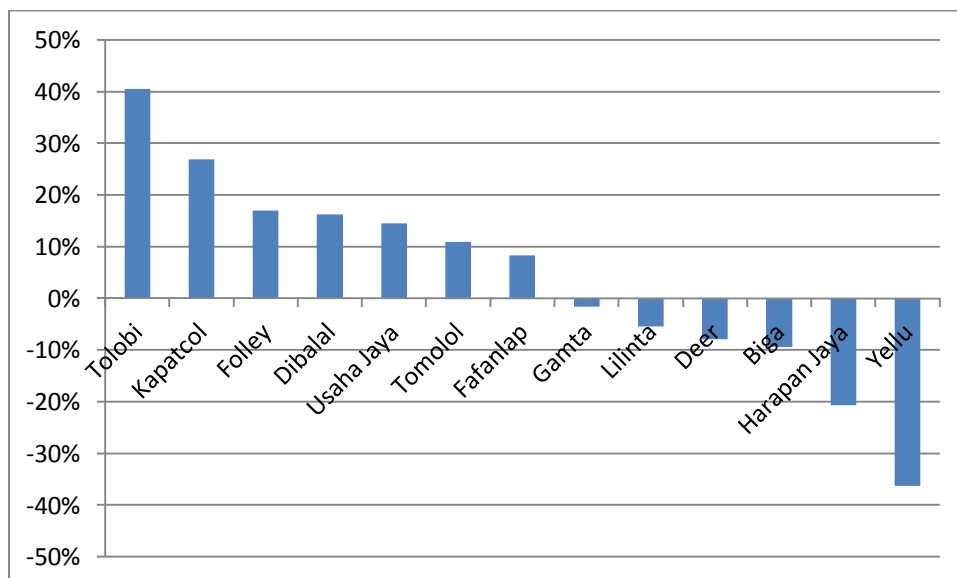


Figure 33. Change in the proportion of agreement with the "don't care" statement 2005-2010³⁷.

Because the positive change over all villages together between 2005 and 2006 seems to have been partly reversed between 2006 and 2010, we also show changes between 2005 and 2006, and between

³⁶ Ordered based on the percentage of people who disagree from largest to smallest, so from the village with the most positive view to the one with the most negative view.

³⁷ A positive change means fewer people agree with the statement, and therefore fewer people think that their neighbours don't care.

2006 and 2010 separately for the village level (Figure 34). The villages in the figure are ranked according to the order for the overall (2005 to 2010) change from the previous graph.

We see that in Tolobi the overall change completely takes place between 2005 and 2006; between 2006 and 2010 there is no change. We also see that there are many villages in which the trend reverses. For most of these, there is a positive change – fewer people agree – between 2005 and 2006, but a negative one in the later period. The only village with an opposite movement (negative change between 2005 and 2006 and a positive one thereafter) is Biga, but changes there are relatively small. In Yellu, views of the villagers support for the environment deteriorate consistently over the two periods.

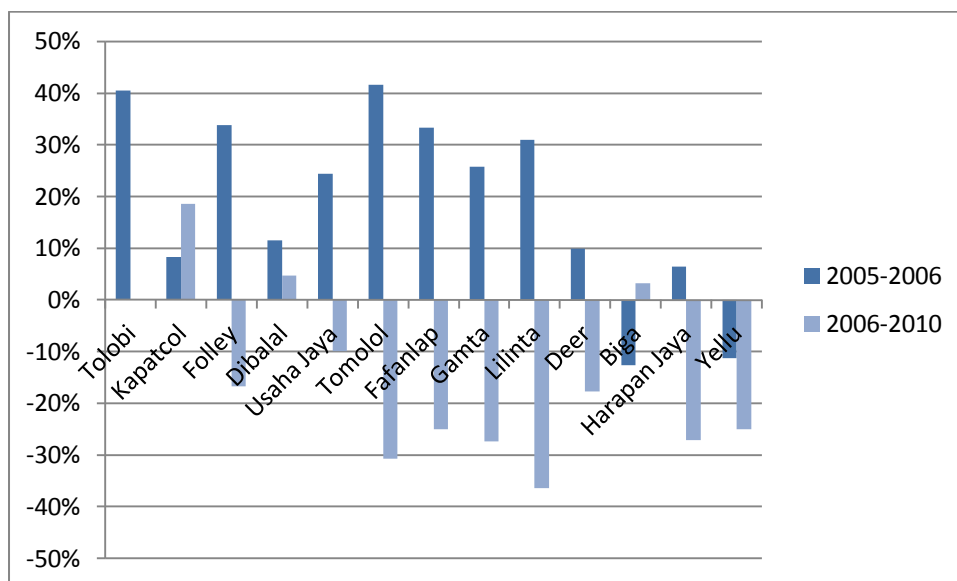


Figure 34. Change in the proportion of agreement with the "don't care" statement 2005-2006 and 2006-2010³⁸.

The next two statements were about how much individuals and the community can do to protect the marine environment and its resources. Again, the doubters are the biggest group in 2005. In 2006 and 2010, the optimists have the upper hand. Unsurprisingly, in all the surveys, people are more optimistic about the ability of the community to do something than about their personal ability. The percentage of people who disagree does grow from 2006 to 2010, which is in line with the response of the earlier statement about how much community members care about the environment.³⁹

³⁸ A positive change means fewer people agree with the statement, and therefore fewer people think that their neighbours don't care.

³⁹ Using Pearson Chi² to check for statistical significance of the changes, we find that all changes – whether including or excluding the “don't knows” – are significant at the 1% level, with the exception of the “community change” from 2005 to 2010, when the “don't knows” are excluded. That change is not statistically significant, which means that the ratio of those who agree to those who do not has not changed significantly between 2005 and 2010.

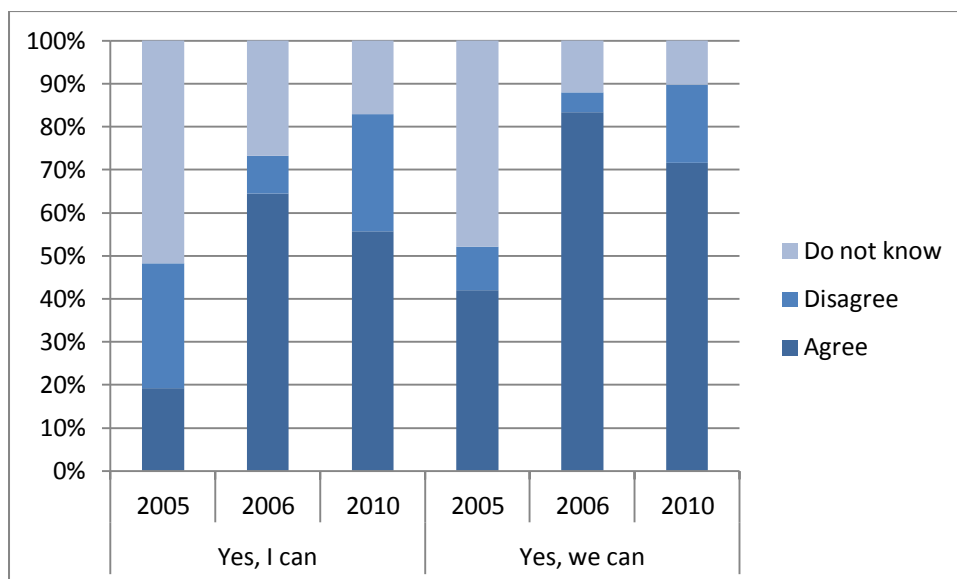


Figure 35. "I/The community can do a lot to protect to the environment!"

Comparing the responses at village level in 2010 between both questions, especially Deer stands out. It has the greatest trust in the ability of the community, but is among the villages with least trust in personal ability. Tolobi and Fananlap score high on both questions. Dibalal and Usaha Jaya are among the lowest three villages in both trust in the community and personal ability.

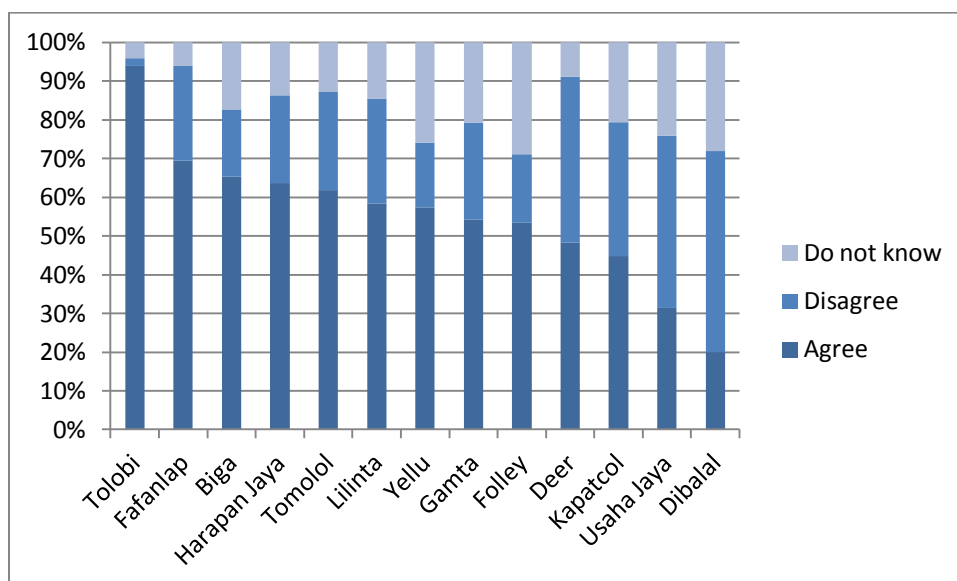


Figure 36. "I can do a lot to protect to the environment!" (Village level results for 2010).

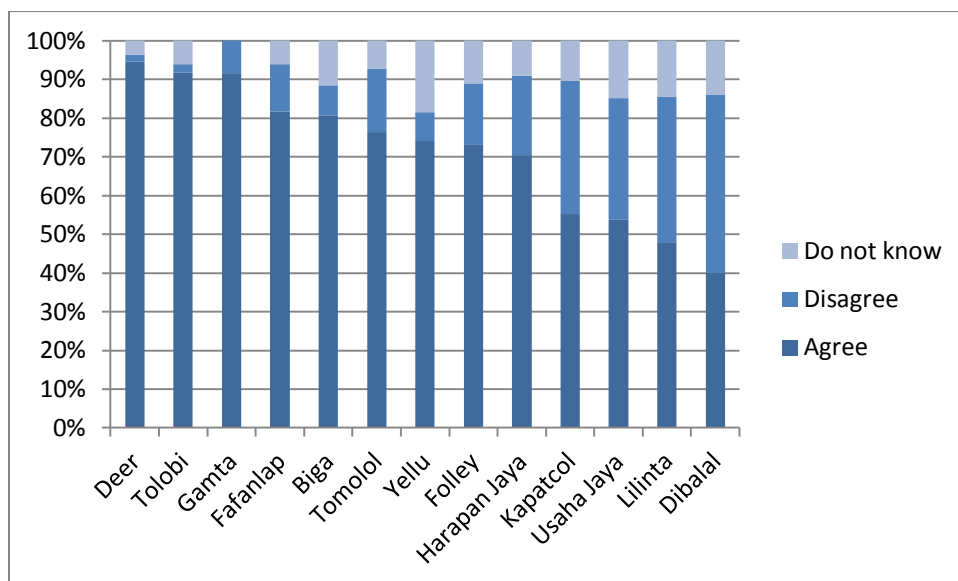


Figure 37. "The community can do a lot to protect to the environment!" (Village level results for 2010).

The change between 2005 and 2010 in the response to the "I can" statement is positive in most villages, mostly strongly in Tolobi, Yellu, and Harapan Jaya. Dibalal, Deer and Kapatcol are the only villages this view changes negatively, although only slightly so.

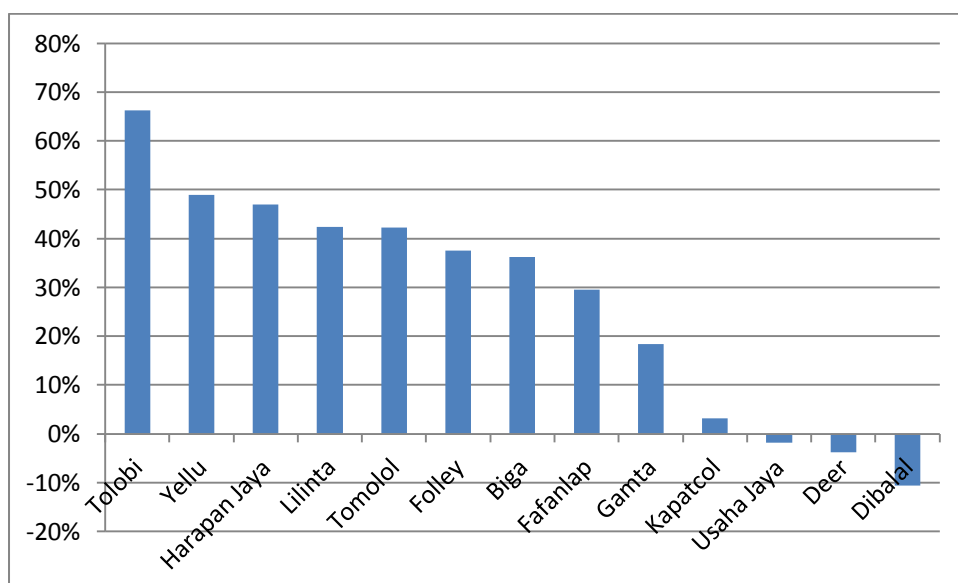


Figure 38. Change in the proportion of agreement with the "I can" statement between 2005 and 2010.

Villages show bigger differences for the change in perceptions about joint capability to protect the environment, and negative changes are more prevalent.

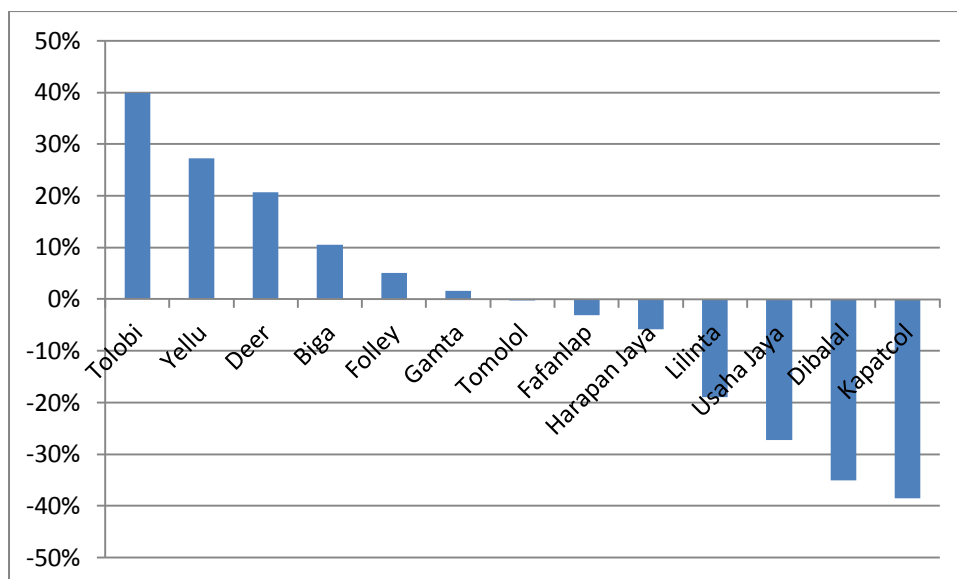


Figure 39. Change in the proportion of agreement with the "We can" statement between 2005 and 2010.

In the next agree/disagree statement, it was suggested that damage caused now would make future life more difficult. Once more, compared to 2005, people were more sure about the statement in 2006 and 2010. In all surveys, the people who agree were far more numerous than those who disagree, but the ratio of acceptance to rejection seems to decline from almost 4 to 1 to a little over 2 to 1.⁴⁰

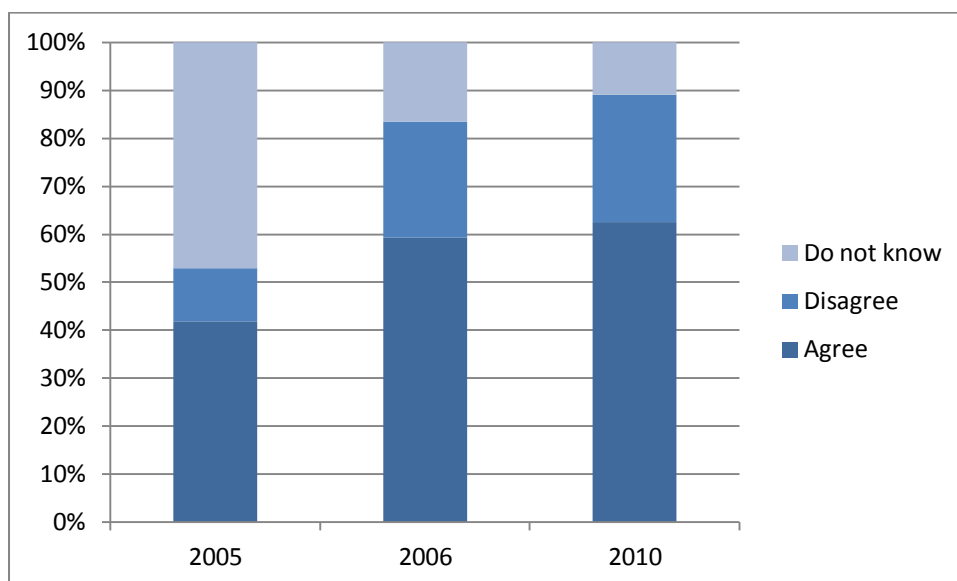


Figure 40. "Damaging the coastal environment now, will make future life more difficult!"

At village level in 2010, only Biga has more respondents who disagree than people who agree with this statement.

⁴⁰ The change from 2005 to 2006 including "don't knows" is statistically significant at the 1% level. When "don't knows" are excluded, it is significant at the 5% level. The change from 2006 to 2010, including "don't knows" is significant at the 5% level, and not significant when "don't knows" are excluded. The change from 2005 to 2010 is significant at the 1% level, regardless of whether "don't knows" are included or not.

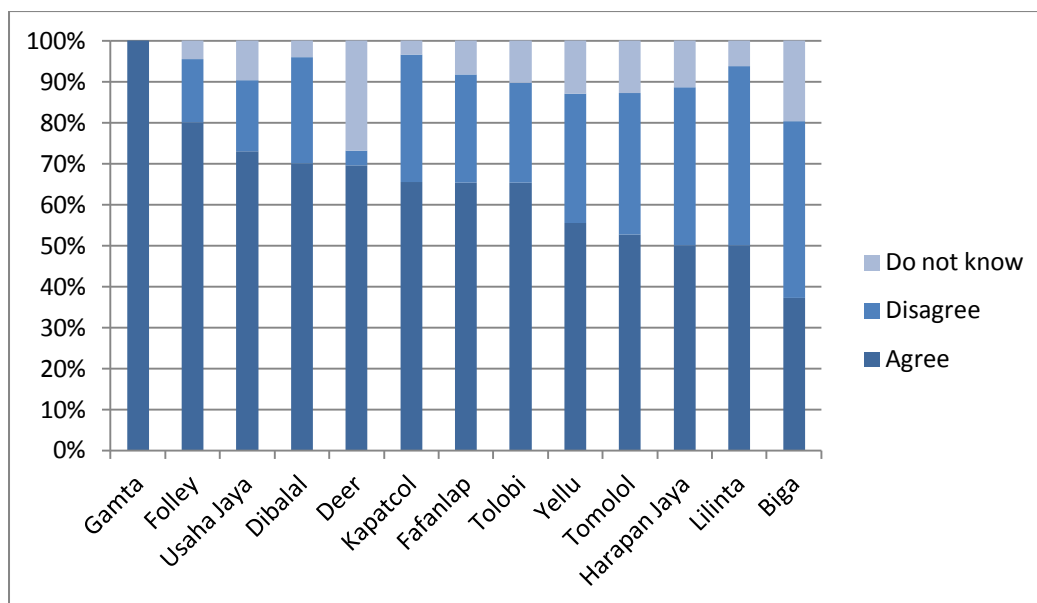


Figure 41. "Damaging the coastal environment now, will make future life more difficult!" (Village level results for 2010).

In Fafanlap, Tomolol and Deer, the change between 2005 and 2010 has been biggest. These are not the villages with the highest percentage of those who disagree in 2010. Harapan Jaya, in which the second greatest positive change occurred, still has a substantial percentage of respondents who disagree in 2010.

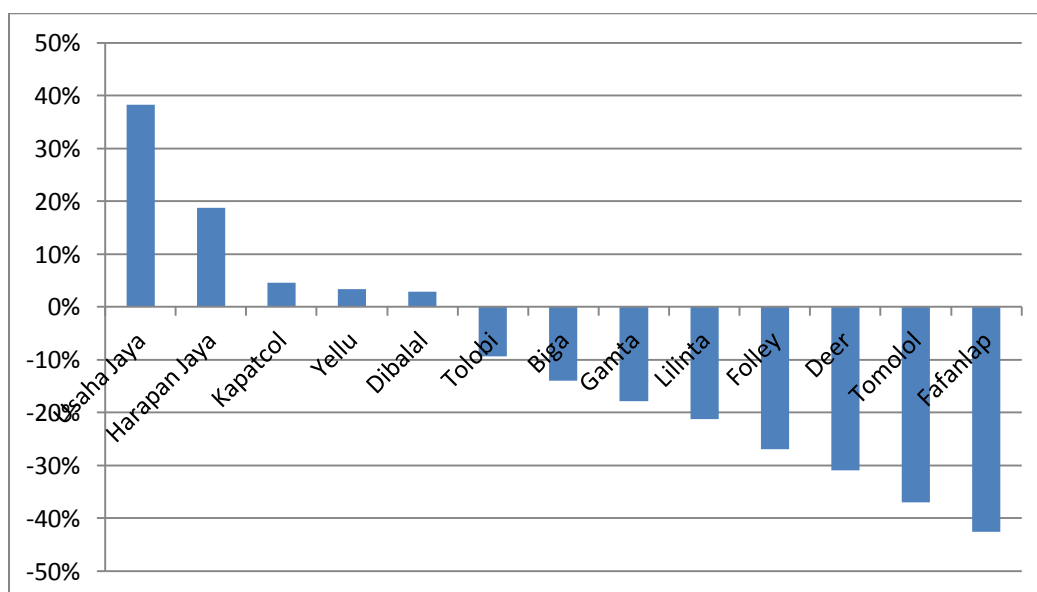


Figure 42. Change in proportion of agreement with the "damage-future" statement between 2005 and 2010.

The next statement, that people who work to protect the environment care more about fish than people, receives a majority of "don't know" answers in 2005, and groups that agree and disagree were

about the same size. The latter has not changed in 2010, but the group that answered “don’t know/not sure” is considerably smaller.⁴¹

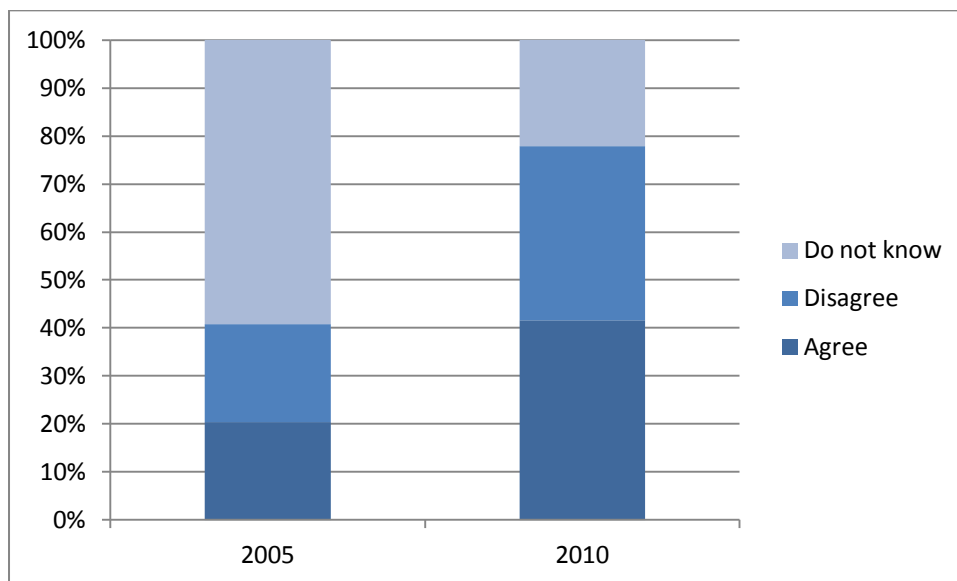


Figure 43. "People who protect the environment care more about fish than people!"

In 2010, in Dibalal, Usaha Jaya and Folley, the people who disagree (so have positive views of people working for environmental protection) clearly outnumber the ones who agree (Figure 44). The opposite is found in Biga, Yellu, Fafanlap, Lilinta, Deer and Harapan Jaya.

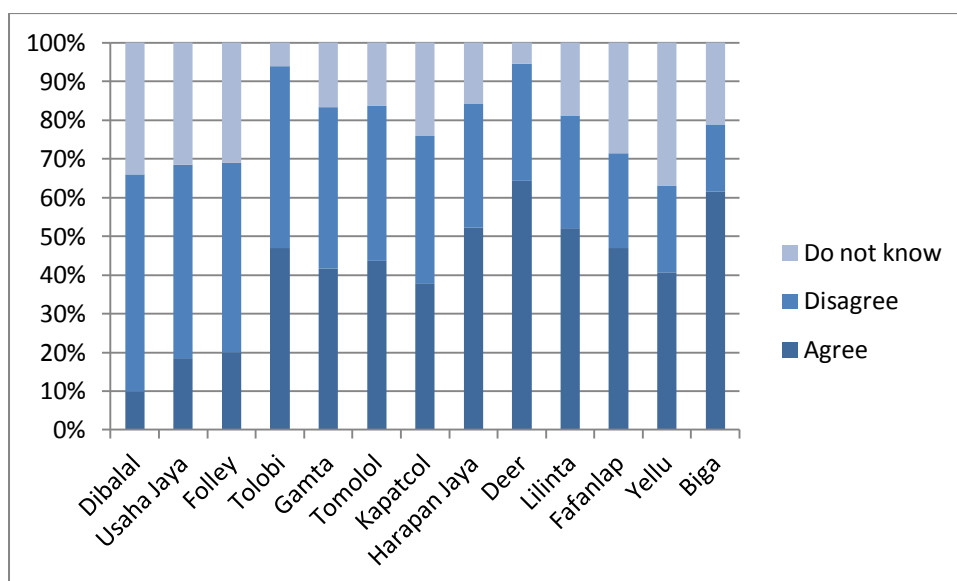


Figure 44. "People who protect the environment care more about fish than people!" (Village level results for 2010)⁴².

⁴¹ The difference between 2005 and 2010 is statistically significant if the “don’t knows” are included. It is not, if they are excluded.

⁴² Ordered based on the percentage of people who disagree from largest to smallest, so from the village with the most positive view of environmental protection workers to the one that holds the most negative view.

By looking at the changes in response to this statements between 2005 and 2010 – the question was not part of the 2006 survey round – we see that the villages where most people disagreed in 2010, Dibalal, Usaha Jaya and Folley, are also the ones where the biggest positive changes in perceptions about environmental protection workers have taken place (Figure 45). The opposite is also generally true.

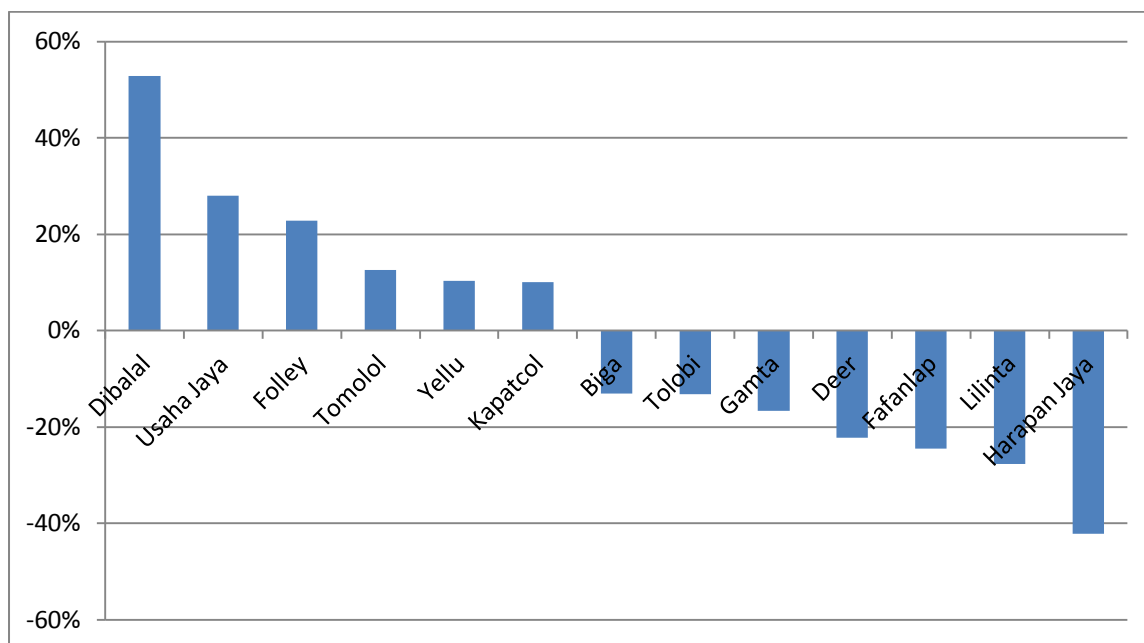


Figure 45. Change in the proportion of agreement with the "fish-human" statement 2005-2010⁴³.

The next two statements are about the punishment of people who damage the environment or take protected species. The overall response for both statements is almost identical. This is the first statement where the “don’t knows” are not dominant in 2005. More than 60 percent agree that these violations should be punished. In 2010, this feeling is even more ubiquitous; almost 80 percent agree. However, the ratio of people who disagree to those who agree decreases in 2010; more doubters have turned to disagreement than to agreement.⁴⁴

⁴³ A positive change means fewer people agree with the statement, and therefore fewer people think protection workers care more about fish than humans.

⁴⁴ The change between 2005 and 2010 on the statement that those who damage the environment should be punished, when excluding the “don’t knows” is statistically significant at the 10% level. If the “don’t knows” are included, it is significant at the 1% level. The change in the other “punishment” statement is significant at the 1% level, regardless of whether “don’t knows” are excluded or not.

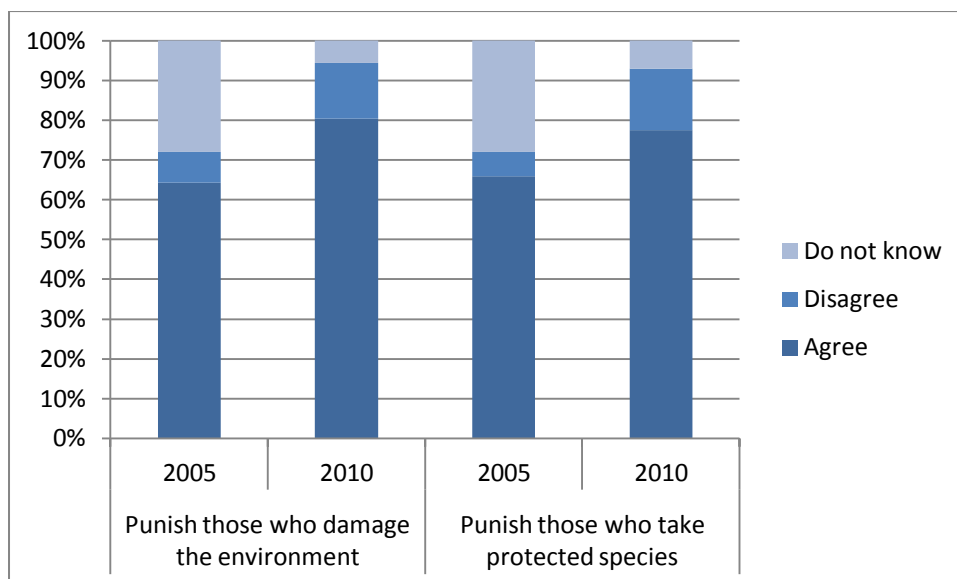


Figure 46. "Those who damage the environment/take protected species should be punished!"

As there is very little difference in the response to the two statements at the village level, we only show the results for the first statement in detail. There is strong agreement with the statement in all villages. In Gamta, Tolobi and Deer, people agree most, while in Usaha Jaya, Lilinta and Kapatcol agreement is a little less common.

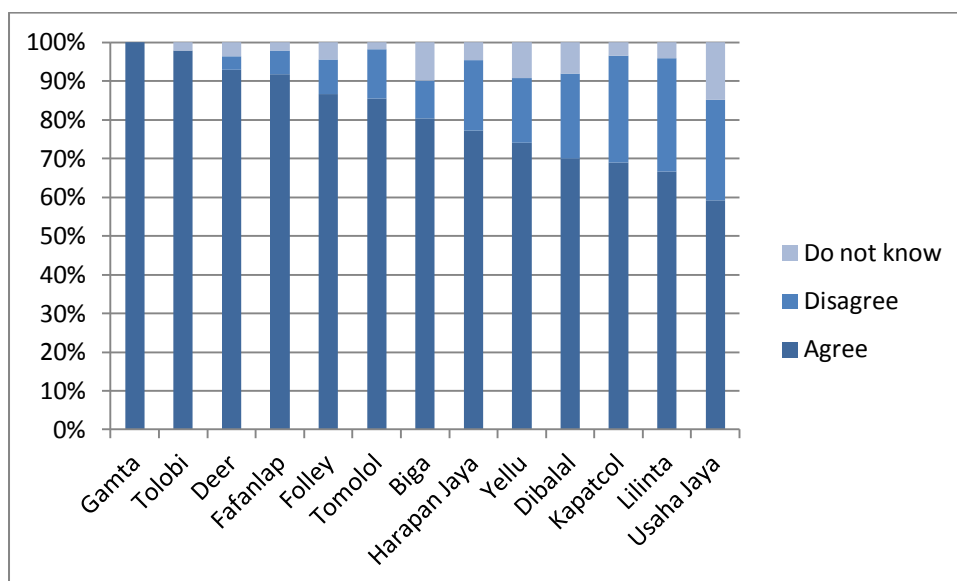


Figure 47. "Those who damage the environment should be punished!" (Village level results for 2010).

There are still big differences between the perception changes that took place in different villages. Deer, Gamta and Tolobi show the biggest increase in people who want to see violators punished. In Dibalal, Lilinta and Kapatcol this opinion has decreased the most. Still in all villages there is a majority who thinks violators should be punished.

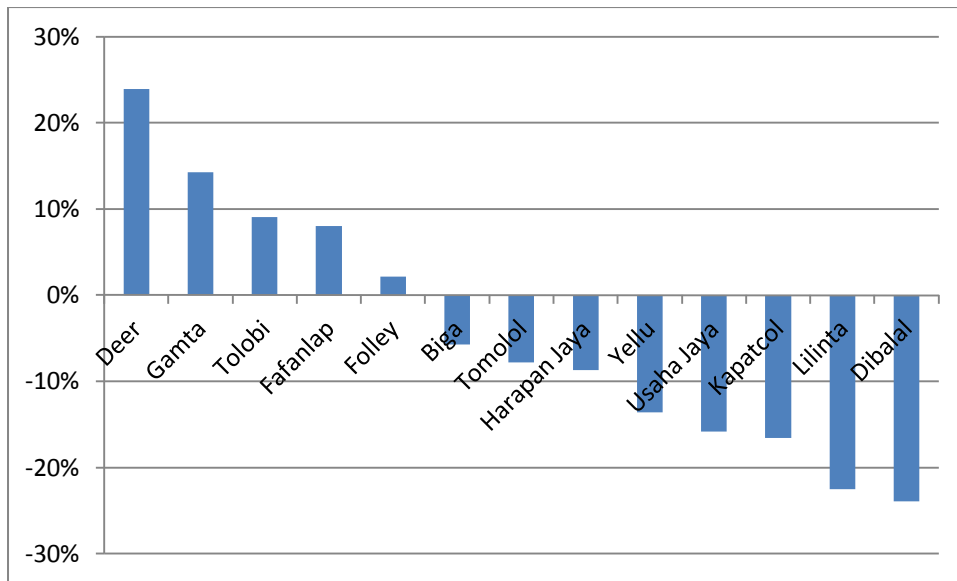


Figure 48. Change in the proportion of agreement with the "punishment" statement between 2005 and 2010.

Table 9 provides an overview of the responses to all statements together. While it is hard to come up with a clear explanation of the pattern, there are some interesting results. Tolobi scores the most green of all villages. Furthermore, Gamta scores red on the first three statements, but is often green on the last five. A somewhat opposite pattern is found for Kapatcol.

Table 9. Overview table of the response to the statements in 2010.

Village	Coral reefs don't need protection	Mangroves don't need protection	Villagers don't care about the environment	I can do a lot to protect the environment	The community can do a lot to protect the environment	Damaging the environment now, will make the future harder	Conservationists care more about fish than humans	People who destroy the environment should be punished	People who catch protected species should be punished
Folley	29%	27%	27%	53%	73%	80%	20%	87%	82%
Usaha Jaya	37%	33%	30%	31%	54%	73%	19%	59%	56%
Tomolol	38%	44%	40%	62%	76%	53%	44%	85%	80%
Yellu	43%	41%	50%	57%	74%	56%	41%	74%	72%
Harapan Jaya	43%	39%	32%	64%	70%	50%	52%	77%	71%
Kapatcol	24%	17%	14%	45%	55%	66%	38%	69%	66%
Lilinta	27%	23%	38%	58%	48%	50%	52%	67%	67%
Biga	52%	44%	50%	65%	81%	37%	62%	80%	78%
Gamta	54%	46%	63%	54%	92%	100%	42%	100%	96%
Fafanlap	45%	45%	31%	69%	82%	65%	47%	92%	92%
Deer	68%	55%	39%	48%	95%	70%	64%	93%	91%
Dibalal	50%	46%	22%	20%	40%	70%	10%	70%	68%
Tolobi	10%	10%	18%	94%	92%	65%	47%	98%	94%

The percentages indicate the degree of agreement with the statements in the villages. For the first four statements, agreement is seen as “bad”, while for the last five it is seen as “good”. However, see the discussion about interpreting the statements on the need to protect coral reefs and mangroves. The top three villages (most “good”/fewest “bad” answers) are highlighted in (light) green, while the bottom three villages are highlighted in (darker) red.

3.3 MARINE PROTECTED AREAS

Knowledge and perceptions about MPAs

In 2006 and 2010, large majorities of the people interviewed think it is a good idea to demarcate certain coastal areas and protect and preserve them together with the marine life living there (Figure 49). In 2005, there are more people for it than against, but almost 70 percent did not know. The results for the different surveys cannot be compared directly, because the phrasing of the question differed from survey to survey, but it seems as though a big shift has taken place between 2005 and 2006. This is probably due to the extensive outreach effort made by local TNC teams at the time.

In 2010, at village level, the approval rates vary between 80 percent (Tolobi, Lilita) and 54 percent (Usaha Jaya and Biga) (see Figure 97 in the appendices).⁴⁵ Kapatcol even has an approval rate of 90 percent, but has fewer than 30 respondents.

When asked why they agree, many answers in 2005 simply refer to the need for protection, and sometimes this is linked to future generations or the benefit of the community. Fish bombing, which was mentioned most often as a big problem in 2005, is referred to in some of the answers as well. In 2006, the same themes dominate among the answers, but there is a little more focus on the goals of MPAs, i.e. to give fish and marine life a chance to recover and grow, so benefits from exploitation of the resource grow as well (“So the community can catch fish easily and sufficiently”). This is the same in 2010, where there is perhaps a bit more emphasis among the answers on future generations than in the previous phases, although, as said, that was already a dominant theme in those earlier phases as well.

When asked why people disagree, the majority in 2005 did not know. Some say it would restrict fishing, which is vital for them, or hurt their livelihoods. This was similar in 2006 and 2010.

Interestingly, the percentage of respondents who think this a good idea was considerably larger than the percentages who think coral reefs or mangroves should be protected. We do not have an explanation for this apparent inconsistency.

⁴⁵ Since the wording of the question was different, comparisons between the survey phases at village level are not made here.

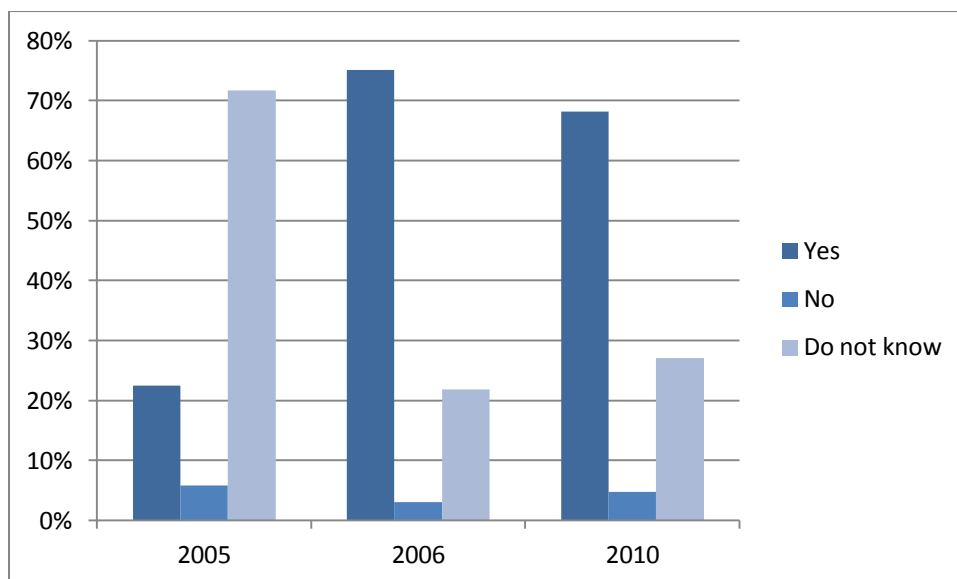


Figure 49. “Do you think it is a good idea to demarcate and protect certain coastal areas?”

Besides asking whether they think this a good idea, the respondents were also asked whether they think they and their community would benefit from such a scheme. Figure 50 presents the answers given in the different phases. Again, a direct comparison cannot be made as the original question about the protected areas was not the same, but we can see a similar pattern as in the previous graph. In 2006 and 2010, a large majority was positive, while there are a large amount of people with doubt in 2005. Strangely, in 2010, a few of the people who say that having a park is not a good idea, do say they will benefit. It is not clear whether these are mistakes or errors in the data entry, or whether there is another explanation.

Biga is the only village where there is a bit more pessimism about the effect of protected areas, even though it remains a minority of 14 percent that believes the effects will be negative (Figure 98).

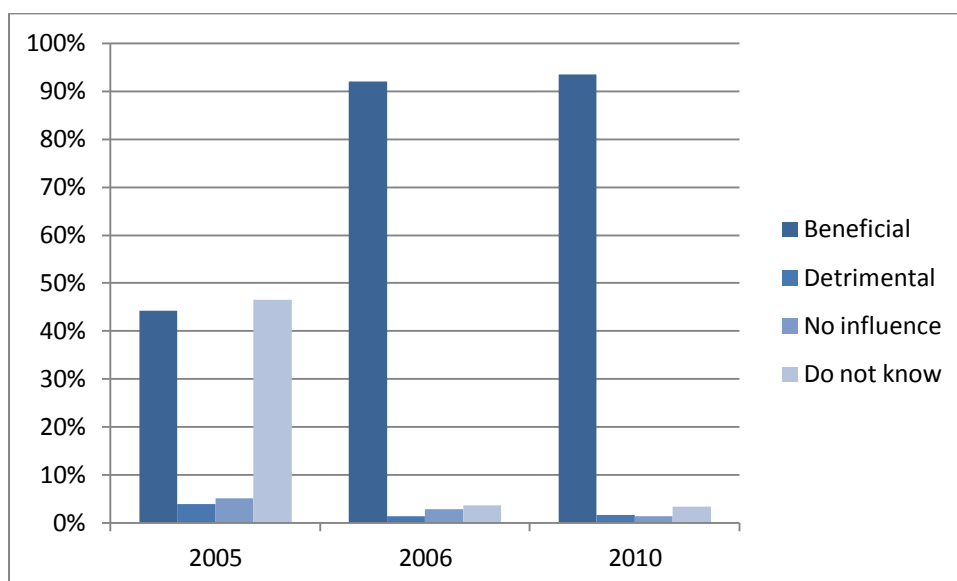


Figure 50. Would a protected area be beneficial for your family and community.

Knowledge of the term “marine protected area” has changed greatly over time (Figure 51). In 2005, the majority of people did not know or was not sure. In both 2005 and 2006, the people who say they have never heard the term outnumber those who say they did, while in 2010 a large majority have heard the term before.⁴⁶

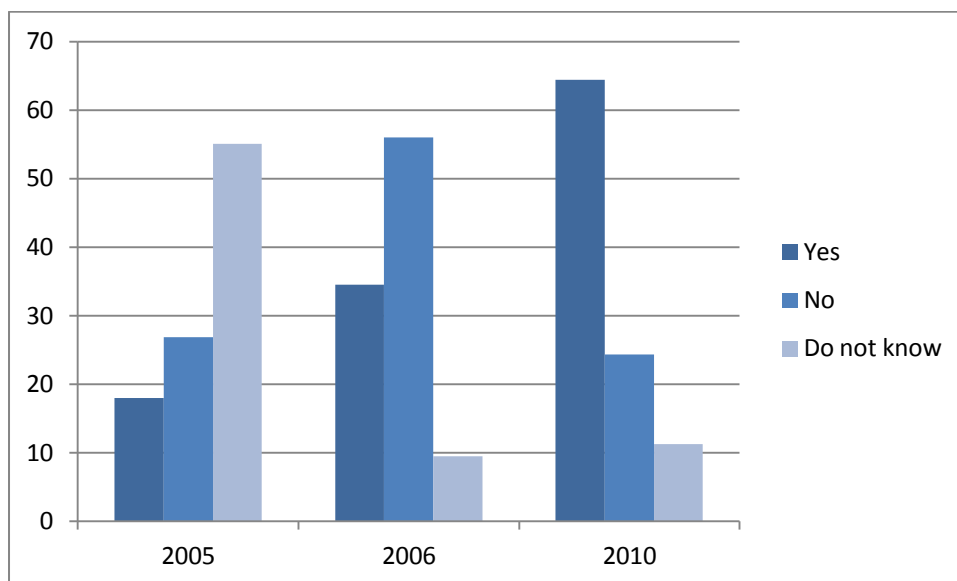


Figure 51. “Ever heard the term marine protected area?”

In 2010, people in Gamta, Dibalal and Tolobi are most familiar with the term, while in Fafanlap, Yellu and Lilinta familiarity was lowest.⁴⁷

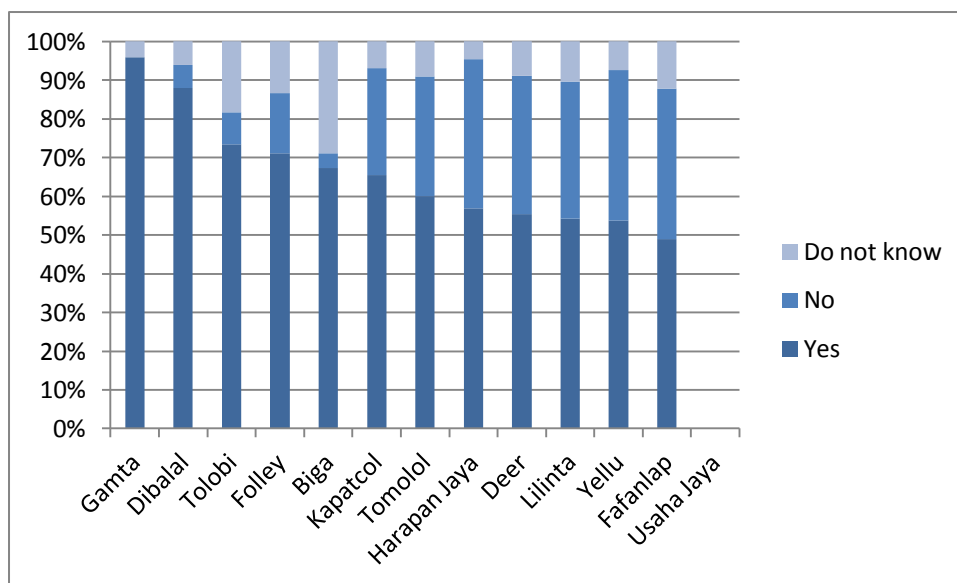


Figure 52. “Ever heard the expression marine protected area?” Village level results for 2010).

⁴⁶ The wording used for “marine protected area” in 2005 and 2006 on the one hand, and 2010 on the other was not exactly the same, but judged sufficiently similar to allow a direct comparison.

⁴⁷ The response on this question is missing for Usaha Jaya data. The reason for this is not know, as the following question is answered.

Since the increase in familiarity with the term MPA mainly took place between 2006 and 2010, we will focus our analysis of village level changes at this period, rather than at the overall period. Almost all villages show increased familiarity. The only village where this is not the case is in Deer, which was ranked lower mid-file above. The villages where familiarity rose most strongly are Gamta, Biga and Folley. Data for Usaha Jaya were almost entirely missing for this question.

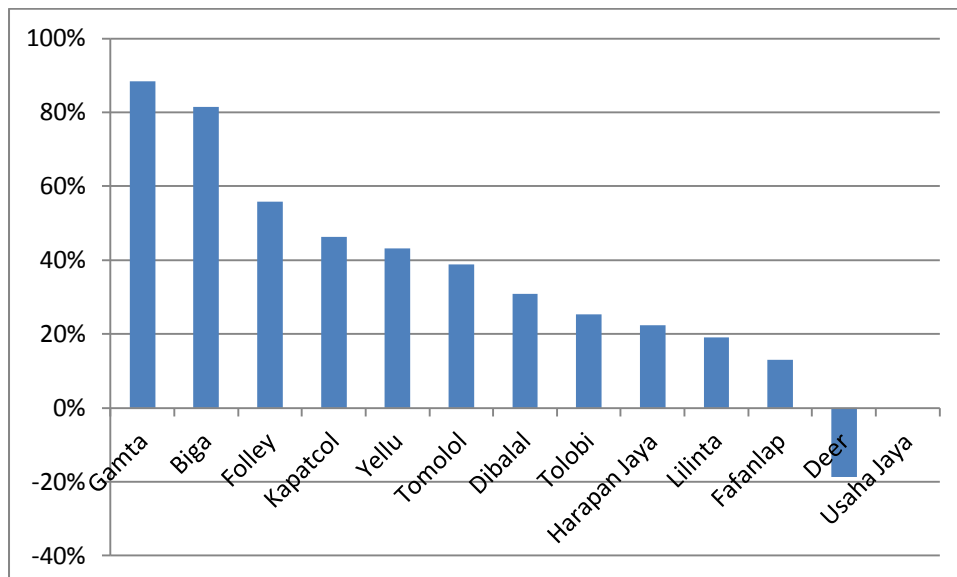


Figure 53. Change in familiarity with the term MPA between 2006 and 2010.

To those respondents who did not know the term MPA (or did not know if they knew), a general description was given (“areas where people are regulated to fish, capture animals or extract seaweed so that the environment can be preserved?”) and then they were asked whether they had ever heard of these.⁴⁸ Figure 54 presents the percentages of people who are familiar with either the term or the description. The percentages of people who know rises only slightly compared to Figure 51, indicating that, if unfamiliar, it is not generally related to the term but rather to the whole idea. This answers the question whether it was the term or the idea that was unfamiliar that was raised by Widodo et al. (2009).

⁴⁸ In 2006, this question was not part of the survey.

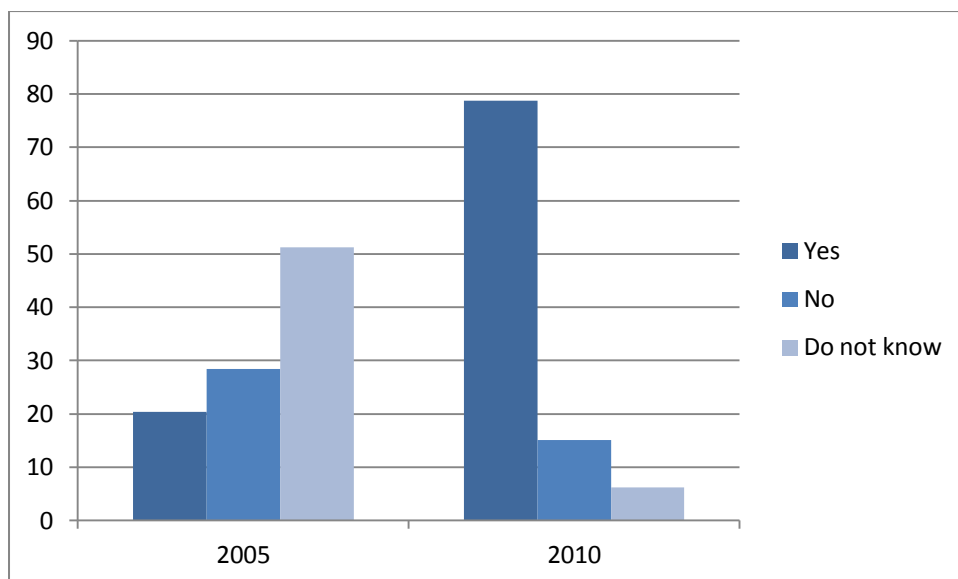


Figure 54. Familiarity with the idea of MPA⁴⁹.

All people who indicated they are familiar with the term or the description of an MPA were then asked a number of questions about the meaning of MPAs. In 2005, only 113 respondents answered these questions.

In the general question what are MPAs, the most common answer in 2005 (65%) and 2010 (48%) was “Areas where seas and coast are protected by law”. The second option, “Areas where fishing/harvesting/capturing animals is regulated” was selected by 15 and 25 percent respectively. The other option in 2010 was selected by 27 percent. In 10 of those 27 percent, the answers have an element of protection of sea, fish, coral or beach. Seven of the 27 percent say they do not know.⁵⁰

Respondents were then specifically asked whether fishing was prohibited in an MPA. The correct answer, that fishing is prohibited in certain parts of an MPA, was given by the largest group in all phases. Strikingly, the already low percentage of people who think it was not prohibited at all almost vanishes in 2010. There was, however, also a strong rise in the number of people who think fishing is prohibited everywhere in the MPA.

In the analysis of comparable surveys in other marine parks in Indonesia, Widodo et al. (2009) find that the percentage of people who get this answer right dropped off after the set-up phase of the MPA. Instead, they find more people thinking fishing was not prohibited anywhere. Widodo et al. suggest to continue paying attention to zoning, especially after the zoning plans are completed. This is an important lesson for Raja Ampat, where the zoning is currently being developed.

⁴⁹ This graph represents people who said yes to knowing the term MPA or were familiar with its description. The naysayers neither knew the term nor were familiar with the description.

⁵⁰ In 2006 the question was structured differently, making a comparison difficult. The “other” category in 2005 contained 20% of the answers but the specification was not available for this analysis.

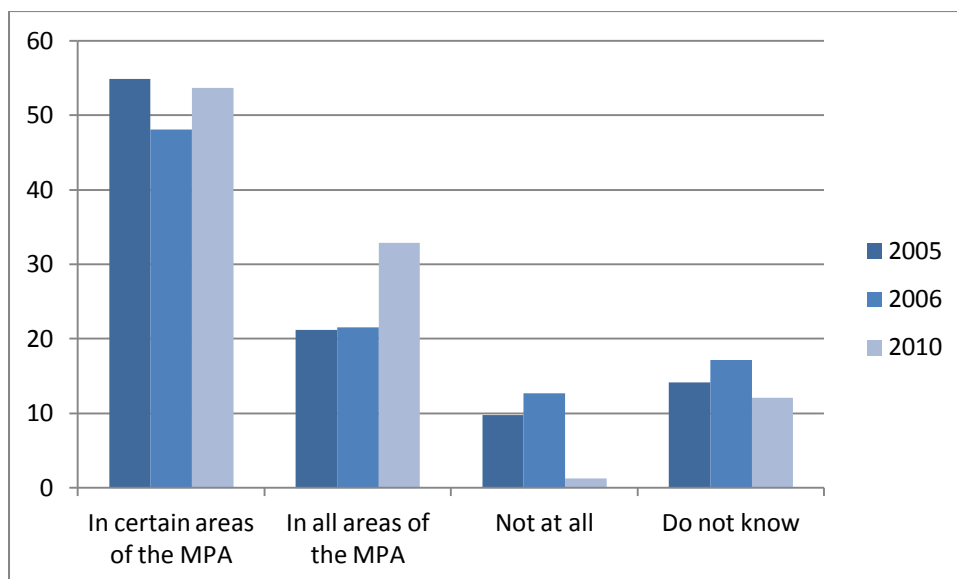


Figure 55. "Is fishing prohibited in an MPA?".

Because the number of respondents is too low in 2005 and 2006, we can only show the distribution across villages in 2010 (Figure 56). In most villages those who think fishing was only prohibited in certain zones outnumber the people who think the ban was general, but there were a number of villages where the groups have around the same size or where more people (wrongly) think the ban was general (Fafanlap, Tomolol, Yellu, and Lilinta).⁵¹

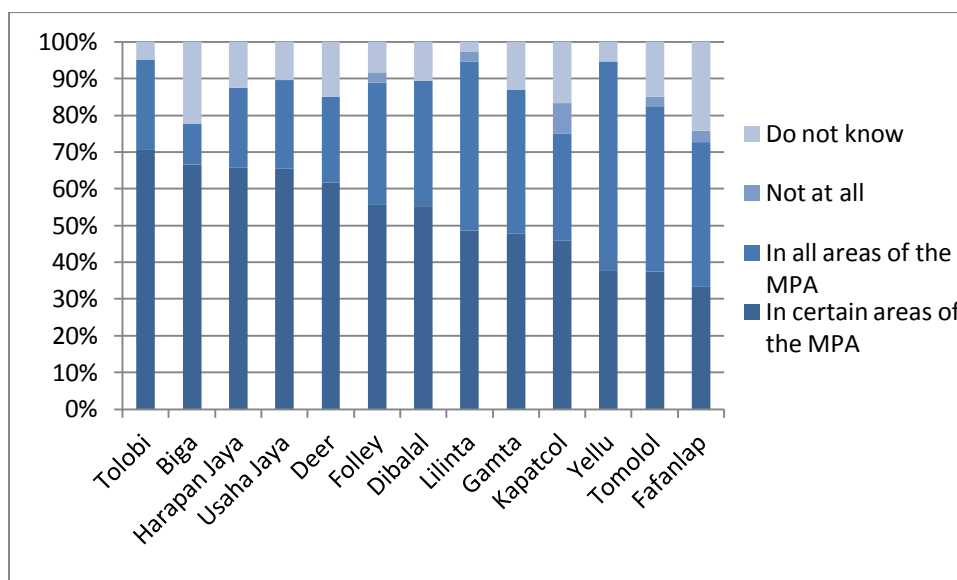


Figure 56. "Is fishing prohibited in an MPA?" (Village level results for 2010).

In 2010, people were also asked whether they thought their village was located inside an MPA. In Deer, Kapatcol and Dibalal, around 90 percent of respondents think this is the case. The only villages where less than half think so are Harapan Jaya and Fafanlap.

⁵¹ The number of observations are below 30 for the following villages: Usaha Jaya, Kapatcol and Gamta.

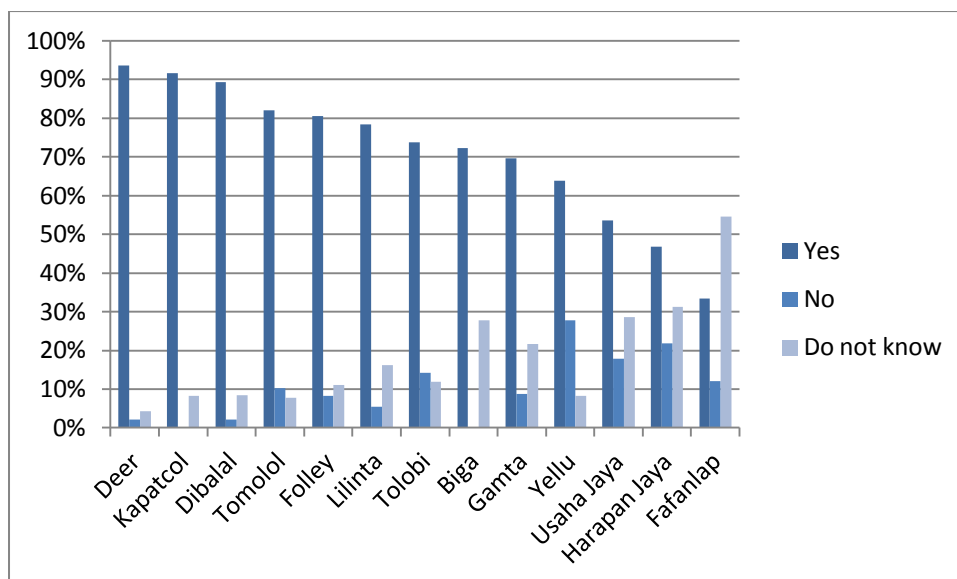


Figure 57. "Is your village inside an MPA?" At village level in 2010.

Allowed and prohibited fishing techniques

People in all rounds were asked whether certain fishing techniques were allowed or prohibited in Indonesia. Not all fishing techniques were referred to in the same way in the different rounds, so for the comparison over time, we will only look at the ones where the names used for the techniques were the same as in 2010.

Almost everyone knows that a hook and line or a spear are allowed, and this has not changed much over the years (Figure 58). There is a big jump between 2005 and 2006 in the percentage of respondents who correctly answer that dynamite fishing is illegal. There is another such jump for the illegal technique of using traditional poison. There are many wrong answers for the legal techniques of long lines, fish traps (bubu and sero), gill and lift nets. The percentage of respondents who get these right increased between 2005 and 2010, but remains relatively low. Gear types such as long lines and lift nets are generally used by outside commercial fishers, and not by local villagers from the MPAs, which could explain the unfamiliarity with the rules. In general, communities in these MPAs are fairly isolated, and there is often little accessible information on legal and illegal gear types.

The way of asking about the damaging technique of cyanide fishing changed between 2005 and the later phases, so we cannot make a direct comparison. Nevertheless, the correct answer in 2005 was given by a little more than half of the respondents, while for 2006 and 2009 the respective proportions are 94 and 95 percent. It is therefore clear that the awareness about especially the illegal fishing techniques has improved dramatically.

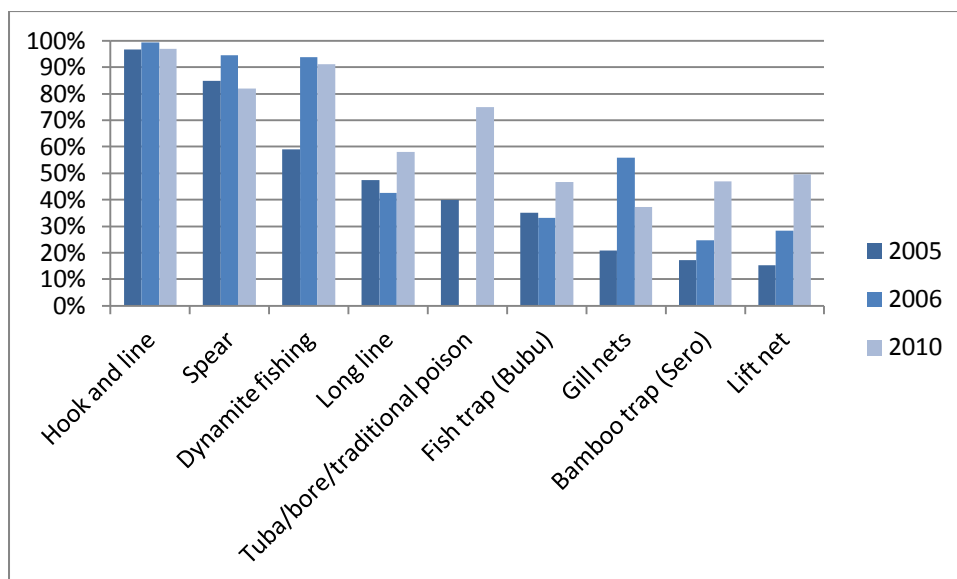


Figure 58. Percentage of correct answers for each fishing technique.

For the 2010 survey, we can give a complete overview of all techniques asked (Figure 59). For the illegal techniques of trawling and using a hookah compressor with an air hose not discussed above, almost everyone gets it right. The same is true for the allowed use of spear guns. Similarly to what we saw above for some of the legal techniques, there is some confusion over the use of seine nets.

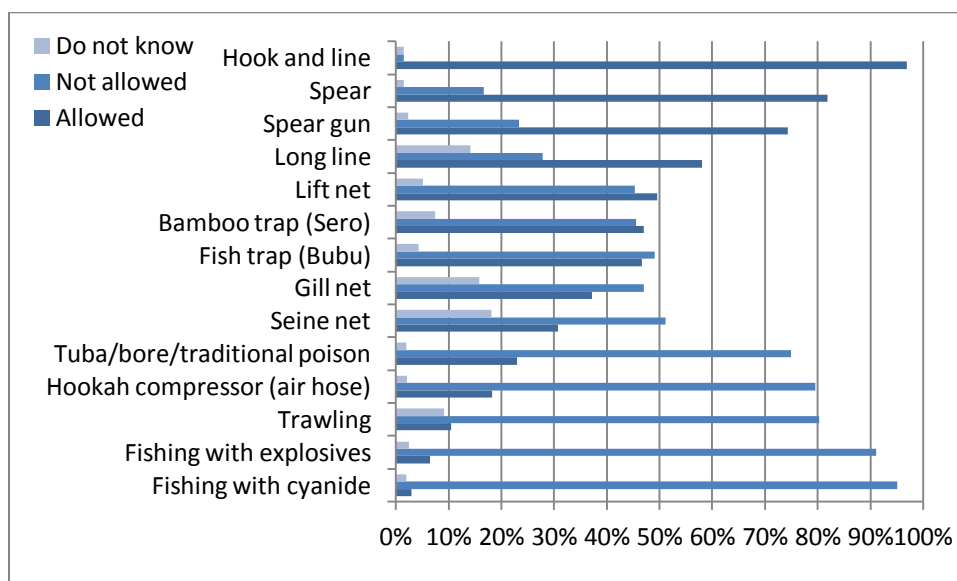


Figure 59. Perception of prohibition of fishing techniques in 2010.

For the situation at the village level, we limit the discussion to the illegal techniques. In 2010, cyanide fishing is known to be illegal in all villages. We do not show a graph for this technique as there is hardly any variation in the results. The village with the lowest percentage of correct answers is Harapan Jaya, which respondents were right in 89 percent of the cases. For dynamite fishing, only one village departs from otherwise similarly ubiquitous correct answers: in Usaya Jaya, more than 40 percent thinks the technique is allowed (Figure 60). Figure 102 in the appendices shows the changes at village level. Usaya Jaya was also alone in having majorities who think trawling and using traditional poison is allowed (70% and 56%, respectively), although for these techniques there were other villages which have higher rates of incorrect answers or respondents who say not to know (see

Figure 61 and Figure 62). Figure 103 in the appendices show the changes for using traditional poison. Finally, more confusion exists about using a hookah compressor (Figure 63), and it is not Usaya Jaya this time that shows a high percentage of wrong answers, but rather Kapatcol, Harapan Jaya, and Yellu where more than 40% incorrectly thinks this is allowed (Figure 63).

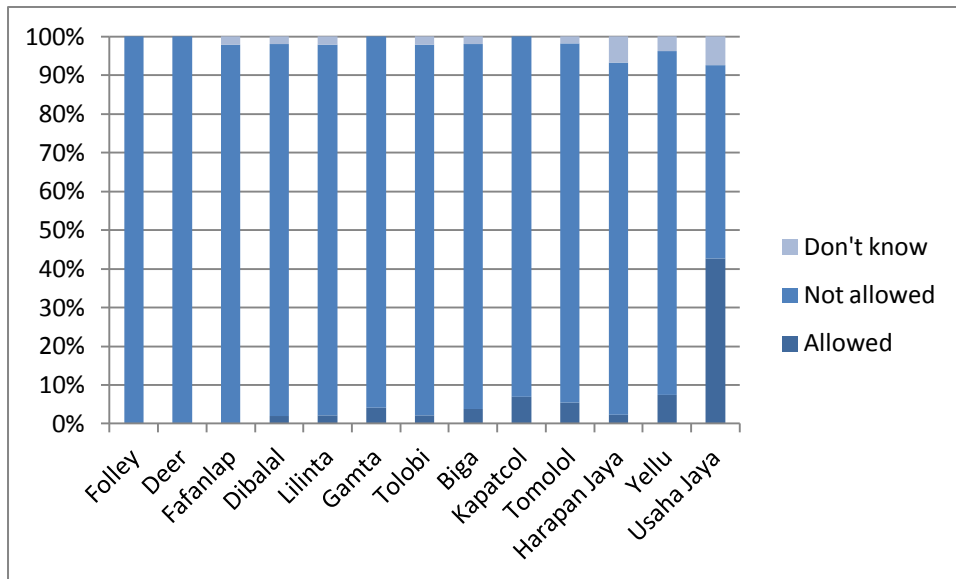


Figure 60. Village perception of the (il)legality of dynamite fishing in 2010.

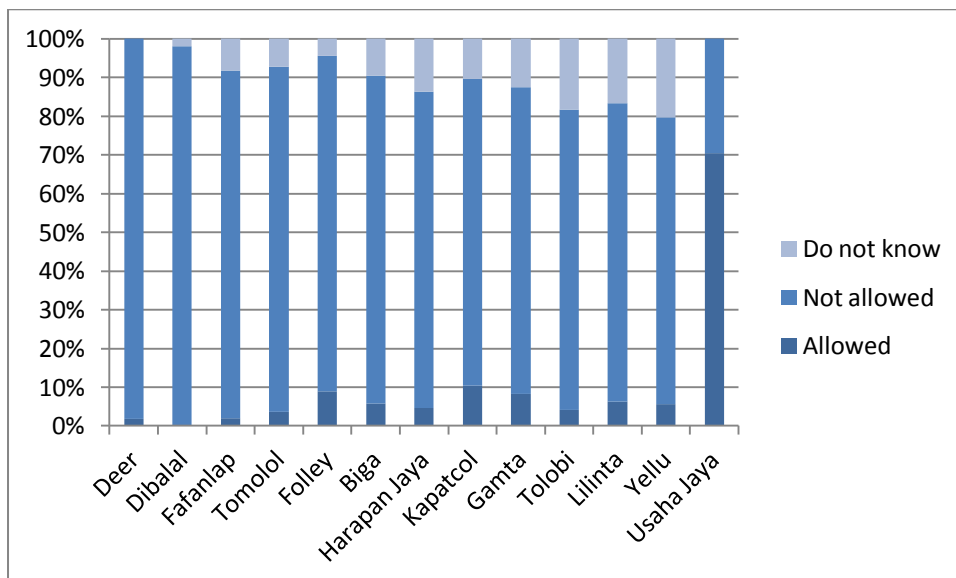


Figure 61. Village perception of the (il)legality of trawling in 2010.

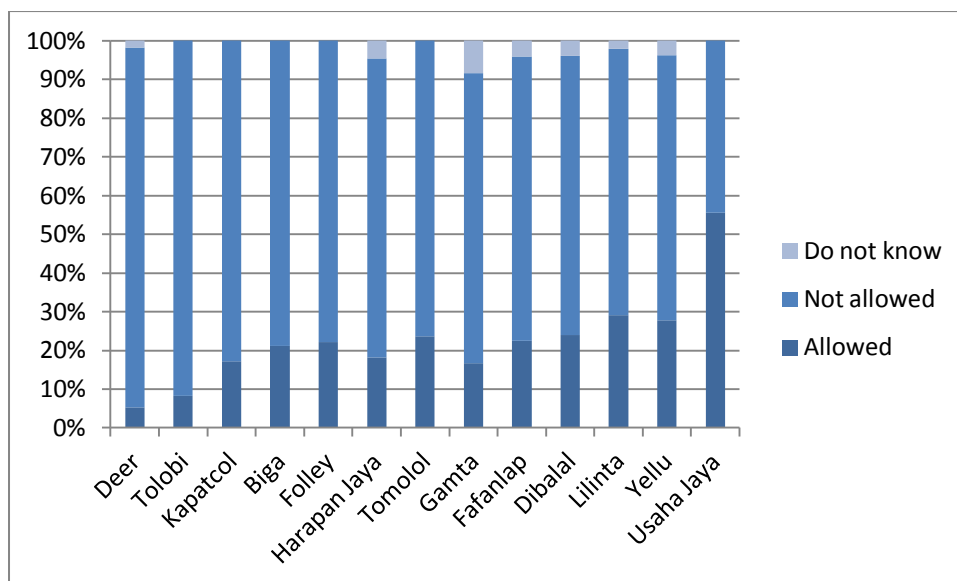


Figure 62. Village perception of the (il)legality of traditional poison in 2010.

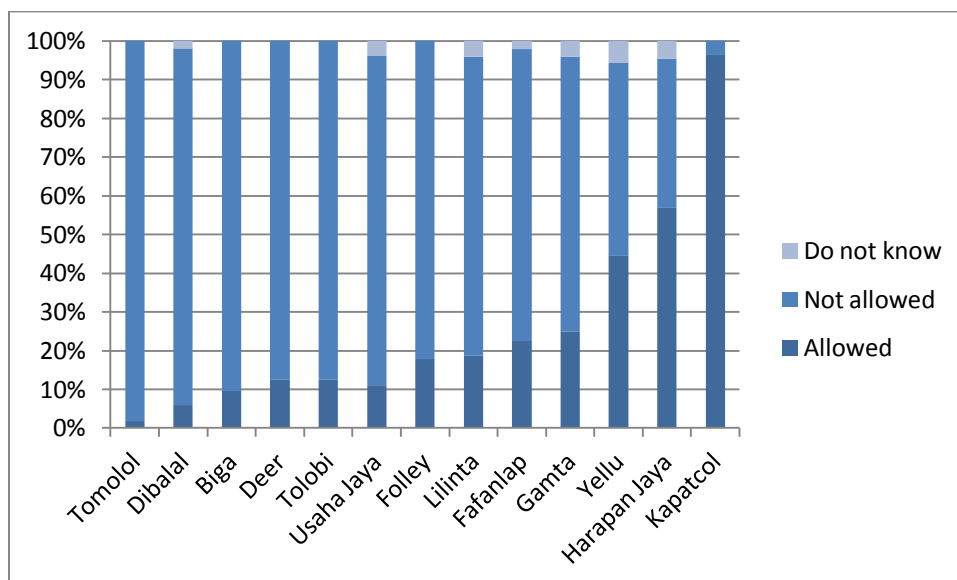


Figure 63. Village perception of the (il)legality of using a hookah compressor in 2010.

Allowed and prohibited activities

The question about allowed and prohibited activities in the 2005 and 2006 rounds refers to the village, whereas in 2010 referral was made to the MPA. Because of this difference and to prevent misinterpretation of potential changes, we will only show results for 2010.

There seems to be more doubt about the activities than there is about fishing techniques. Even for something as innocent as playing on the beach there is almost 30 percent who thinks this is not allowed. It is clear to most that coral mining, catching turtles and sand mining is not allowed inside the MPA. For other illegal practices inside the MPA, the picture is more mixed. Thirty-five percent or

more incorrectly thinks collecting giant top shell snails or giant clams, and collecting wood from mangroves is allowed.

While catching lobster and reef gleaning is allowed, there are majorities who think otherwise.

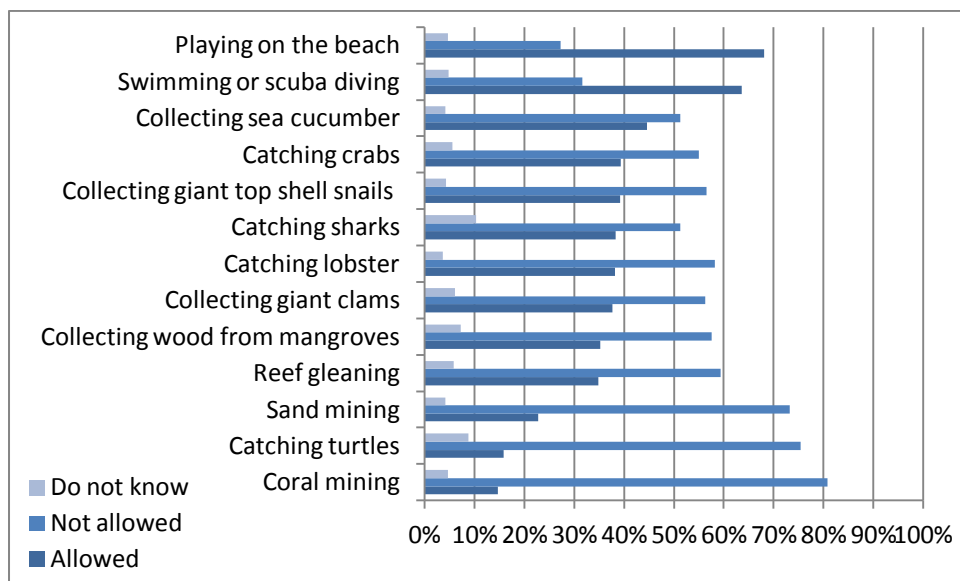


Figure 64. Perception of prohibition of activities within the MPA in 2010⁵²

For the discussion about the activities at the village level we will again mainly focus on the illegal activities. We see that these activities are most often correctly identified as illegal in Dibalal, Tolobi and Folley (Figure 65). In those villages, the respondents, on average, got it right for around five of the six activities. Fafanlap, Deer and Kapatcol are at the lower end, getting it right between three and four times, on average.

If all activities – also the legal ones – are looked at we find generally lower scores between 50 and 60 percent, and there is not much variation between the villages in this regard. This indicates that people are generally more uncertain about the legal activities.

⁵² Table 12 in the appendices shows the Indonesian names of the activities as used in the survey.

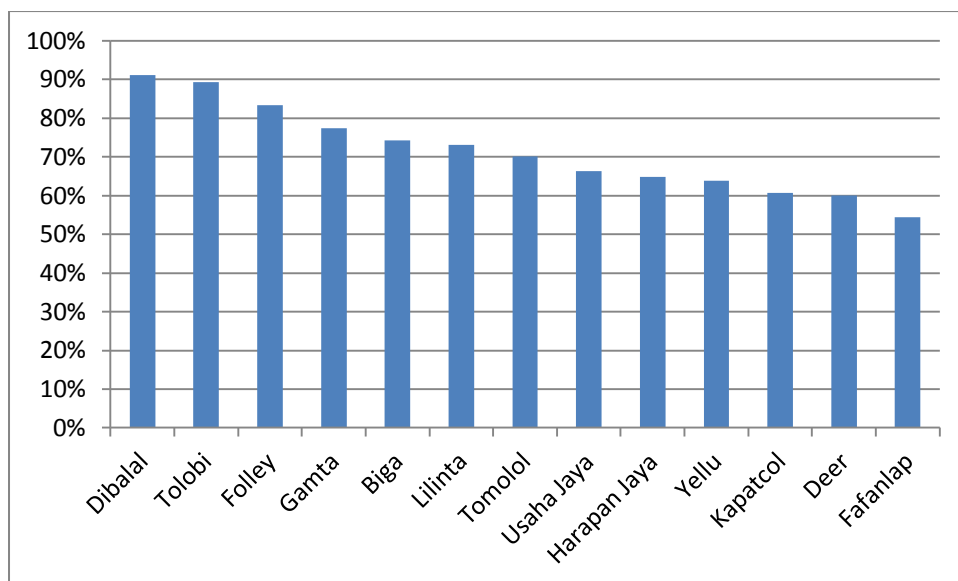


Figure 65. Average percentage of correctly identified illegal marine activities at village level in 2010.

Awareness and observation of MPA rules

In the 2010 survey, respondents were asked whether they think people in their village know and observe the MPA rules. As mentioned in the introduction, the MPAs were not effectually functioning in 2010, so there were no specific MPA rules to be aware of or followed. It is therefore not entirely clear what respondent were thinking about when answering these questions. Most likely, they were thinking about traditional rules, which was also the question in previous survey phases. However, because this is not entirely clear, we do not compare the results of the different phases here but only show the 2010 responses.

The most commonly held opinion is that most village members know the rules: 46 percent thinks this is the case (see Figure 66). Fewer respondents, however, also think that most people adhere to the rules (35%).

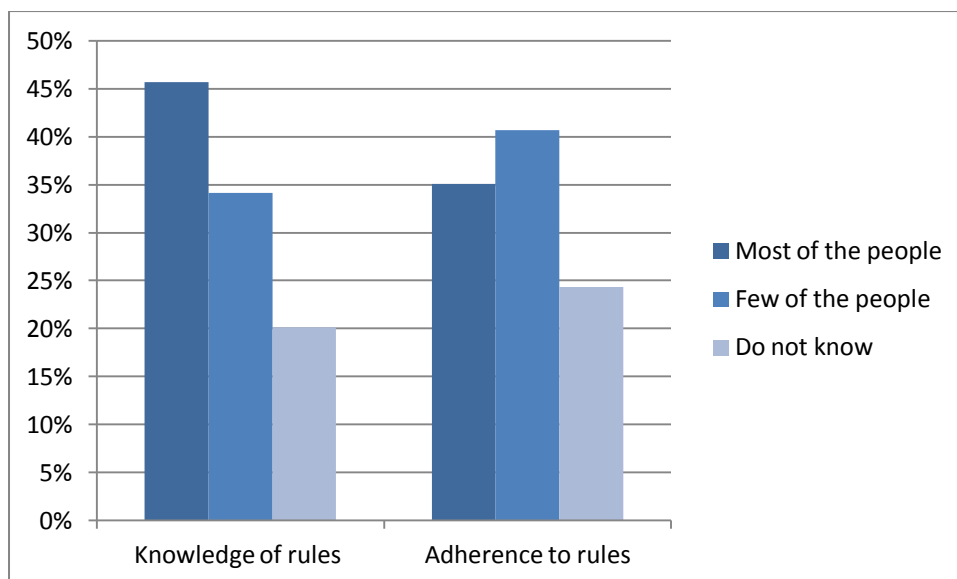


Figure 66. Knowledge and observation of rules in 2010.

At village level, some differences exist. Gamta and Dibalal stand out for the having high proportions of respondents who think most of the fellow village members know the rules (91% and 88%, respectively) (Figure 67). The opposite extreme is found in Kapatcol where 72 percent thinks only few of the villagers know the rules.

If we look at adherence to the rules (Figure 68), we find comparable results, but generally the percentage of respondents who think most people adhere to the rules is a little smaller in every village. The differences between the responses to both questions are greatest in Dibalal, Gamta, Folley and Deer, where they vary between 30 and 20 percent. Biga is the only village where more respondents think that people adhere to the rules than that know them, which is a strange result, although if MPA rules were for instance in line with traditional rules, not impossible.

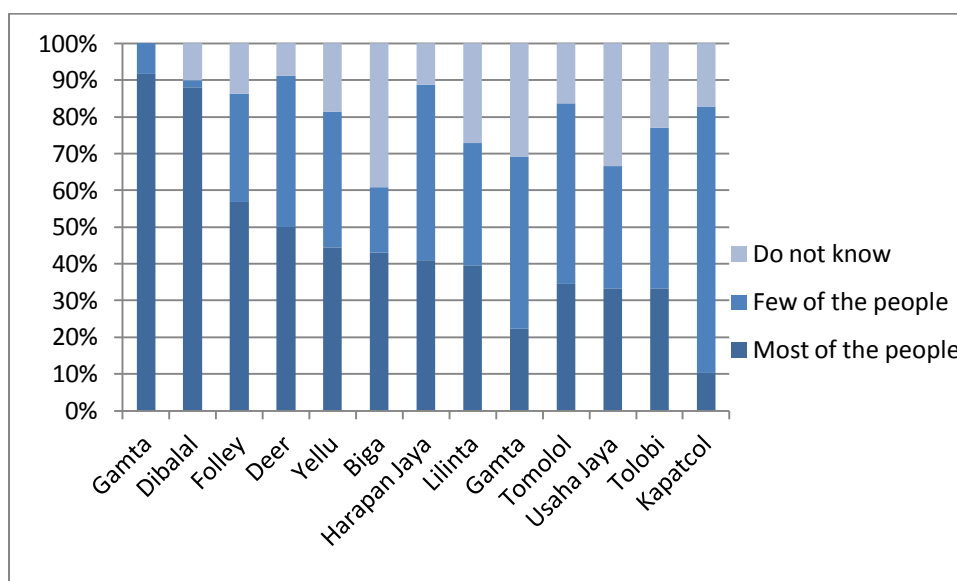


Figure 67. Knowledge of MPA rules at village level in 2010.

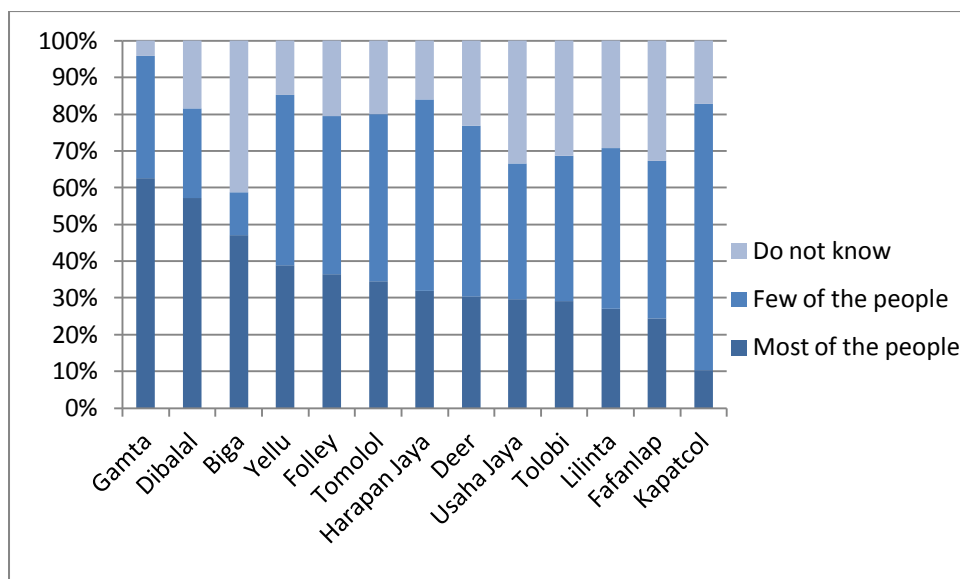


Figure 68. Observation of MPA rules at village level in 2010.

Penalties for breaking MPA rules

Next, people were asked which penalties someone might face for breaking MPA rules. Again, the questions were different in previous survey rounds, so we focus on 2010 here.

The penalty most people think would be faced is the confiscation of one’s catch. Second comes a written warning, and third the confiscation of one’s fishing gear. The opinions are divided over whether a prison sentence could be the result of breaking the rules, and only a few people think the perpetrator’s house should be confiscated.

Currently, local fishers are given a warning and an explanation about the MPA if they are caught doing anything illegal inside it. Outside fishers are expelled from the MPA and have their gear confiscated, or face prosecution, depending on the nature of their offense.

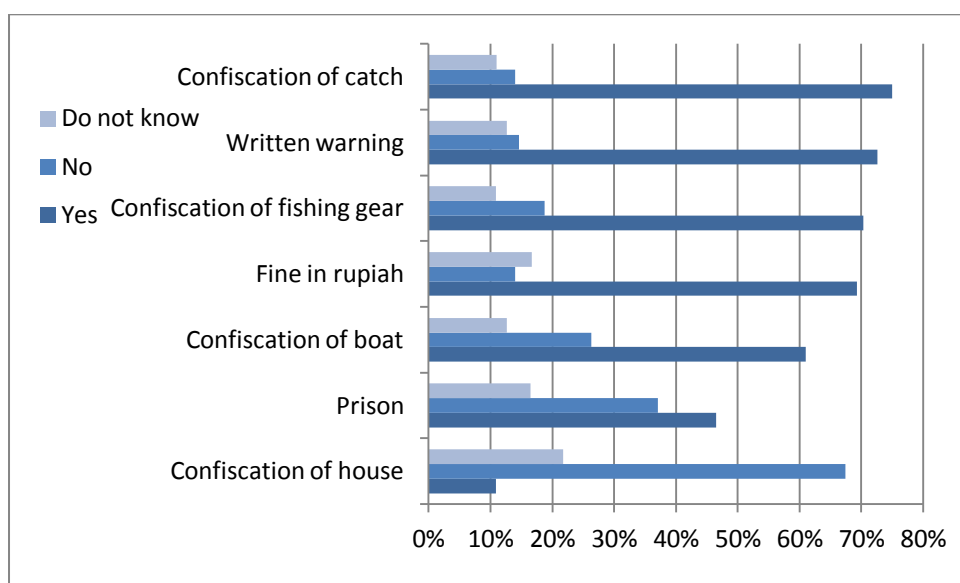


Figure 69. Punishment for violating MPA rules in 2010.

3.4 SOURCES OF INFORMATION

In all the surveys there were a number of questions about people’s main information sources. As these questions were structured differently between the surveys, we will only go into detail for 2010 but still look for major changes.

In 2010, the source of information question is split between media and non-media sources. Of the first, radio is most popular by far. Almost half (49%) of the sample indicates this as their main source. The only other media source mentioned with any frequency is television (20%). Other sources, such as newspapers, are mentioned by less than a handful of people. Strangely, almost 30 percent of respondents did not answer this question. The reason for this high non-response on this (and other information) questions is not known.⁵³

For non-media sources, the non-response is even greater (33%). Among the respondents that did answer this question, the community, neighbours, family or friends are mentioned most often (grouped together, they make up 50%). Second are NGOs (31%), of which TNC (13%) and COREMAP (2%) are mentioned specifically. Village institutions such as the village head, traditional leaders, or village meetings are also mentioned by a sizable proportion of people (8%). Sources that are mentioned less often include school, church and bulletins.

At village level, there are a few villages where television is hardly mentioned (Biga, Dibalal and Tolobi), while in Usaha Jaya it is mentioned far more often than radio (by close to 80%) (Figure 70).⁵⁴

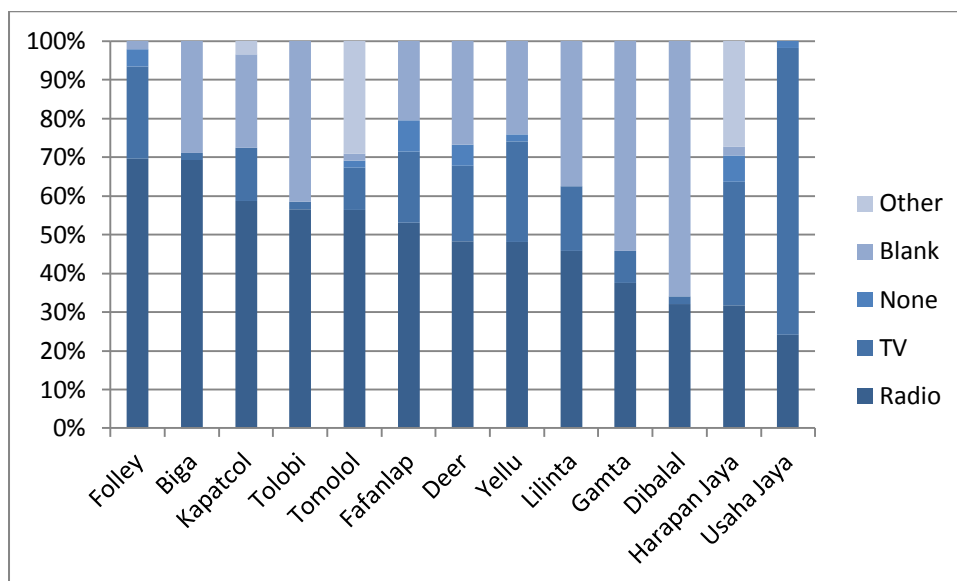


Figure 70. Main media source of information at village level in 2010.

For non-media sources, TNC is most often mentioned in Tolobi and Dibalal, and not or only very little in other villages. NGOs in general are mentioned often in a number of other villages (Tomolol, Harapan Jaya, Deer and Gamta), but response is very low in all but Tomolol, and results may

⁵³ It could be that the answer “don’t know” was left as a blank. In 2005 and 2006 there are many “don’t knows” and few blanks.

⁵⁴ The highest non-response (>50%) takes place in Dibalal and Gamta.

therefore not be representative. In Usaha Jaya, the village meeting and school are important non-media sources.

The general picture in 2010 is not very different from 2006. Radio (62%) and television (25%) are the most important media sources. For non-media sources, NGO's (52%) are more often mentioned – but TNC specifically less often (3%) – together with village institutions, while friends and family are mentioned less often.

In 2005, media and non-media sources were not separated. Radio is by far the most important source. Television is mentioned quite often, but a little less so than in later phases. TNC is already mentioned, but by less than two percent. NGOs in general are not mentioned at all, but perhaps if the questions hadn't been split in 2006 and 2010, NGOs might have been largely pushed out by the main media sources (radio and television) as well.

Frequency of exposure to media sources

As seen above, newspapers are not an important source of information. The far majority in both 2005 and 2010 indicates never or only very rarely to read a paper.⁵⁵ For radio and television, there is a strange jump in 2006 in the number of people who listen to radio or watch television between every day and once a month (Figure 71). The cause of this jump is unknown. The phrasing of the question is exactly the same in 2005 and 2006, although the question's location within the questionnaire was different. In 2010, the location of the question was the same as in 2006, although the phrasing used was slightly different. Disregarding 2006, the frequency of access to media sources seems largely unchanged from 2005 to 2010.

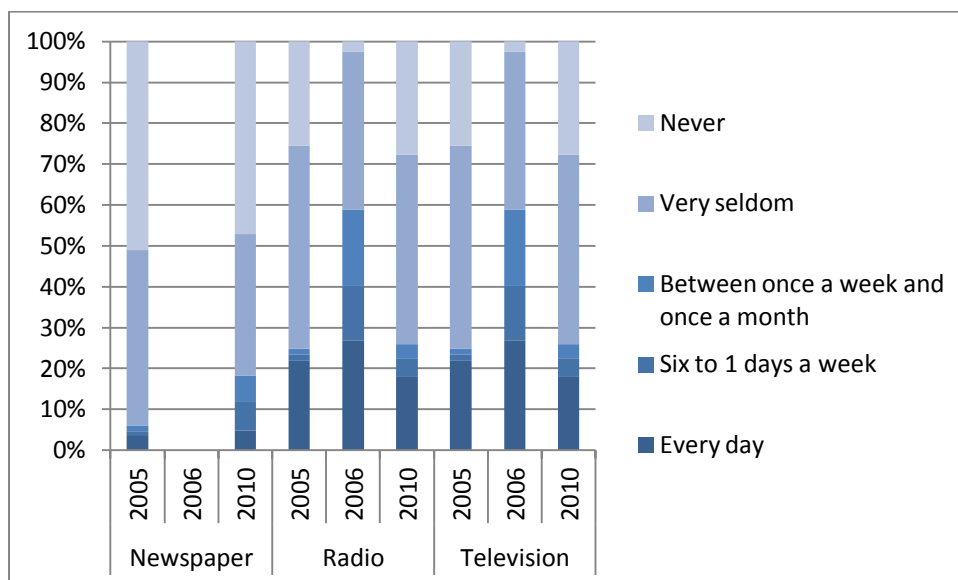


Figure 71. Frequency of use of information sources.

At village level in 2010, the frequency of listening to the radio is low in Dibabal, Fafanlap and Usaha Jaya. It is highest in Kapatcol, Lilita and Yellu. People in Dibabal and Usaha Jaya, together with

⁵⁵ The frequency of reading a newspaper was not asked in 2006.

people in Biga also watch television only rarely compared to the other villages. People in Kapatcol and Harapan Jaya watch television relatively often.

Source of information about the marine environment

When asked about their source of information about the marine environment, the community, friends, family or neighbours are again most often mentioned in 2010 (43%). Twenty-nine percent mentions NGOs, of which 11 percent specifically mentions TNC, sometimes in combination with COREMAP or CI.⁵⁶ Religious leaders or government officials are mentioned by minorities (6% and 5%, respectively). Fourteen percent does not know. TNC is mentioned most often in Tomolol, Tolobi, and Dibalal, while NGOs in general are mentioned relatively often in Deer, Tomolol (again), and Harapan Jaya.

In 2006, NGO (36%) is the most common answer to this question, followed by family or friends (25%).⁵⁷ Another relatively common answer is an enforcement agency (14%). The question was phrased slightly different than in 2010. In 2005, this question was not asked.

Environmental radio messages

A relatively large percentage of people also pick up environmental information from the radio, as shown in Figure 72. The percentage went up between 2005 and 2006, but again diminished a little in 2010.⁵⁸ We again see the large percentage of “do not know” answers in 2005. At village level in 2010, relatively many people have heard this type of radio message in Tolobi, Tomolol and Harapan Jaya. In 2006, this is also the case for Tolobi and Harapan Jaya in 2006. Dibalal is also among those villages in 2006, but is among the villages where they heard them least in 2010 (Deer, Gamta, Lilita and Usaha Jaya also score low in 2010).

On average, people have heard such messages about five times in the previous six months in the 2010 round, while in the 2005 round people say they have heard them only three times in the previous 12 months.

In 2010, the topics of the messages are mostly described in a general nature; to protect the sea and marine environment. Sometimes more specific messages, such as not to use dynamite fishing, or to protect turtles, are mentioned as well. The answers also refer to information about protected areas. A lot of the answers have nothing to do with the environment. People for instance say they have heard (sport) news or family messages. Evidently, not everyone fully understood the question. In 2005, topics of the same nature are mentioned. There seem to be no unrelated answers in 2005, indicating that the question was better understood.

⁵⁶ The combination TNC and CI is mentioned once, COREMAP is mentioned in combination with TNC thrice, and once by itself.

⁵⁷ TNC specifically is mentioned by only 1%. CI is mentioned once.

⁵⁸ The question changed the time reference between 2005 and 2006 surveys. In 2005, it referred to the last 12 months, while in 2006 and 2010 it was 6 months.

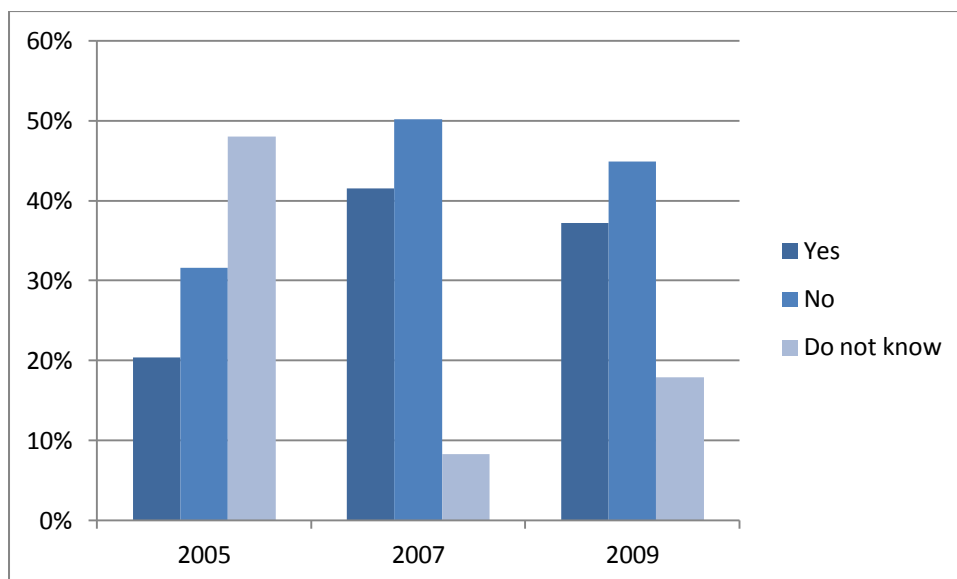


Figure 72 “Did you hear any environmental messages on the radio during the last 12/6 months?”

Discuss the environment with friends and/or family

Respondents in 2010 say they talk about the environment with their family and friends far more often than respondents in 2005 (Figure 73). In 2006, this question was not part of the survey. In 2005, respondents were asked to recall the last 12 months, while in 2010 it is six months, but this should not have had a big influence on the results.

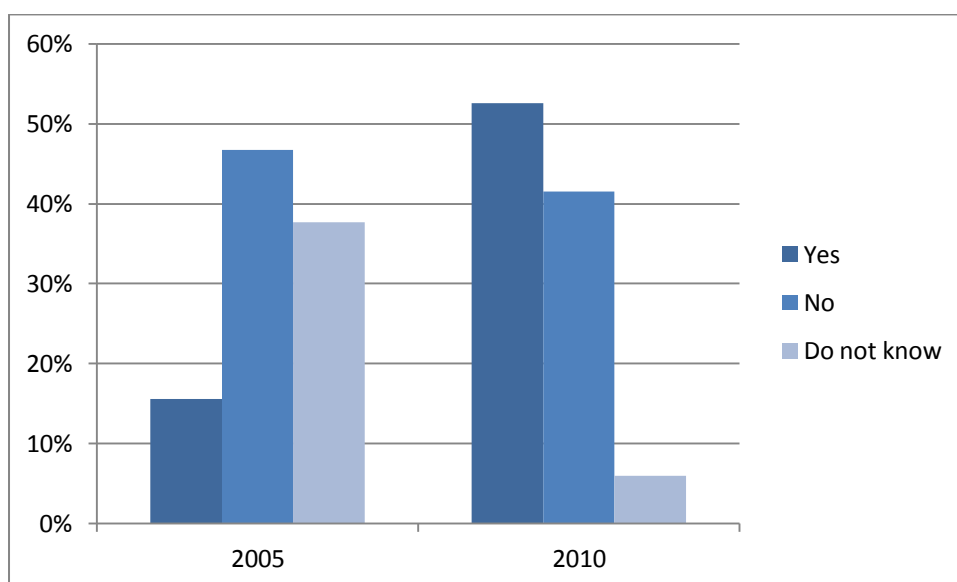


Figure 73. "Did you talk about the environment with family and/or friends during the last 6/12 months?"

In Kapatcol and Tolobi, a relatively large percentage of the people talk about the environment (76% and 71% respectively) (Figure 74).

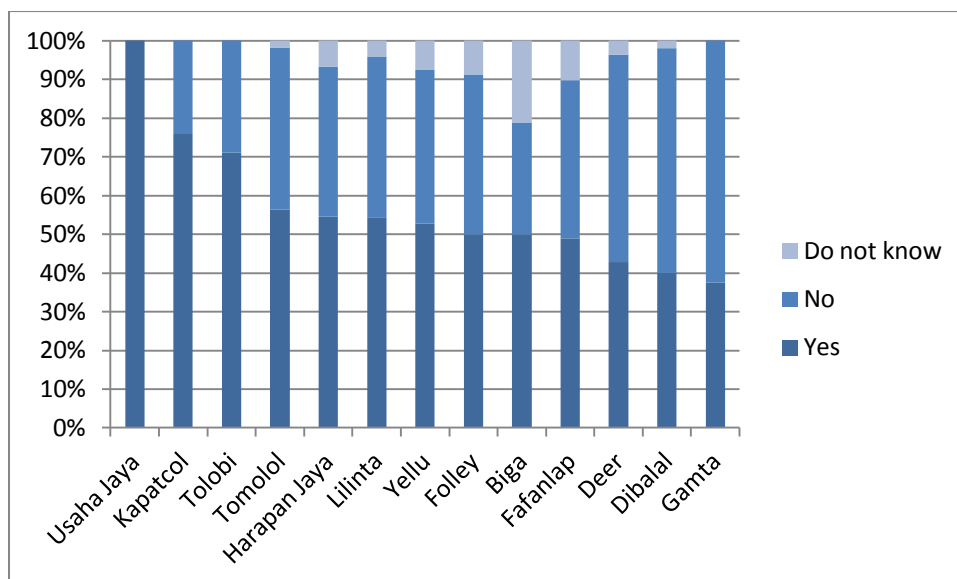


Figure 74. "Did you talk about the environment with family and/or friends during the last 6 months?" At village level in 2010.

Respondents were also asked if they had read about the environment in brochures. The results are presented in Figure 75. Some caution is appropriate when interpreting the results, as the question was not the same throughout the different monitoring phases. In 2005, the question referred to the last 12 months, while it was six in 2006 and 2010. More importantly, in 2010, the question was more specific, mentioning brochures from TNC/CI/WWF/PNK. This may have helped trigger people's memories, and therefore led to a higher number of people answering this question positively. Nevertheless, considering the size of the difference between the surveys, a real change has clearly occurred. In 2005 and 2006, the people who say no greatly outnumber the people who agree, but in 2010 this has turned around and the people answering yes are in the majority.

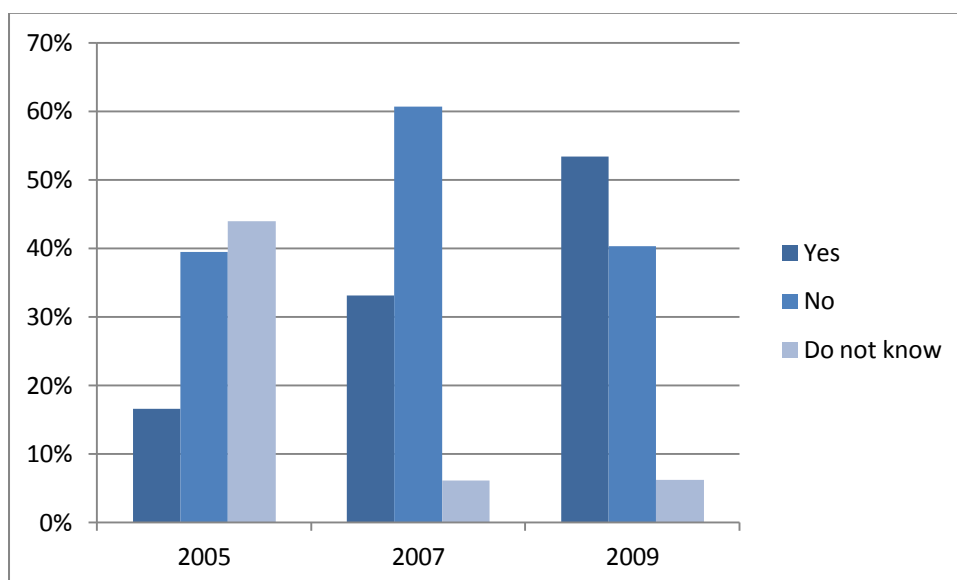


Figure 75. "Did you read any environmental brochures during the last 6/12 months?"

At village level in 2010, Tolobi and Tomolol stand out positively, with 80 and 87 percent, respectively, having read a brochure in the last six months (Figure 76).

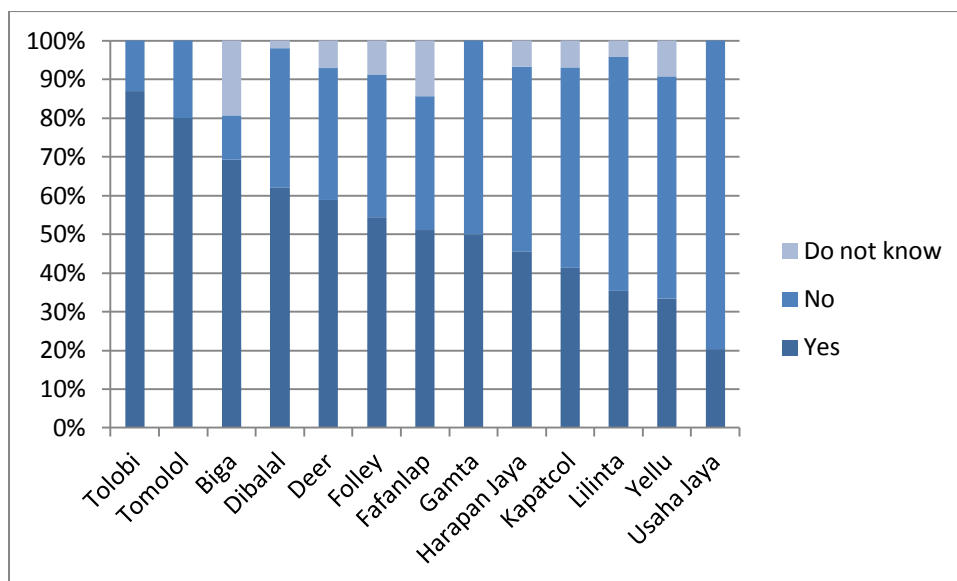


Figure 76. "Did you read any environmental brochures during the last 6/12 months?" At village level in 2010.

3.5 PRESENCE OF AND PARTICIPATION IN ENVIRONMENTAL STAKEHOLDER GROUPS

The introductory question to this part of the questionnaire, i.e. whether the respondent knows about an environmental stakeholder organisation in the village, differs among the three surveys. In 2005 and 2010, the phrasing is different but the general meaning is similar. In 2006, the question is about stakeholder organisations in general, not specifying the environmental character. After reviewing the 2006 data, it was decided to exclude these from the analysis.⁵⁹

The knowledge about and participation in these organisations differ greatly between 2005 and 2010. In 2005, less than ten percent of respondents has heard that such an organisation exists in the village. In 2010, close to half has (Figure 77). Due to the low level of knowledge of and participation in such organisations in 2005, the remainder of this section will deal only with 2010.

⁵⁹ The stakeholder groups were generally not environmental in character, not were the activities that people were involved in.

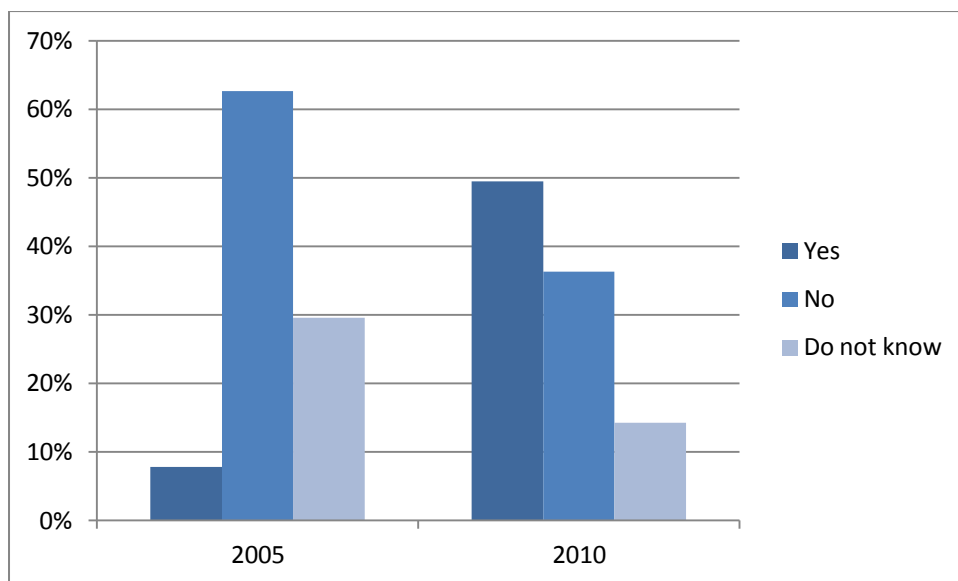


Figure 77. Knowledge about an environmental stakeholder group in the village.

Figure 78 below shows the results at village level. In Dibalal, Tolobi and Yellu relatively many respondents say there is a group, while in Fafanlap, Deer and Gamta, a relatively large percentage says there is not. In Biga, 40 percent does not know.

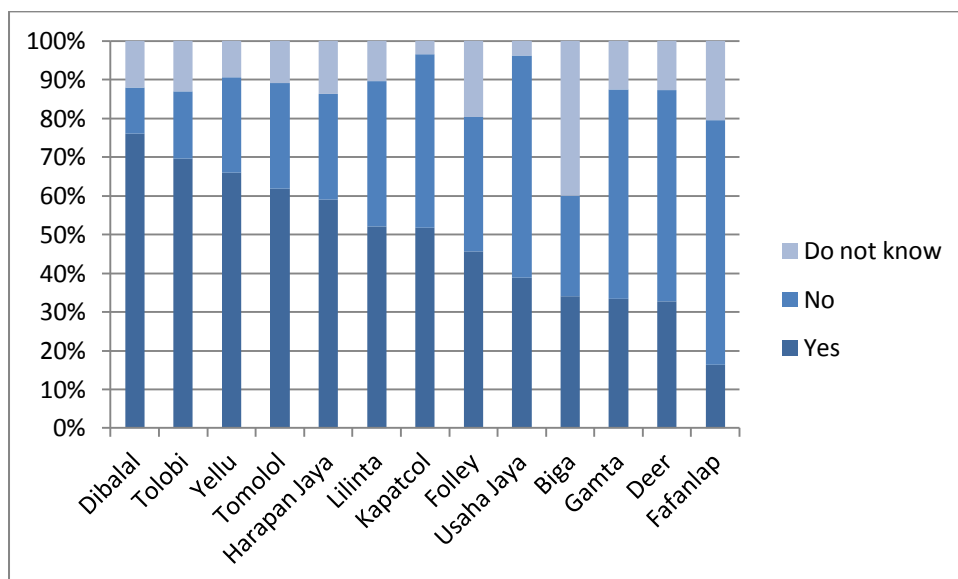


Figure 78. Knowledge about an environmental stakeholder group in the village. At village level in 2010.

Among many different answers, respondents most commonly name or describe these groups as a “community group” or a “conservation group”. TNC and COREMAP (jointly or separately) are specifically mentioned by 17 percent of respondents. There are also some names that do not directly indicate an environmental link, such as “Empowerment Family Welfare” or “Women’s group”. The village government is also mentioned as an environmental organisation.

Of the people who know about a group, the majority thinks it is beneficial for marine and coastal environmental management. This is true both for the people who participated in the activities of the

organisations and for those who did not (Figure 79). As expected, the percentage of participators who think positively about the organisations is higher.

When asked why they think it is beneficial, most just say that it is beneficial, or it will do good. Eleven percent think it is beneficial because it increases skills, knowledge or awareness. A similar percentage thinks it will protect the sea. Ten percent of the answers relate to benefits for the future, children or next generations. A final common answer is that it helps bring the community together or motivates community members. It should be said that this grouping has been made afterwards, based on very short descriptions.

For the small percentage of people who do not think the organisations are beneficial, the answers are varied. One person says it will restrict fishing, another that only a film was shown, yet another says that the activities were too hard.

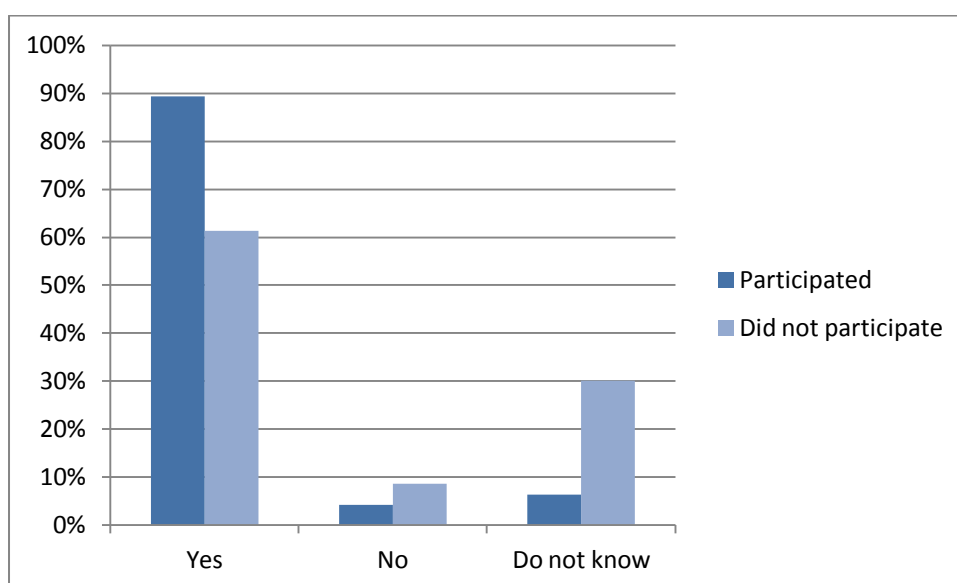


Figure 79. "Is the organisation beneficial for marine and coastal environmental management?" In 2010.

Overall, 31 percent of villagers participated in a group during the previous six months (65% of the people who say there is a group). Figure 80 below shows participation at village level. A group of five villages (Usaha Jaya, Fafanlap, Gamta, Biga and Deer) show a considerably lower participation than the others.

On average, the people who participated in the activities of these groups have done so five times over the previous 6 months. More than half only participated three times, but the average is higher, because the magic number ten is mentioned fairly often.

Many participating people have heard about the group from village officials, such as the village head. Many have also heard from NGOs such as TNC/CI or COREMAP.⁶⁰ Some have also heard it from the group leader himself or herself (especially the leader of the PKK, or Family Welfare Movement, is mentioned).

⁶⁰ TNC is mentioned most often in this group.

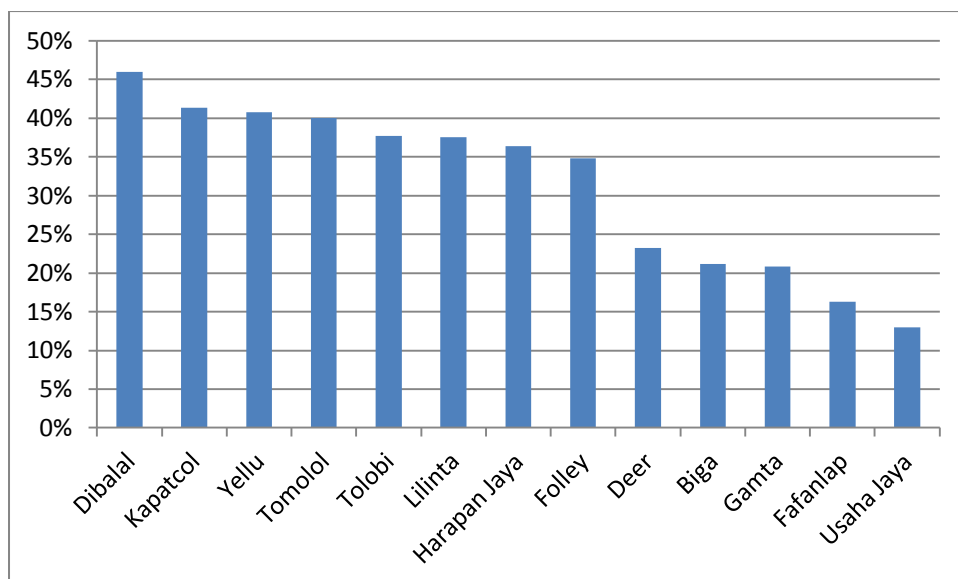


Figure 80. Participation in stakeholder groups. At village level in 2010.

The activities that people were involved in can be divided into a number of groups. The most common group of activities (32%) is related to cleaning the beach, the village or the environment. The second biggest group (28%) is what seems like activities that are not related to the environment. Worship and the church are common within this group, but there are also answers such as doing sports. Some of these might be related to an environmental action, but this could not be made out from the answers. The third biggest group (22%) has to do with economic development. Answers such as making mats, sewing and starting plantations have been placed into this group. Other ocean-related activities, such as monitoring and patrolling, fishing, diving are also mentioned (10%). Finally, there are also answers relating to medicines or health (2%), environmental information provision (2%), or simply referring to TNC and COREMAP (3%). It should be said that this grouping has been made afterwards, based on very short descriptions.

Of the people who do know there is an organisation in the village, but have not participated (103 respondents, or 17 percent of the 2010 sample), most have not because they lacked spare time (30%). The second most common answer is that the respondent is not a group member. This answer does not give much information as to the real reason for not participating or becoming a member. Thirteen percent (12 respondents) simply says not to be interested.

When asked which environmental activities people expected to be involved in the next two years, cleaning is again a common answer, together with protecting the sea or the environment. A common answer that is unrelated to the environment – despite this being explicit in the question – is development of the village, such as building roads, houses or empowering the village.

4 SUMMARY AND CONCLUSIONS

We should start these conclusions with a note of caution. While the 2010 survey had an overall confidence interval of 96 percent, the village level confidence intervals range from 82 to 88 percent. This means that had the survey been repeated there would have been an 82 to 88 percent probability that the village results would have been the same. These village level confidence intervals are below the generally accepted 95 percent norm for robustness. Moreover, not all questions were answered by all respondents, which reduces the interval even more for some questions, and some of the villages with lower number of respondents turn up relatively often in the highest or lowest range of the results. This flaw in the statistical robustness of the results makes it even more important than what is generally true, namely that statistical relationships and trends should always be placed in context and should not be the sole source of information upon which to build policy action.

Having said that, our analysis has shown many interesting results and changes over the years. When combined with the in-depth knowledge of local managers, these results provide important information on both the effects of the outreach work done so far, as well as on where to focus conservation efforts in the coming years.

Background trends

The overall welfare in the villages seems to have improved between 2005 and 2010. The housing situation in the villages is somewhat better. More households have brick, concrete or stone floors and walls. Access to electricity has increased substantially, and there are also more households that have running water in the house, although the latter remain a small minority. Ownership of a television set is more common than it was in 2005, and the same is true for motorboat ownership. Ownership of more basic assets, such as radios or rowing boats has not changed, but was higher to start with. The housing, amenity and asset situation has not evolved in the same way in all villages of the MPAs. The Misool villages seem to have done a little better than the Kofiau ones, but there are no villages that clearly outperform the others on all counts.

Education and literacy levels seem to have improved slightly, but only on Misool. Overall, in both 2005 and 2010 the highest level of education reached by the far majority of the respondents is primary school.

The employment situation for men has not changed much. Around four fifths of all men have a job. Female employment does seem to have risen, although the change is not statistically significant.⁶¹ Farming is mentioned most often as a first occupation, although this has gone down by nearly half from 2005 to 2010. Fishing, on the other hand, seems to have become more important, and other employment was mentioned more often, as well.

⁶¹ Some caution is warranted here, as the 2005 question asked whether the respondent had (paying) employment during the last 12 months, while in 2010 the question referred to the last 6 months.

Environmental perceptions

In 2005 there was a large percentage of respondents who were unsure about almost all perception questions, and in many questions they comprised the biggest group. In later surveys, this percentage has dropped significantly. This reflects an increased awareness, or at least a willingness to speak about the issues dealt with in the questionnaire.

As was the case for welfare changes, we find that differences and changes in environmental perceptions vary across the villages, but consistent “good” or “bad” villages do not appear to exist. Although Tolobi comes up in the higher ranges relatively often, generally different villages have good and bad scores for different questions. In these conclusions, we shall therefore not mention the “good” and “bad” villages for each topic, but shall indicate when village differences exist. For detailed information about which village scores what on which question, the reader is referred to the sections where these questions are discussed in detail.

Almost everyone agrees that coral reefs and mangrove forests are important for storm and wave protection, and for (future) livelihoods. They are also perceived to be in a good state by majorities in all surveys and almost all villages. The percentage of people who are not sure about these questions drops between 2005 and the later rounds. In 2006 and 2010, the percentage of both the people who see the reef and mangrove condition as good and those who see it as bad increase as the “not sure” answers decrease, but the ratio between them does not change much. This seems to indicate that the overall condition of the reefs and mangrove forests has not changed between 2005 and 2010, but at the village level there are large differences. In some, perceived conditions improved, while in others they declined.

A notable change has occurred in the way in which people perceive problems and threats facing the marine and coastal environment. In 2010, large majorities think coastal damage, seawater pollution, and reduced fish numbers are major problems, while in 2005 only about a third of the people do. This change in perceptions has occurred in all villages, although there are differences in the size of the change. Eighty percent of respondents answered that outside fishers were a major problem in 2010.⁶² Another question about environmental problems did point to a consistent proportion of people who do not see or deny there are problems: when asked in an open question about the main problems, around 20 percent of respondents in all surveys answer that there are no big problems.

Commonly mentioned causes of the problems are outsiders or outside fishers, the people in the villages themselves, and the village head or regent. It is difficult to say anything about the change in the perceptions about the responsible parties, because the questions and answer options changed from survey to survey. One notable change appears to be the rising visibility of Raja Ampat’s Bupati/regent. The responses differed greatly between the villages, however. In some, outsiders were not mentioned at all or by only very few respondents, and the Bupati was also not mentioned in all villages.

The village head, law enforcement agencies (and the Bupati in 2010) were seen as most able to solve the problems. NGOs were mentioned by some in 2006 as able, but not in the earlier or later surveys. It is interesting to see that the people themselves were seen relatively often as the cause of the problems,

⁶² This problem was not presented to respondents in 2005 or 2006.

but less so as the ones who can do something about this. An interesting question was added in 2010 that allows a comparison between who was thought able to solve the problems and who was thought responsible. Law enforcement agencies, the Bupati and villagers themselves were all assigned a higher responsibility than ability, while there was an opposite difference for the village head.

With regard to perceptions about what can be done by whom to help the environment, we first see that, in general, people have become less negative about the environmental awareness of their fellow villagers. In 2005, as many people agreed as disagreed with the statement that the villagers do not care about the environment. In 2006, the group that disagrees is more than twice as large. It declines in 2010, but is still significantly higher than in 2005. Once more, there are big differences at village level, but the decrease in negative views between 2005 and 2006, and the subsequent increase between 2006 and 2010 is seen in almost all villages.

People have also become more positive about what they can do to help the marine environment, both personally and as a community, but we do see a similar rising and falling pattern between 2005 and 2006, and 2006 and 2010 as we saw for the previous statement about environmental awareness in the villages. Most likely, people in the build up to the establishment of the MPAs (the survey took place in August 2006 and the MPAs were established in December of the same year), became optimistic that the problems could be solved. Three and a half years later, part of the people have become disillusioned as the MPAs are still not operational. If this is indeed the reason, it is another reminder of the importance not to promise too much when creating support for conservation schemes, and once they are accepted to move rapidly to achieve some visible results. It is much harder to get a disillusioned person back on board than it is to convince someone from the start. The overall change between 2005 and 2010 is positive for most villages for the statement about individual ability, but there is an even divide between villages that become more optimistic and those that become more pessimistic about communal ability. As community participation is vital for the success of the marine protected areas, it should be a priority for future work to find out precisely why perceptions have gone down in these villages, and what can be done to improve the situation.

There is overall majority agreement for the statement that damage to the environment now will make life harder in the future. Here, we again find a reduction in the percentage of people who are not sure, but the ratio of people who disagree to those who agree increases from 2005 to 2006 and again becomes stronger in 2010. This negative change occurs in most, but not all villages, and even in 2010 are there only a few villages where the people who agree do not clearly outnumber those who disagree. Nevertheless, it would be interesting to find out why this has occurred.

The view of conservation workers is mixed in both 2005 and 2010. Excluding the people who are not sure, and who again are much more numerous in 2005 than in 2010, about half the people think conservationists care more about fish than people in both phases. While this ratio has not changed much overall, there are big differences between the villages in both the level of and the change in these perceptions.

In general, people are strongly in favour that those who damage the environment or take protected species should be punished for it. This is one of the few perception questions where the people who were not sure are not the biggest group in 2005: around 60% of them are in favour of punishment. The percentage of people who agree in 2010 has risen even further to around 80%. However, and interestingly, the ratio of people who are in favour compared to those who are not does decrease,

indicating that relatively more people feel that violators should not be punished. This remains a small minority, and does not occur in all villages, but it would be interesting to find out why it happened.

Perceptions about and familiarity with Marine Protected Areas

There is a marked change between 2005 and the later survey rounds with regard to the proportion of respondents who think it would be a good idea to demarcate and protect certain coastal areas and the species living there. In 2005, more than 70 percent was unsure about this, while in later rounds a similar percentage of the people was in favour. While the phrasing of this question changed between the rounds which makes a direct comparison difficult, it is clear that a big shift took place. In all villages approval rates are above 50 percent.

Familiarity with the term Marine Protected Area has changed quite radically over the years, as well. In 2005, most people are unsure whether they have heard the term. In 2006, most answer that they have not heard it. While in 2010 more than 60 percent is familiar with the term. At the village level, familiarity rose in all but one village. Most people also knew if their village was inside an MPA. There are just two villages where this was not the case.

Of those familiar with the term MPA, a majority in all phases correctly describes it as an area where fishing is restricted in certain zones. In 2010, there was almost nobody who thinks that there are no prohibitions on fishing in the MPA, while around 10 percent thought this in the earlier surveys. The percentage of people who think fishing is prohibited everywhere in the MPA increased in 2010. This is worrisome, as it could lead to an unnecessarily negative image of the MPA and marine conservation. This mistake is relatively common in almost all villages, and there are a few villages where it is the most commonly held view. The results therefore seem to indicate that more information provision about fishing restrictions in the MPA is warranted in almost all villages.

Allowed and illegal techniques and activities

Outreach work in the years since TNC established a presence in the Raja Ampat islands has apparently had a big effect on the knowledge about illegal fishing techniques and marine activities. The most damaging fishing techniques and activities, such as dynamite and cyanide fishing and coral mining, are well known to be illegal in 2010 but much less so in 2005. However, extra outreach effort in certain villages - Usaha Jaya in particular – seems to be warranted based on the results found here. While awareness is lower, most people also know it is illegal to use a hookah compressor (fishing with air hose equipment connected to a continuous air supply), traditional poison or to collect giant clams. Of course knowing a technique or activity is illegal does not mean it is not practised, so outreach and control activities certainly should not be based on these results alone.

Considerable confusion exists about certain legal techniques and activities, such as using long lines, fish traps (bubu and sero), gill and lift nets, catching sharks, crabs and lobsters. While some techniques are mostly used by outsiders, clearing up this confusion should be an important goal for the outreach activities, as the perception that “we can’t do anything anymore” can have a destructive effect on people’s views towards conservation and MPAs.

Overall, it is felt by respondents that around 45 percent of his or her fellow villagers know the MPA rules. Comparing this to the questions about the rules in the questionnaire (can you fish inside the MPA, and which techniques/activities are allowed), this appears quite accurate. Fewer people think

that these rules are also adhered to by all those who know them. There are some villages that stand out positively or negatively on these questions, but most are close the average.

People believe that a violator of MPA rules should face a range of penalties. Of the options presented to people (they were asked to say for each whether it was a potential penalty), the confiscation of one's catch is selected most often. Other penalties that were thought to apply are a written warning, the confiscation of gear or boat, or a monetary fine. More than 40 percent also believes a prison sentence can be given. The confiscation of one's house was selected by only ten percent.

Information sources

To find the best way to inform people about MPAs and conservation, it is important to know which information sources people generally have access to. With regard to the media, radio is the most common source. This is followed by television. These overall results differ per village. In some, hardly anyone has access to television, while in others it is a more important source than radio. The frequency with which people access either source does not differ much. Media outreach might therefore best be aimed at both radio and television.

The most common non-media sources of general information are the community or family and friends. NGOs in general, and TNC and COREMAP in particular, are also mentioned quite often even when people were asked about general sources of information. Sources mentioned for specific information about the marine environment are very similar to the non-media sources: the community, family and friends are mentioned most often, followed by NGOs. Even though radio was not mentioned as a source for this specific type of information, when asked directly, close to 40 percent in 2010 says they have heard environmental radio messages during the previous 6 months. This percentage may be lower in reality, as the question does not seem to have been understood correctly by everyone. This also makes it hard to compare results between the surveys.

Positive signs are that the percentage of people who discusses the environment with family and friends has gone up between 2005 and 2010. A rising percentage of people also indicate they have read TNC or partner institutions' leaflets about the environment during the previous 6 months.

Participation in environmental stakeholder organisations

In 2005, only a small minority is aware of the existence of environmental stakeholder groups in his or her village. This has risen substantially, and in 2010, half the respondents say they know such an organisation. The actual percentage may be a little smaller, as some of the organisations mentioned do not appear to have a direct environmental character. The same is true for the activities that people say they have participated in. Despite this, there is a clear increase of – and the awareness of – such groups. These vary depending on the village. In some, less than 20 percent has heard about a group, while in others around 70 percent has. Almost a third of the respondents (two thirds of the ones who know about a group) have participated in its activities during the previous six months. The activities include cleaning the environment or the village, but economic or mixed activities, such as making mats or starting plantations are also mentioned often.

The analysis of the three survey rounds has provided an enormous amount of results. The great number of variables, graphs and tables makes it difficult to get a grasp of the general trends. Nevertheless, it is clear that large changes have taken place in the perceptions about the environment

and the knowledge and awareness people have of the MPAs around their villages. Not all developments have been positive. On a number of questions, negative views have persisted among part of the respondents throughout the period of the three surveys, and some positive changes seem to have partly been undone from the second to the third survey. To facilitate the use of these results an MS Excel-based tool has been developed that allows the close up investigation of the results for a number of the most important questions. It is hoped that both the analysis presented in this report and the use of the Excel tool can provide insights in how previous outreach work has changed views, and provide leads to where further improvements might be attained.

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APPENDICES

APPENDIX I. DETAILED VILLAGE LEVEL INFORMATION

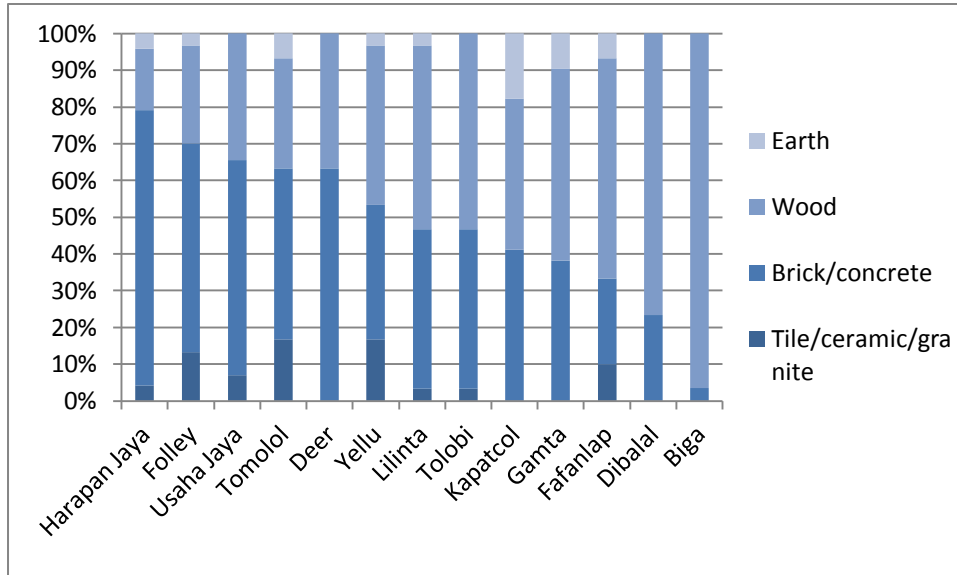


Figure 81. Floor material at village level in 2010.

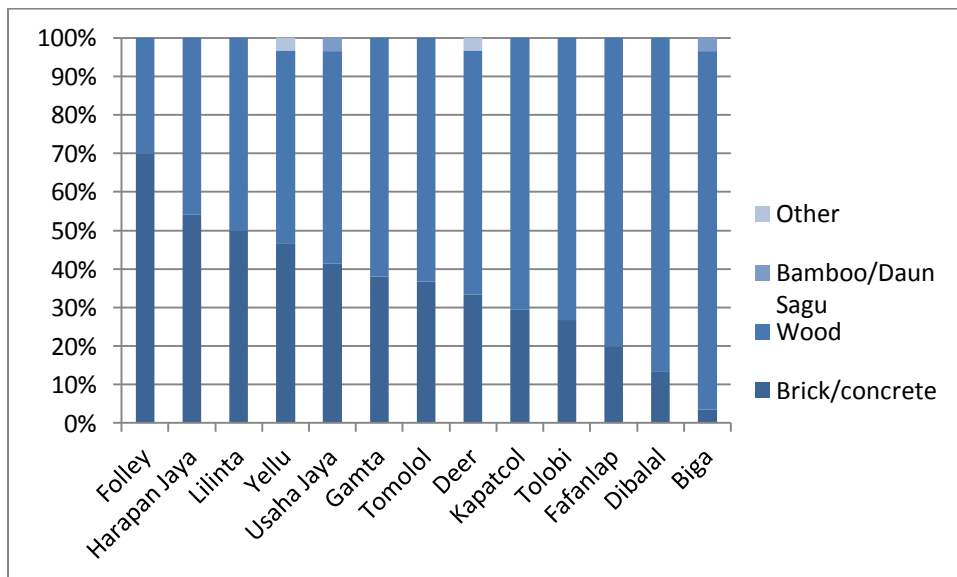


Figure 82. Material of the walls at village level in 2010.

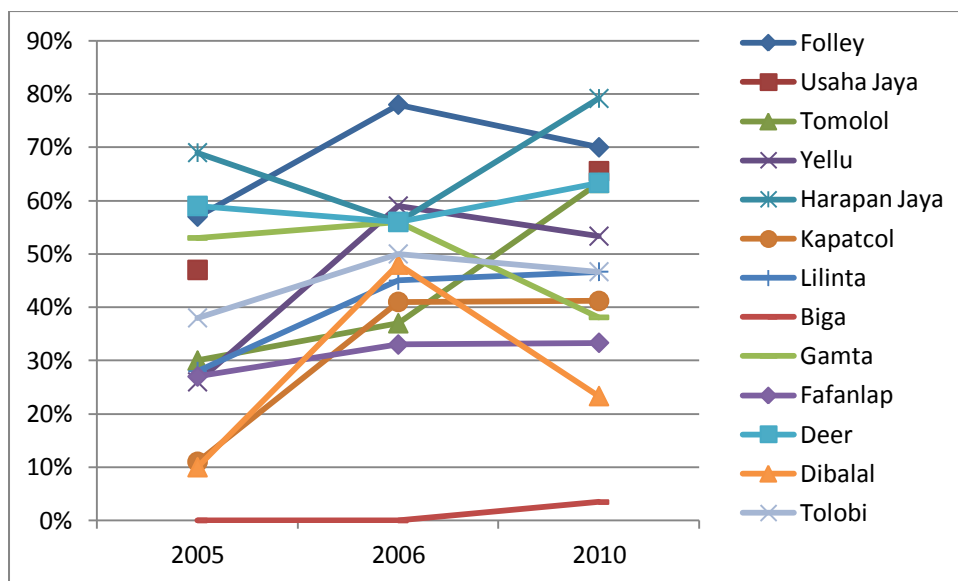


Figure 83. Change in floor material at village level⁶³.

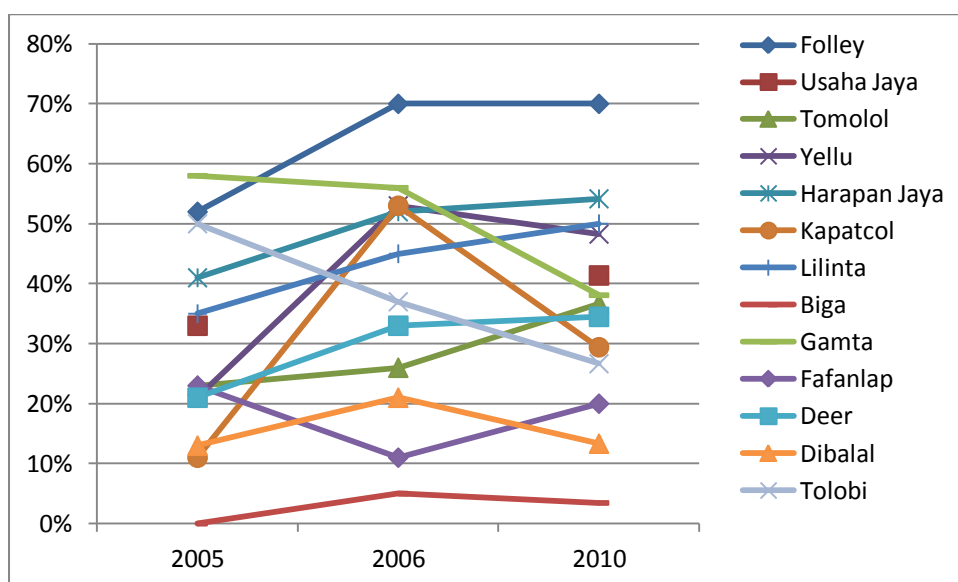


Figure 84. Change in wall materials at village level⁶⁴.

⁶³ The graph presents the percentage of households with brick, concrete or stone flooring in their main dwelling.

⁶⁴ The graph presents the percentage of households with brick or concrete walls of their main dwelling.

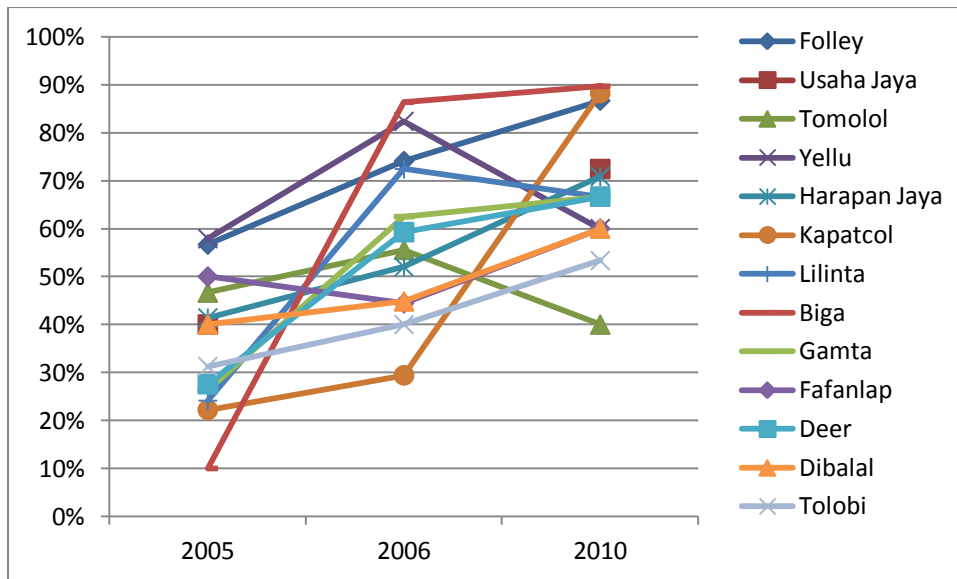


Figure 85. Access to electricity at village level.

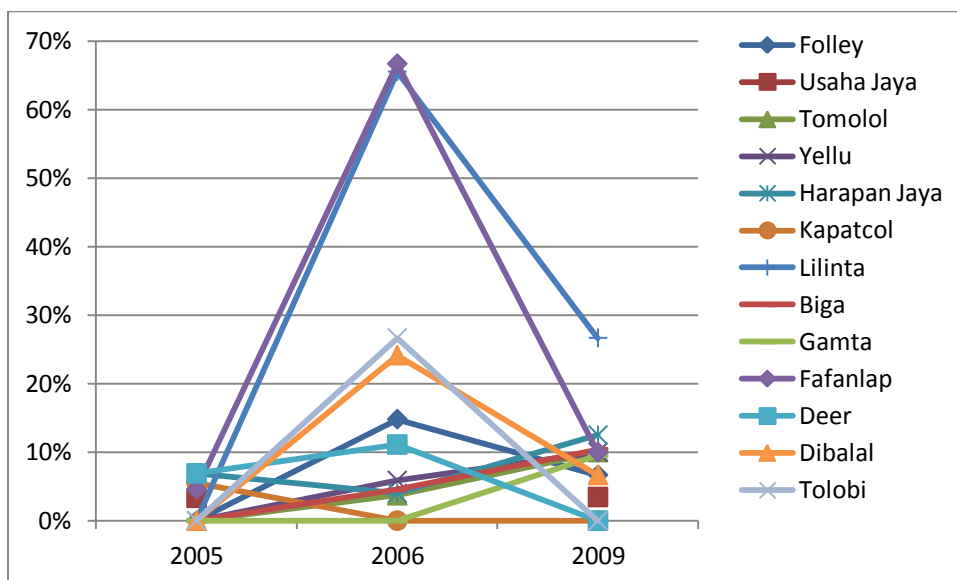


Figure 86. Access to running water at village level.

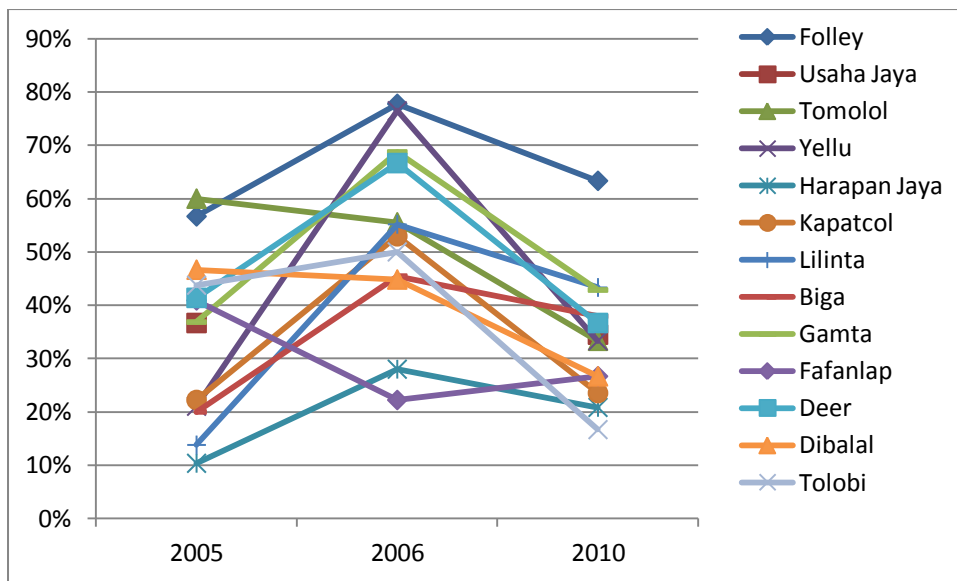


Figure 87. Radio ownership at village level.

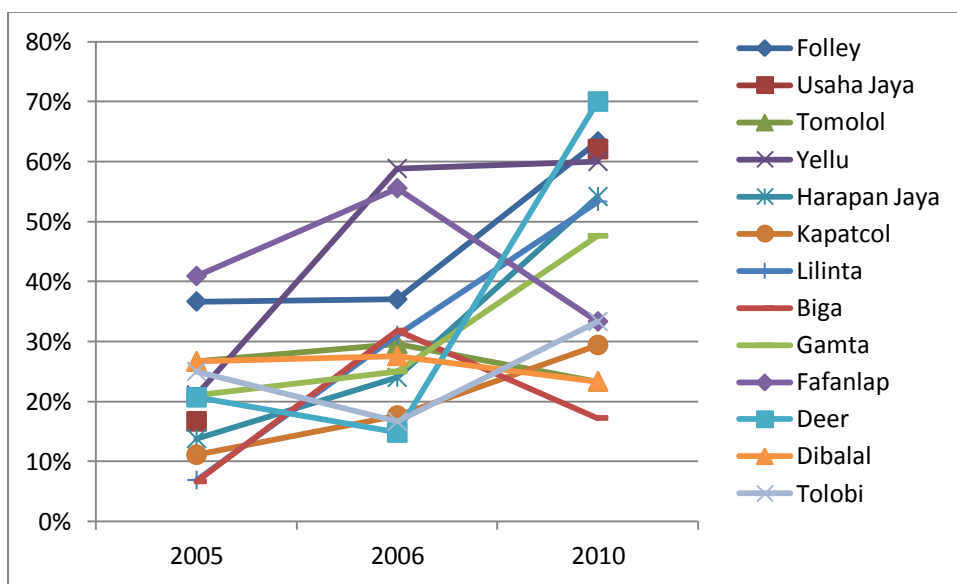


Figure 88. Television ownership at village level.

TNC Raja Ampat marine protected area perception monitoring trend analysis

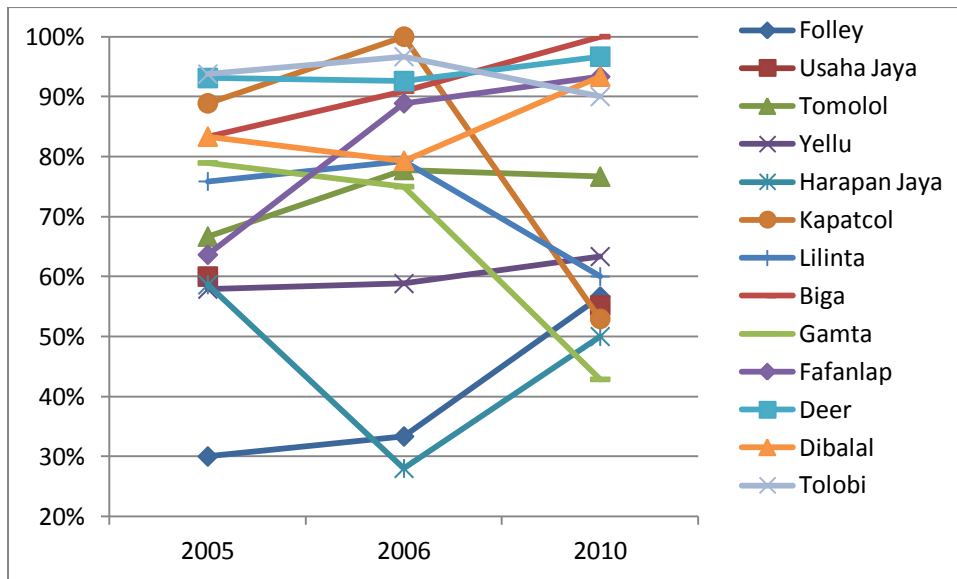


Figure 89. Rowboat ownership at village level.

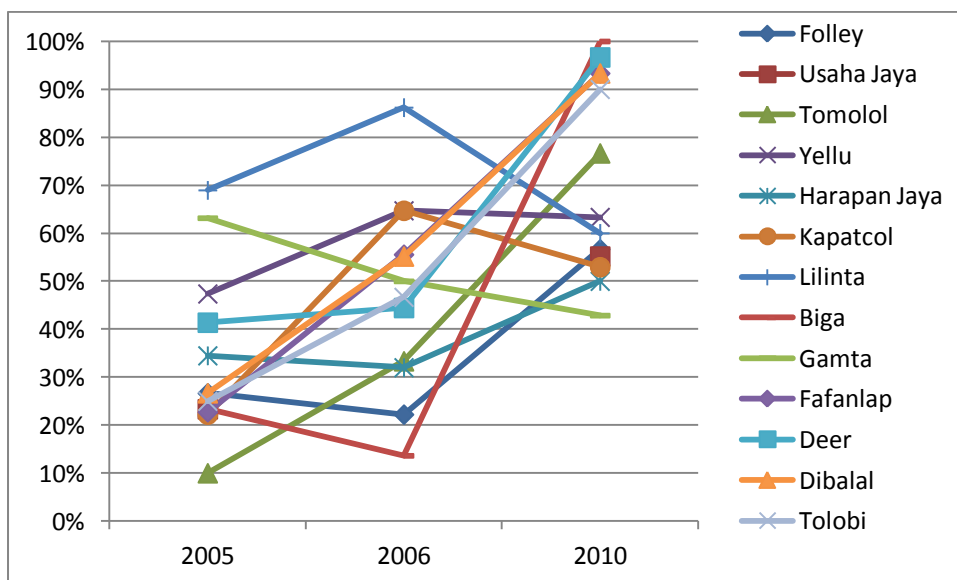


Figure 90. Motorboat ownership at village level.

TNC Raja Ampat marine protected area perception monitoring trend analysis

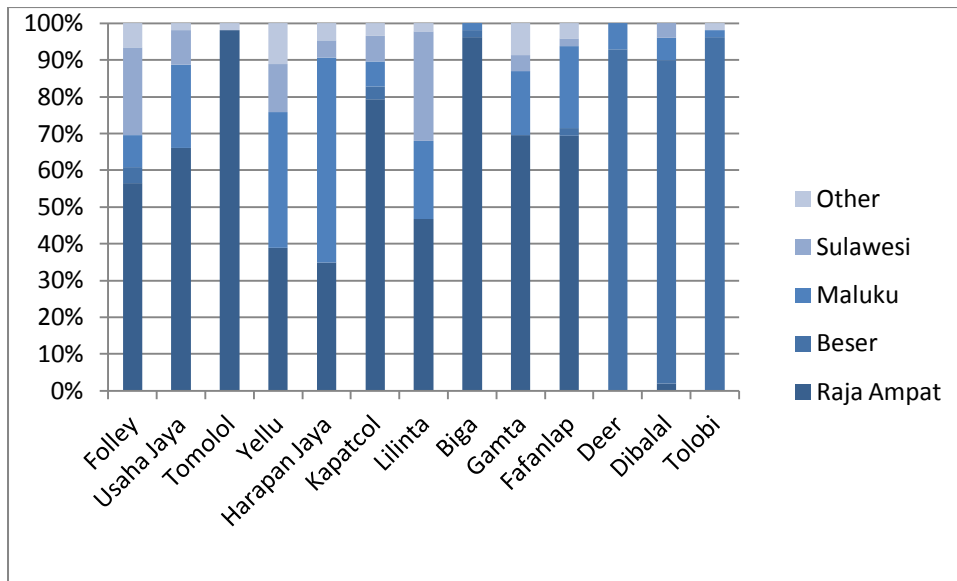


Figure 91. Ethnic distribution at village level in 2010.

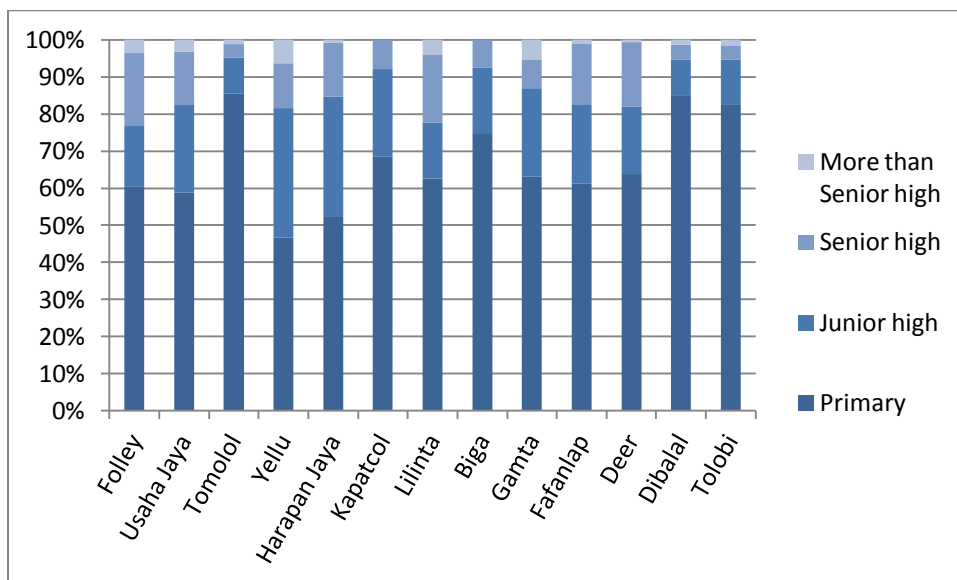


Figure 92. Education level at village level (2005/2006/2010 average).

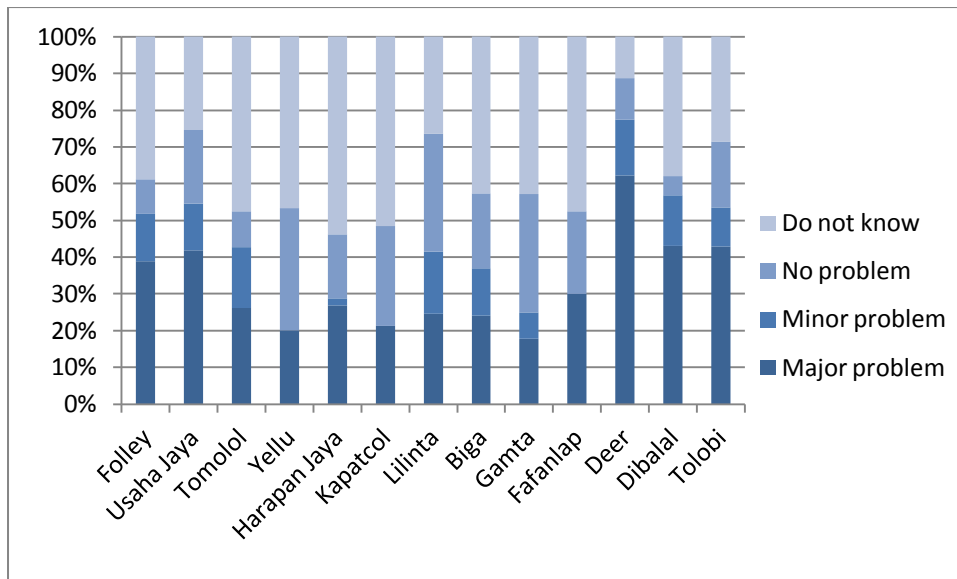


Figure 93. Coastal damage perception at village level in 2005.

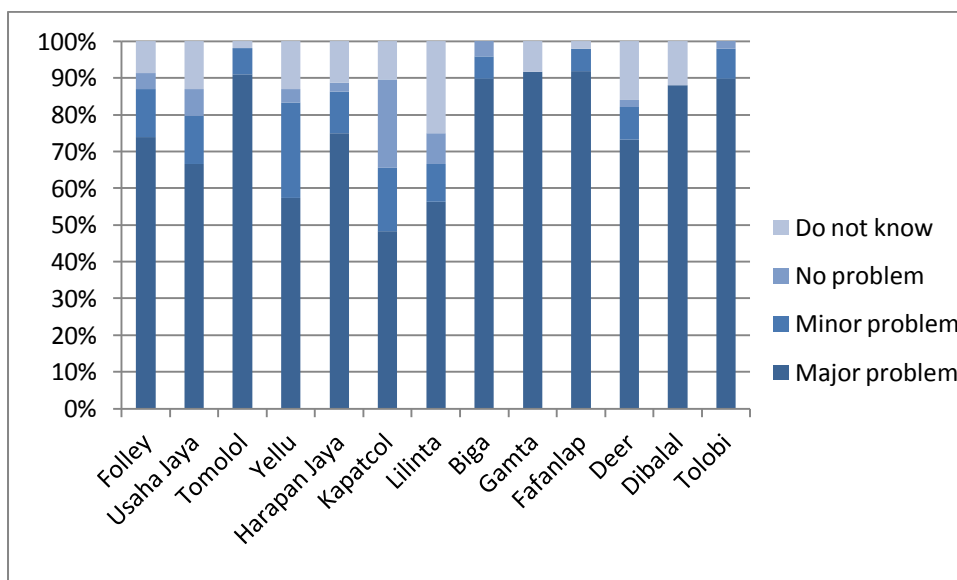


Figure 94. Coastal damage perception at village level in 2010.

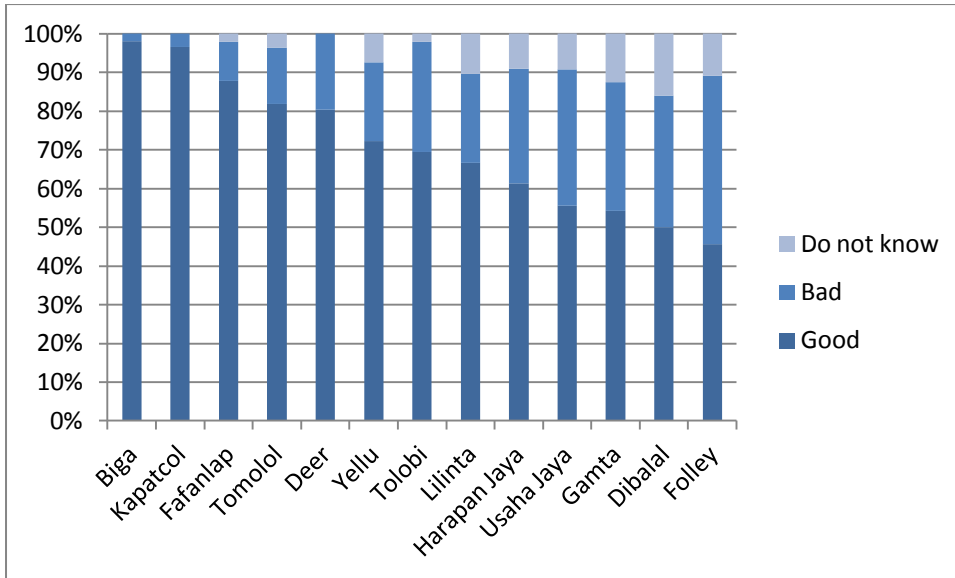


Figure 95. Perception of coral reef condition at village level in 2010.

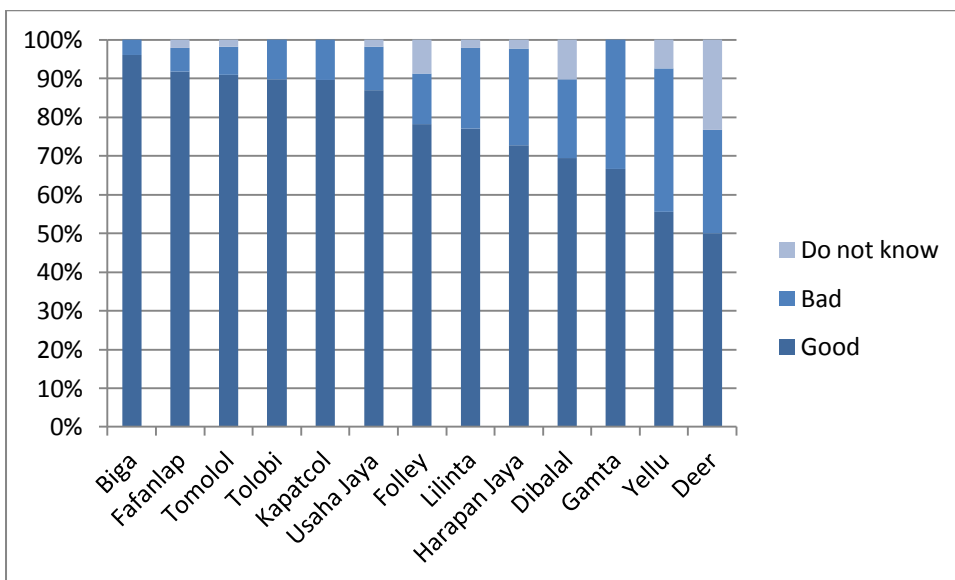


Figure 96. Perception of mangrove condition at village level in 2010.

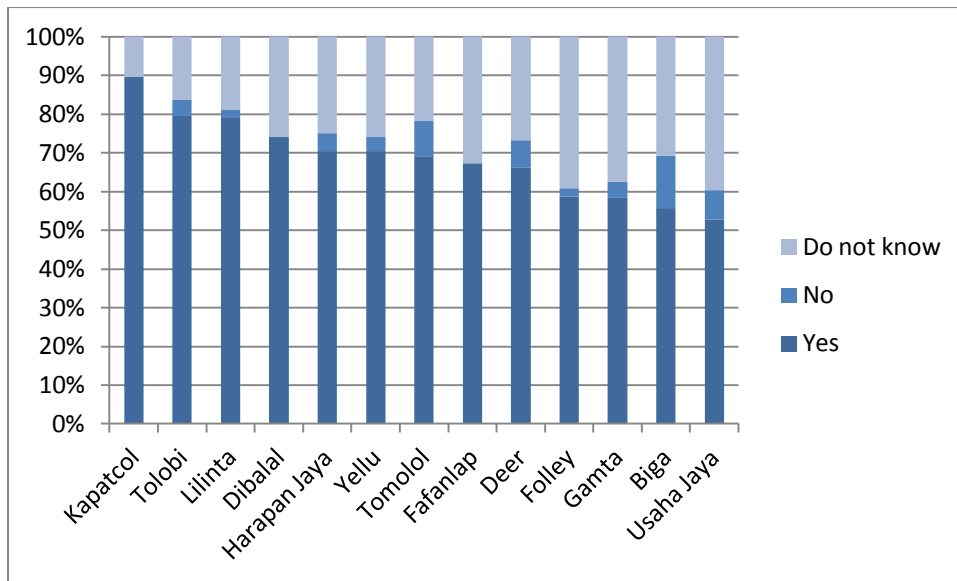


Figure 97. "Do you think it is a good idea to demarcate and protect certain coastal areas?" At village level in 2010.

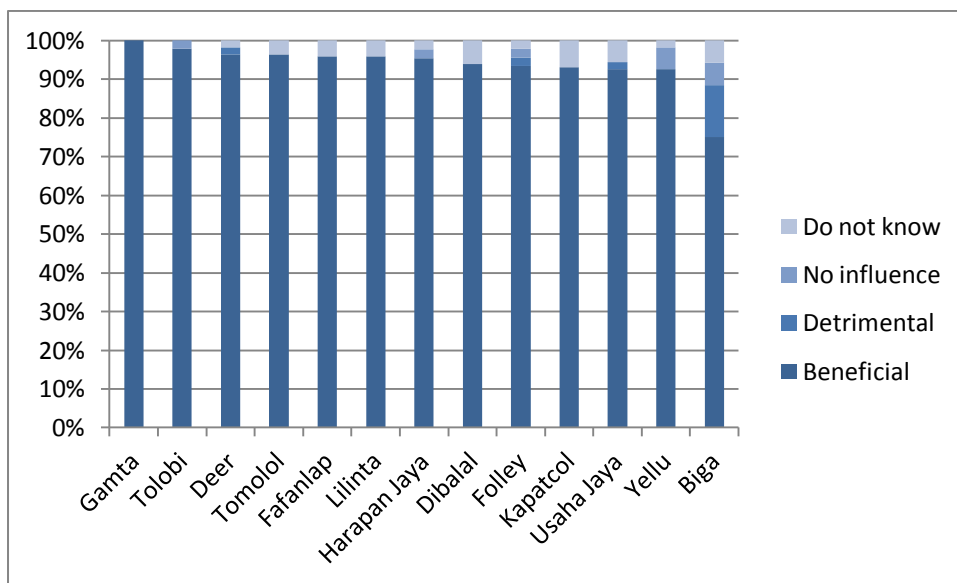


Figure 98. Will demarcating a coastal area for protection be beneficial for you and your community? At village level in 2010.

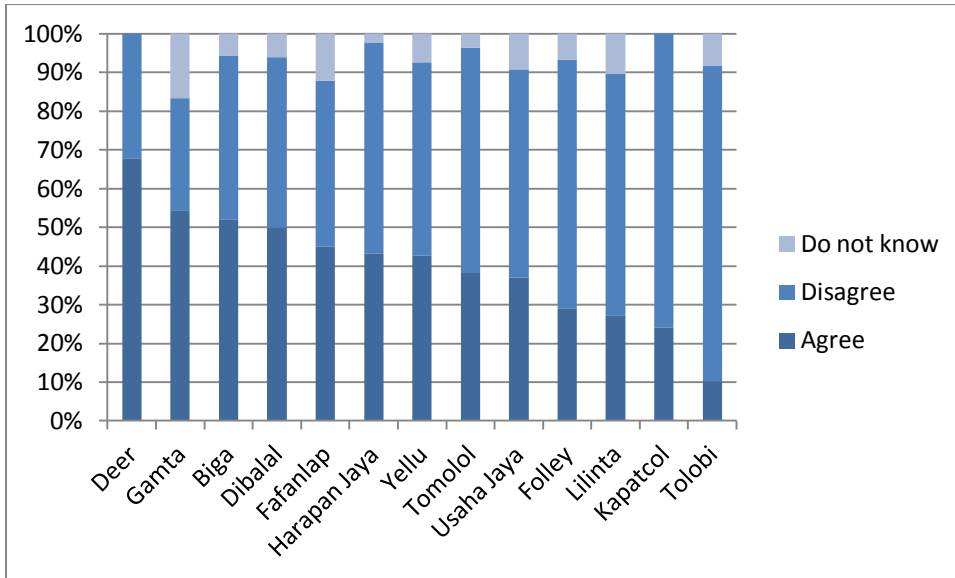


Figure 99. "Coral reefs don't need protection!" Village level 2010.

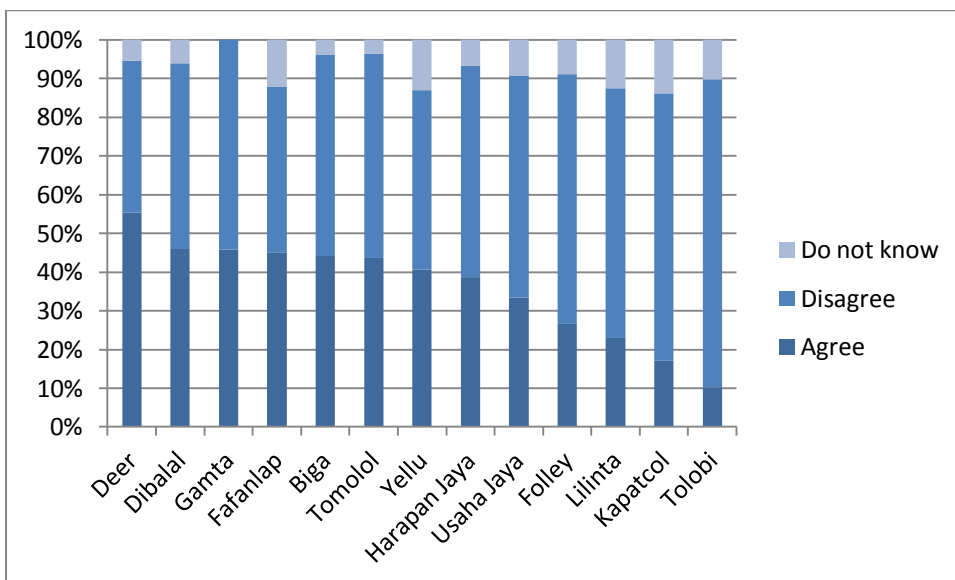


Figure 100. "Mangroves don't need protection!" Village level 2010.

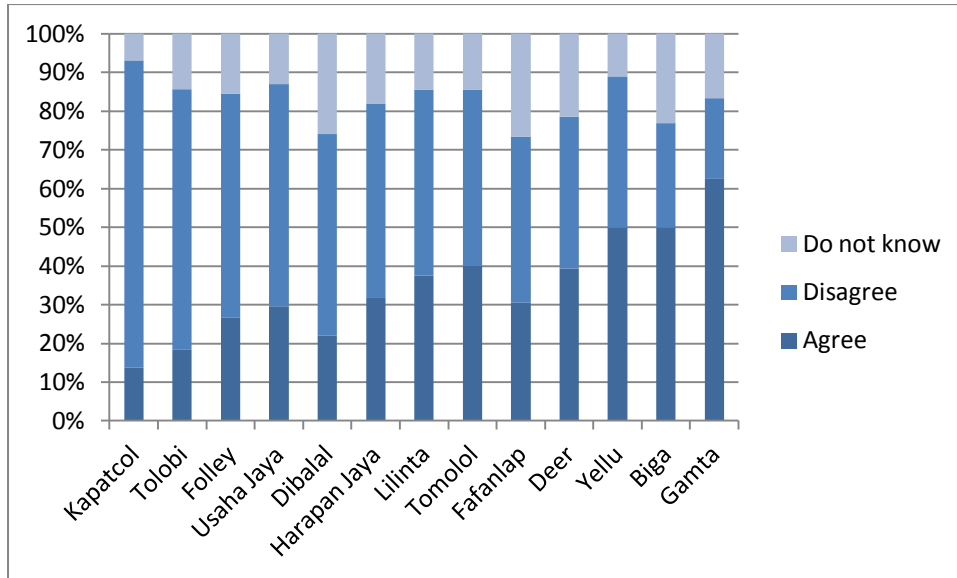


Figure 101. "Most people in this village don't care about the environment!" At village level in 2010.

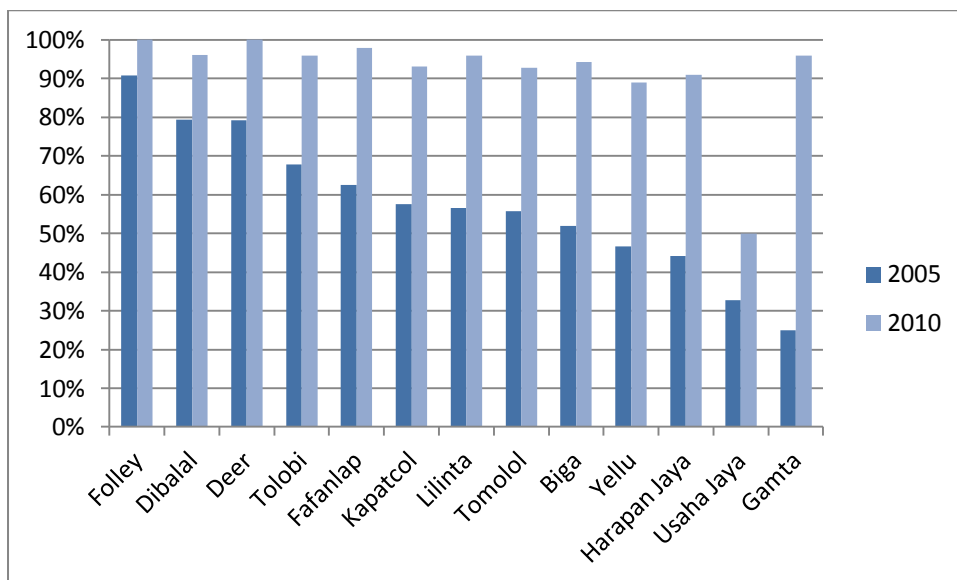


Figure 102. Change in the percentage that knows dynamite fishing is illegal at village level 2005-2010.

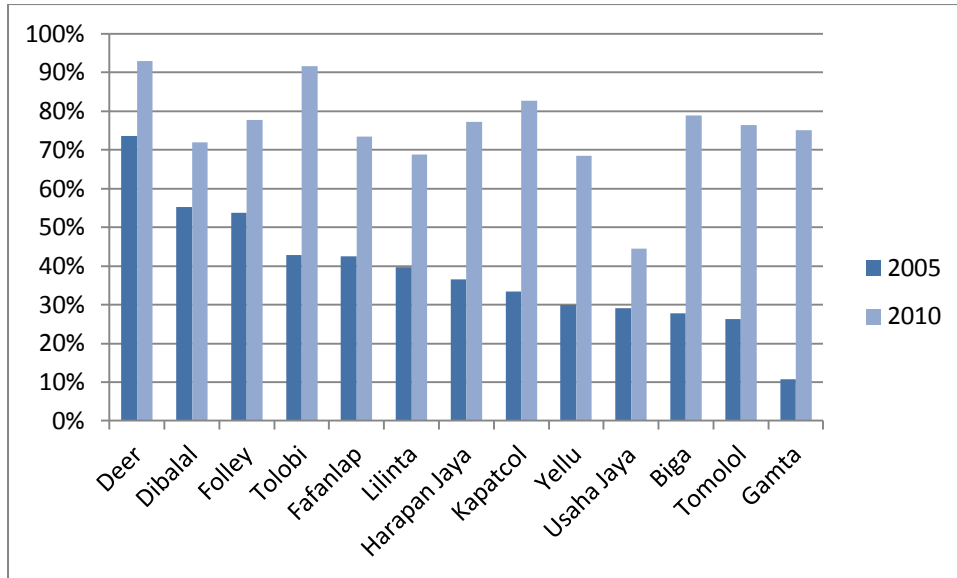


Figure 103. Change in the percentage that knows using traditional poison is illegal at village level 2005-2010.

APPENDIX II. DETAILED ETHNIC BACKGROUND

Table 10. Detailed ethnic background 2010.

Ethnic group	Within group share
<i>Raja Ampat</i>	
Matbat	54%
Matlou	41%
Maya	5%
Misool	0.3%
<i>Beser</i>	
Biak Beteuw	96%
Biak	4%
<i>Maluku</i>	
Seram	60%
Ternate	15%
Kei	6%
Maluku Tenggara	5%
Maluku	3%
Halmahera	3%
Maluku Utara	3%
Ambon	2%
Tobelo	2%
<i>Sulawesi</i>	
Buton	56%
Bugis	40%
Sulawesi Utara	4%
<i>Other</i>	
Jawa	30%
Moi (Papua)	25%
Timur	15%
Arab	9%
Fak-fak (Papua)	0.6%
Inanwatan (Papua)	0.6%
Kaimana (Papua)	0.6%
Kokas (Papua)	0.6%
Batak (Sumatra)	9%

APPENDIX III. FISHING TECHNIQUES AND ACTIVITIES: ORIGINAL INDONESIAN WORDING

Table 11. Legal and illegal fishing techniques with the original Indonesian terms.

Kail/Pancing dasar	Hook and Line	Legal
Bubu	Fish trap	Legal
Pukat harimau (trawl)	Trawling	Illegal
Jaring insang	Gill net	Legal
Jaring lingkar	Seine net	Legal
Bahan peledak/Bom ikan	Fishing with explosives	Illegal
Sianida/potasium/racun	Fishing with cyanide	Illegal
Kompresor	Hookah compressor	Illegal
Tombak/kalawai	Spear	Legal
Tuba/akar bore/racun	Tuba/bore/traditional poison	Illegal
Senapan Molo	Spear gun	Legal
Rawai	Long line	Legal
Sero	Bamboo trap	Legal
Bagan/Bagang	Lift net	Legal

Table 12. Legal and illegal activities with the original Indonesian terms.

Meting/Bameti di karang	Reef gleaning	Legal
Menangkap penyu	Catching turtles	Illegal
Menangkap/memancing ikan hiu	Catching sharks	Legal
Mengambil batu karang	Coral mining	Illegal
Mengambil pasir di pantai	Sand mining	Illegal
Menangkap kepiting	Catching crabs	Legal
Berenang atau menyelam	Swimming or scuba diving	Legal
Mengambil kayu bakau/mangi-mangi	Collecting wood from mangroves	Illegal (inside the MPAs)
Bermain di pantai	Playing on the beach	Legal
Mengambil teripang	Collecting sea cucumbers	Legal
Mengambil kima (cipu garay)	Collecting giant clams	Illegal
Menangkap udang/lobster	Catching lobster	Legal
Mengambil Lola	Collecting giant top shell snails (Trochus)	Illegal

APPENDIX IV. FOCUS POINTS FOR QUESTIONNAIRE IMPROVEMENTS

When analysing the data, a number of irregularities were noted that could be addressed by small adaptations to the questionnaire or to the procedures for interviewer training, interviewer supervision or data entry. The results of the analysis may also raise new questions that could lead to small alterations of the questionnaire. It should be noted however, that differences in the questionnaires using in the three survey phases sometimes made analysis over time difficult, as it could not be determined whether differences in the questions or differences in the real situation led to the observed changes in the response. When considering future changes, a careful deliberation should be made about the benefits and disadvantages of the changes.

Common irregularities in the data

The most common irregularity encountered when cleaning the data, was the inconsistent following of skip codes in the questionnaire. As a result, sometimes questions were posed to respondents to whom these were not relevant. If these responses are not removed from the analysis, they can influence the results. This problem especially occurred for questions in section 5, but not exclusively so. Examples of where this occurred are listed below:⁶⁵

Questions 114 to 118 about the respondents' occupation. Sometimes when someone indicated to have worked an answer was also found for the question why they had not worked. It also occurred that someone had apparently not worked, but a job was specified in a following question.

Questions 301 to 305 about familiarity with the term or description of MPAs. Some people who said that they were familiar with the term were still asked question 302 about the description of an MPA. There were many missing answers to question 301, as well. People who said not to be familiar with the term or description were sometimes asked the following questions.

Questions 501 to 509 about environmental stakeholder groups. Sometimes it was indicated that a respondent was not aware of any group, but a name of a group was given, or it was indicated that the respondent had participated in a group. It also happened that no answer or a "don't know" answer was given for the question whether the respondent was aware of a group or had participated in a group, but subsequently, activities were listed.

This kind of errors can take a lot of time to filter out of the data, and it is sometimes hard to know which the correct answer should be, forcing one to treat the answers as missing. They are however not very difficult to avoid. First, the skip codes sequences should receive sufficient attention during interviewer training, and interviewers should be allowed to practise with all answer combinations. Once the survey is underway, a supervisor should if possible check the questionnaires on a daily basis, which is a second way to filter out such irregularities at the source. If spotted when still in the field, sometimes it will be possible to make corrections, either on the basis of the interviewer's recollection, or by revisiting a respondent. Even when correction is not possible, the pointing out of mistakes during the survey ensures that interviewers will not continue making the same mistakes over and over.

⁶⁵ Only examples for the 2010 survey are listed here.

Unrelated and uninformative answers

For a number of the open questions, answers were found that seem to indicate that the question was not understood correctly. This was the case for the questions about environmental radio messages and environmental stakeholder organisations. When asked about the type of messages and the character of the organisations or activities participated in, in many answers the environmental character was missing. For radio messages, answers such as “*sports*” or “*family messages*” were sometimes given. For environmental stakeholder organisations, examples of seemingly unrelated answers are “*Youth mosque organisation*” and “*worship*”.

A similar problem occurred with question 508 & 509 about whether the organisations were beneficial. Many answered simply “*It is beneficial*”. Such answers do not provide any information.

Another example is question 507, why people did not participate. The answer “I am not a member” was sometimes given, but this is not very informative.

Interviewers should be trained to only accept answers that make sense, and that are a response to the question asked. If they receive an answer that does not make sense, they should be instructed to repeat or better explain the question. In case an answer is not very informative, a follow-up question should be asked. For the examples given above, these could be: “But why do you think it is beneficial, how will it help?” or “But why are you not a member of the organisation?”. Attention to such open questions should also be paid by supervisors in the field, and any mistakes should be pointed out to the interviewers immediately to prevent similar mistakes to be made in following interviews.

Having the knowledge of three surveys, some of the open questions might be precoded to save time for the interviewer and to facilitate the analysis. It was sometimes difficult to know what exactly was meant, based on a shortened (and translated) answer of about two or three words. It would be easier for well-trained interviewers to pick from a list of distinguishing and non-overlapping options based on the longer answers of the respondent.

Comments on specific questions

Questions H5, 115 & 116. Some unexplained shifts in the response to the occupation questions were found. This, in combination with an unexpectedly low reliance on fishing raised the concern whether subsistence fishing (and farming) are seen as an “occupation” as referred to in the questions. This should be tested before a new survey is implemented and changes to the phrasing might be necessary.

Questions 212A and 212B. It wasn’t clear which underlying motivation drove the response to the statements “The coral reef/mangrove forest does not need protection!” in the 2010 survey. As described in the main report, no correlation was found between answers about the state of the reef/mangroves and these questions, nor between these questions and the need to demarcate and protect coastal areas. A small pre-test in which the answers to these questions are discussed with the respondents might provide some insights.

Question 214: Creator of environmental problems. First, “outsiders” were not listed as a pre-coded option for this question in 2010, but were often mentioned under the “other” category, and actually formed the most common answer. It is suggested to include this as a pre-coded option. Code 11 was given to this in the analysis, and in the Dashboard. Second, the answer options “people in village” and “fishers” seem to overlap. A clearer distinction might be made (*e.g.*, local fishers; outside fishers,

and other local people in village). This would mean that comparisons with the 2010 survey phase would become more difficult.

Data entry

In the 2010 survey, answers were entered into a database using the actual answers in combination with the coding given to these answers in the questionnaire (e.g., "ya (1)" or "tidak(2)"). A lot of time had to be spent recoding these answers to end up with a numerical database that could be analysed using a statistical programme (SPSS in this case). In the phase two (2006) survey only codes had been entered. While the latter approach is potentially more liable to lead to data entry errors (as it is easier to mistakenly type a "2" when a "1" should have been entered than it is to write "no" instead of "yes"), it would save a lot of data cleaning time. It might therefore be considered beneficial to move back to the data entry approach of phase two (which included data entry restrictions, so only the available answer options could be entered into a cell), while attention is given to hire precise data entry staff.

A further aid to the analysis would be the use of standard codes, such as -99, for answers that are truly missing (not for answers that were not supposed to be answered). If it is possible to enter the data in the field, corrections can sometimes still be made. Even if this is not possible, the identification of true missing values during data entry will save valuable time during the analysis. It requires some level of understanding of the questions by those who perform data entry, or access to knowledgeable supervisors who can be asked in case of doubt.

Questions 201 & 213 about environmental problems. Some inconsistency seems to exist in the responses to these questions. For the different problems presented to the respondent in question 201, there are never more than 10 percent of the respondents, who indicate that these problems are not problems at all. However, when asked about the most important environmental problem in an open question later (Q213) almost 25 percent says there is no big problem. It is not exactly sure why these differences occurred. It might be tested in a pre-test to the next survey round to see if people understand the questions very differently, or if something else is going on.

A final recommendation for the next survey round is to try to reach the target number of interviews in every village (30 household, and 60 individual interviews per villages). Low numbers of observations for different villages in different survey rounds, made it difficult to make robust comparisons between villages and over time. Some of the villages are very small, perhaps making this difficult.



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