

Adoption of socio-cultural norms to increase community compliance in permanent marine reserves in southwest Madagascar

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SUMMARY

Local and co-management approaches are increasingly adopted in marine conservation to increase compliance with rules, which is essential for effective management. Here, we evaluate an innovative approach to increasing compliance with community laws restricting access to permanently closed marine reserves within a locally managed marine area in southwest Madagascar. Drawing upon strong cultural bonds with ancestors and local taboos, permanent reserves were sanctified through a traditional ceremonies in which ancestral benediction was requested during reserve closures. We evaluated the effectiveness of the ceremonies in increasing respect for the rules through structured interviews with 161 fishers and local leaders from 10 villages located near established permanent reserves. Almost half of the respondents believed that respect for the rules is increased by the ceremonies. If this is reflected in actual behaviour change, it will help reduce rule infringement, enforcement costs and social conflict. At a one-off cost of approximately 500 US\$ each, we believe the ceremonies provide value-for-money as a conservation intervention in the context of southwest Madagascar.

BACKGROUND

Fisheries are in decline worldwide as a result of overexploitation, threatening the ecological functioning of the oceans as well as global food security (Myers & Worm 2003, Pauly *et al.* 2002, 2003). In response, scientists at the fifth International Union for the Conservation of Nature (IUCN) World Parks Congress recommended that 20-30% of global marine habitats be protected (IUCN 2005), and the establishment of marine protected areas (MPAs) and permanently closed marine reserves (i.e. no-take zones) have been prioritised in global policy (CBD 2006). However MPAs are often ineffective, especially those established by state governments, failing to meet their objectives despite legal recognition (McClanahan 1999). Management effectiveness largely depends on compliance with rules (Sumaila & Charles 2002, Walmsley & White 2003), and rule enforcement is difficult in marine areas, particularly for governments in developing countries that lack adequate resources.

Partly to overcome these shortcomings, marine conservationists have increasingly adopted a co-management approach to MPA establishment (Granek & Brown 2005, Leslie 2005), in which local communities and resource users are integrated into planning and management. The aim of co-management is to minimise conflicts between advocates of conservation and resource use, and to increase the legitimacy and acceptance of MPAs by promoting local ownership, both of which serve to increase compliance with rules (Gutierrez *et al.* 2011). Further, local stakeholders can assist with enforcement of rules, which may be critical when other resources for control and surveillance are lacking (Cinner *et al.* 2005, Lundquist & Granek 2005).

The integration of customary management institutions, such as taboos, into modern marine management has attracted much attention worldwide (reviewed in Cinner & Aswani 2007), because compliance in such areas has been shown to be higher than in either community- or state-managed protected areas (Berkes *et al.* 2000, McClanahan *et al.* 2006). Of most interest

to conservationists are 'resource and habitat taboos' (Colding & Folke 2001) which, while they may not have a conservation objective, can provide conservation services by restricting resource use. In this paper, we present a case study of a locally managed marine area in southwest Madagascar where ancestral ceremonies were carried out to sanctify the creation of permanent (no take) reef reserves, and evaluate the effectiveness of the ceremonies in increasing respect for rules using structured interviews with local fishers. This case study notably differs from those reported in other literature, as it is not based on the 'absorption' of an existing customary institution into a hybrid management intervention, but instead on the adoption of a socio-cultural institution not associated with resource use to sanctify a modern conservation institution.

Velondriake is the largest locally managed marine area in the western Indian Ocean at nearly 1,000 km² (Harris 2011) and is home to approximately 7500 semi-nomadic Vezo, a seafaring people who depend on marine and coastal resources for their daily subsistence, income, and cultural identity (Astuti 1995). Uniting 25 coastal villages in the collaborative management of marine and coastal resources, it is legally recognised as a protected area (IUCN category V) within Madagascar's expanded protected area system, and was granted temporary protected status by inter-ministerial decree in 2010; definitive protected status is expected by the end of 2012. Vondriake originated in 2004 as an initiative to improve the sustainability of the (Harris 2007). The management of the locally managed marine area has since expanded to include a range of further resource management interventions such as temporary mangrove closures, aquaculture (algae and sea cucumber) development, and the establishment of permanent reserves in coral reef areas, in which the extraction of all resources is banned.

Velondriake is managed by the Velondriake Association, an elected body including representatives from each of the participating villages, which receives technical and financial support from the British non-governmental organisation, Blue Ventures. A committee composed of representatives from the provincial government, private fisheries aquaculture and hotel operators, together with marine conservation organisations,

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provides oversight and reviews changes to the management plan. The primary governance tool is the *dina* (see Henkels 1999), a set of local laws that regulate resource use within the locally managed marine area. Developed by the member communities of Velondriake themselves but ratified by the Malagasy regional court system in 2006 to become legally binding (Andriamalala & Gardner 2010), the *dina* bans the use of destructive fishing practices (poison fishing, beach seining and overturning live coral) within the entire area, regulates the closures of temporary octopus and mangrove reserves, and governs permanent reef reserves (Andriamalala *et al.* in review). The *dina* gives primary enforcement and conflict resolution powers to local communities, allowing them to impose fines for *dina* infractions and call upon the regional court system in cases where conflicts cannot be resolved internally.

ACTION

Permanent reserve creation and ceremonies: The six permanent marine reserves within the locally managed marine area (Table 1) serve as core protected areas, from which no extraction is allowed. These areas were identified via a participatory process, with local communities, during which fishers proposed areas they were willing to put into protection. Scientists then assessed these areas for marine health and ecological protection benefit (Cripps & Harris 2009). The location of the reserves was finally agreed in 2009, spread across the locally managed marine area's reefs and encompassing a total area of approximately 80ha (0.8 km²) (Figure 1). Taking advantage of an existing area with a taboo, one reserve (Ambatohalaomby) was zoned specifically to incorporate a fady (taboo) underwater cave.

Although the *dina* legally restricts activities within the permanent reserves, the Velondriake Association sought to increase compliance and further legitimise the reserves by carrying out ancestral ceremonies (*fomban-draza*) to mark their establishment. One of the oldest and most respected male elders in the central village of Andavadoaka, a long-standing supporter of marine conservation efforts, presided over the ceremony marking the first permanent reserve closure in August 2009. Since then, elders in the other villages with permanent reserves have followed his lead and conducted the closure ceremonies.

Ancestral ceremonies, such as these, are common when undertaking anything of significance within Vezo culture (Astuti 1995, Langley 2006). For example, it is common to ask for ancestral benediction for a new boat or house, or before setting out on a long fishing journey. Incorporating an ancestral blessing for the permanent reserves was therefore straightforward for both the Velondriake Association and the communities involved. Similar, though much smaller, ancestral ceremonies were already being conducted by the Association

Table 1. Permanent marine reserves within the Velondriake locally managed marine area

Name of Reserve	Reserve size (ha)	Date officially closed
Agnorondriake	20	August 2009
Ankiroma Atsatsa	10	June 2010
Ankafotiambe	10	November 2011
Anjivampase	10	November 2011
Belovo	10	November 2010
Ambatohalaomby	20	May 2010

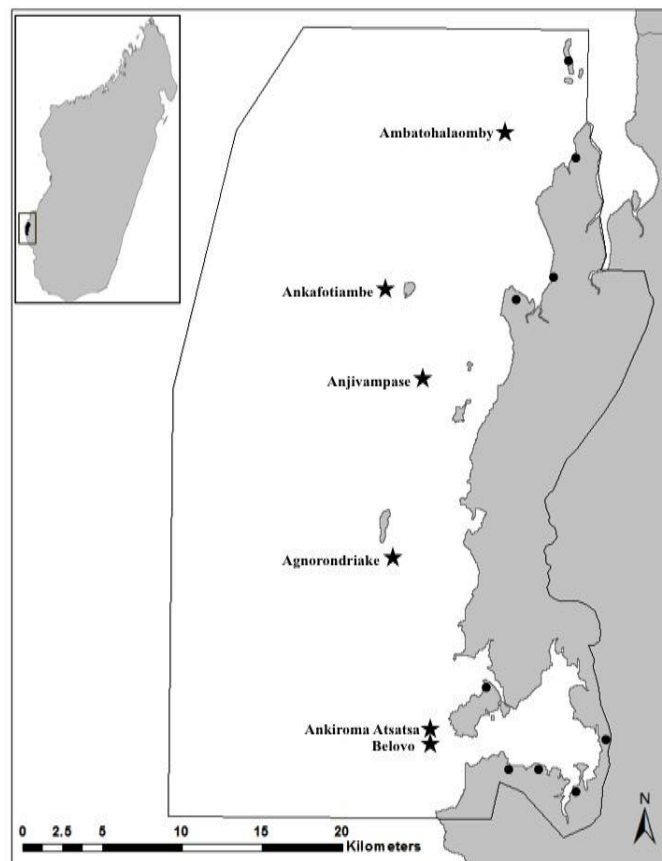


Figure 1. Map of the Velondriake locally managed marine area (solid line) showing location of permanent marine reserves (stars) and surveyed villages (circles). Inset shows location of Velondriake locally managed marine area in Madagascar.

for temporary octopus fisheries closures each year. The ceremony process for the permanent reserves begins with a visit to an elder in the village where the reserve is located. This elder can be male or female, and is possessed by *tromba*, which allows him or her to consult with the ancestors to choose an auspicious date for the closure. This process also relays information about the specification of the cow to be sacrificed during the ceremony - for example, brown with a white spot somewhere on the head. On the chosen day, the ceremony to mark the official closure of a reserve begins with a village assembly where the spiritual elder proclaims the area protected. If the ancestors disapprove of this designation, a small accident will befall the elder. Such an occurrence would be taken to signify the ancestors' dissatisfaction or disapproval with the designation, and if no such mishap occurs it is assumed that the ancestors have given their blessing to the creation of the reserve. The chosen cow is then sacrificed in the village and its blood is often applied to one of the reserve's demarcating marker buoys before it is deployed at sea. Following the ceremony, village leaders and Velondriake Association representatives transfer the four buoys and anchors out to the reserve. Just before lowering the buoys' anchors, an offering of rum and soda is poured into the water and another request is made to the ancestors for blessings and a fruitful reserve. The rum must be dark, as the colour red is sacred and used for anything related to the ancestors, while soda must be provided for those ancestors who do not drink alcohol.

Evaluation: In order to evaluate the effectiveness of ancestral ceremonies in increasing compliance with rules regulating permanent reserves, we carried out 161 structured

interviews with male and female fishers and village leaders from 10 of the 25 villages within Velondriake. Fishers and leaders were chosen as interviewees because they are the most familiar with the reserves and the rules governing them; sampling was therefore purposive to ensure that only target groups were interviewed. The number of interviews carried out ranged from 9-27 per village, in approximate proportion to the size of the village. Interviews were conducted during January 2012 to ensure that migrant fishers, who spend up to ten months to the north of Velondriake but return to the area over the austral summer cyclone season, were included in the survey. Local surveyors, who were trained and supervised by a social survey technician, carried out interviews in the Vezo dialect.

We avoided directly asking those interviewed about their own behaviour with regards to the permanent reserves in order to avoid defensive reactions. Instead, we asked for their perceptions of the community's general attitudes and behaviour. To assess knowledge of the reserves and the *dina* that governs them, respondents were asked to describe the rules and comment on how well they were respected. They were then asked to explain why they thought people respect the rules. We then asked a series of questions about the ancestral ceremonies conducted during reserve closures, focusing on why they were carried out and of what they were comprised. Finally, informants were asked whether they thought the ceremony had any impact on how well people now respected the reserves and comply with the *dina*. We used chi-square contingency tables to test for differences in responses between migrant and non-migrant fishers, and between men and women.

CONSEQUENCES

Table 2 presents the results of the survey. Interviewee responses indicate that regulations pertaining to the reserves are well known; over 90% of respondents correctly identified the rules governing the reserves, citing restrictions on harvesting and the *dina*, and while only 5% were able to correctly identify the fine for infringements of the *dina* (200,000 MGA and a cow), over 90% stated that the fine consisted of money, a cow, or both. Over 90% of respondents named the local community and/or the Velondriake Association as the entity responsible for establishing the reserves and associated rules, suggesting a high degree of community ownership; only 1.8% stated that Blue Ventures were responsible in any capacity.

The majority of respondents (95%) believed that rules governing the reserves are respected, citing the *dina* (61.5%) and a desire to conserve resources (20.5%) as the principle reasons for this respect; a further 4.3% stated that the rules are respected because they stem from a community decision to establish the reserves. All respondents who answered the question were aware that ancestral ceremonies had been conducted during establishment of the reserves, and that these ceremonies had consisted of a sacrifice of a cow and/or an offering of rum. Over half of respondents stated that the ceremonies were performed in order to ask for ancestral blessing for the reserves or tell the ancestors about them, while a further 16.8% stated that the ceremonies serve to make the reserves more important or taboo. When we asked whether, in addition to the payment of a fine, anything else would happen to a transgressor as a result of a reserve infraction, little over half of respondents were able to respond. Of those providing

an answer, the majority stated that the transgressor would either be arrested or taken to some form of authority, such as the Velondriake Association, local authorities, or Blue Ventures. None of the 161 respondents stated that a transgressor would suffer any form of ancestral retribution.

Respondents were approximately evenly split in their opinions as to whether the ancestral ceremonies increased local respect for the reserves' rules, with 46.6% of those providing an answer believing that respect was increased, and 53.4% stating that it was not. Of those stating that the ceremonies did increase respect, over half cited fear of the ancestors as the reason, while a further 30.9% provided similar justifications, stating that it is because the areas are taboo, blessed or sacred. Amongst respondents who did not believe that the ancestral ceremonies result in increased respect for the rules, almost all (97.4%) stated that people are more scared of the *dina* than of the ancestors, and that is the *dina*, rather than fear of the ancestors, that prevents people from infringing on reserve rules. There were no significant differences between the responses of migrant and non-migrant fishers, and between men and women, with regards to knowledge of the *dina* or beliefs about the effects of ancestral ceremonies on respect for the rules (Table 3).

DISCUSSION

Our survey was designed to investigate whether holding ancestral ceremonies to sanctify marine reserves conferred any additional respect for their rules, over and above the respect already shown to the *dina*. The results are inconclusive; while almost all respondents were aware that ceremonies had taken place and what they consisted of, less than half of respondents were of the opinion that respect for the rules had increased as a result of them. Of those that did not believe that respect increased, almost all stated that they were more scared of the *dina* than of the ancestors, suggesting that an additional layer of 'protection' as a result of the ceremonies was not required, because the *dina* itself already accorded sufficient protection to the reserves.

Amongst respondents who believed that the ceremonies did increase respect for the reserves, over 50% stated that this was due to fear of the ancestors, while a further 31% believed that respect increased as a result of the sacred, blessed or taboo nature of the sites following the ceremonies. Prior to asking about ceremonies, we asked respondents whether, in addition to paying a fine, anything else would happen to transgressors caught breaking reserve rules. This question was designed to investigate whether respondents believed they might suffer some form of misfortune or ancestral retribution, but no such responses were provided. While the lack of responses pertaining to the ancestors is inconsistent with later responses, it may have arisen as a result of misunderstanding the question, or associating the question only with the 'worldly realm' of rule enforcement.

The results of our survey do not provide clear evidence of the utility of ancestral ceremonies in increasing compliance with rules because they are based on users' self-reported perceptions rather than actual behaviour. Monitoring of *dina* infractions by the Velondriake Association is continuing, but an empirical investigation of the effect of ancestral ceremonies is not possible because no before and after time series is available due to ceremonies being held during reserve closures, and no control sites exist since ceremonies were performed for all reserves. Despite the lack of empirical evidence, we believe

Table 2. Responses of 161 interviewees from 10 villages of Velondriake during January 2012.

1	What is the rule governing permanent reserves?	Cannot harvest	Cannot enter	Dina	Did not answer				
		79.5%	0.6%	10.6%	9.3%				
2	Who established these rules?	Velondriake Association	Community	Community & VA	BV	VA & BV	BV & Community	Did not answer	
		33.5%	34.8%	23.6%	0.6%	0.6%	0.6%	6.2%	
3	Do you think people respect these rules?	Yes	No	Did not answer					
		94.4%	0.6%	5.0%					
4	Why do people respect these rules?	Dina	Conservation	Dina & conservation	Distance to reserve	Fear	Community decision	Did not answer	
		61.5%	20.5%	1.9%	1.2%	3.1%	4.3%	7.5%	
5	What is the fine for someone caught infringing reserve rules?	Correct answer (200, 000 MGA and cow)	Money and cow, but incorrect amount	Cow only	Money only	Did not answer			
		5.0%	23.0%	1.2%	62.7%	8.1%			
6	Would anything else happen in addition to paying the fine?	Arrest by Gendarmerie	Velondriake foibe	Taken to authorities	Taken to BV	Nothing	Other	Did not answer	
		24.8%	12.4%	9.3%	1.2%	1.2%	4.3%	46.6%	
7	Was an ancestral ceremony performed when the reserves were created?	Yes	No	Did not answer					
		93.8%	0%	6.2%					
8	What did the ceremony consist of?	Sacrifice or blessing with cow and /or rum	Did not answer						
		91.3%	8.7%						
9	Why was the ceremony performed?	Ask/tell ancestors	Tell people about the reserve	Inaugurate the reserve	To make the reserve more important	Conservation	To scare people	To make it taboo	Did not answer
		52.8%	2.5%	2.5%	11.2%	9.3%	2.5%	5.6%	13.7%
10	Did the ceremony increase people's respect for the reserve rules?	Yes	No	Did not answer					
		42.2%	48.4%	9.3%					
11	Why did the ceremony increase respect? [for those answering yes to question 10]	Fear of ancestors and dina	Fear of ancestors	Fear of dina	It is blessed/sacred	Fear of taboo	Did not answer		
		7.4%	51.5%	5.9%	11.8%	19.1%	4.4%		
12	Why did the ceremony not increase respect? [for those answering no to question 10]	Greater fear of dina	Fear of ancestors	Did not answer					
		97.4%	1.3%	1.3%					

that holding ancestral ceremonies provides value-for-money as a conservation intervention. Each ceremony cost approximately 500 US\$ (primarily for the cost of the sacrificial cow), funded by Blue Ventures. While this is a substantial initial outlay, over the long-term, enforcement costs should be greatly reduced. If, as reported, almost half of respondents are more likely to respect rules of the reserve, then we can expect a concomitant reduction in *dina* infractions compared to a situation in which no ceremonies had taken place. It should be noted, however, that this expense could not likely be borne by the Velondriake Association, and large ceremonies like these are therefore dependent on outside funding.

Fewer infractions will not only improve the effectiveness of the reserves in conserving biodiversity and increasing harvestable biomass in adjacent fishing areas, but also result in reduced social conflict between those that apply the *dina* and those that transgress it, and reduced costs of *dina* enforcement. Further, the ancestral ceremonies may have increased a sense of community ownership over the reserves, which our data demonstrate is already high (with 92% of respondents stating that the rules were established by the community or the Velondriake Association); but we did not investigate this in our survey. Finally, the cultural protection afforded the sites through the ceremonies may increase the long-term viability of the reserves and their rules as institutions, rendering them less dependent on outside finance and enforcement, and more resilient to potential future changes to government conservation policy (i.e. if the Velondriake protected area was de-gazetted). Nevertheless, customary institutions worldwide remain vulnerable to socioeconomic change such as population growth, modernization and economic development (Cinner & Aswani 2007, Jones *et al.* 2008, Negi 2010).

This case study contributes to the literature on the integration of customary and contemporary conservation institutions. While it is common for conservationists to incorporate pre-existing cultural institutions into modern conservation interventions (Cinner & Aswani 2007, Wild & McLeod 2008), such as including sacred forests within new protected areas in Madagascar (Gardner *et al.* 2008), few examples exist of cultural institutions being used to reinforce or sanctify institutions established purely for conservation. Ormsby and Bhagwat (2010) report a case from northern India where, frustrated by the continual transgressions of local people into a conservation area, forest officers performed a traditional ceremony by sprinkling saffron water around the site and found that this increased respect for its boundaries. In

southern Madagascar, the conservation NGO WWF has used ritual ceremonies to elevate the endemic tree *Alluaudia ascendens* to the status of *razan-keta* or heritage tree (WWF 2008), but no information is available about the outcome of the approach.

The case study also provides insight into Malagasy cultural institutions and their potential to contribute to conservation goals. This topic that has attracted much attention since the government launched its 'Durban Vision' to triple the coverage of the national protected area system in 2003 with the objectives, among others, of conserving the country's endemic biodiversity and cultural heritage (Commission SAPM 2006). Cinner (2007) states that Malagasy taboos (*fady* or *faly*) are highly inflexible and that attempts to incorporate them into contemporary conservation initiatives have met with little success. While not dealing specifically with *fady*, our case study demonstrates that Malagasy cultural institutions can be successfully utilised in conservation interventions. Jones *et al.* (2008) found that, in the eastern rainforests of Madagascar, the imposition of external conservation rules served to weaken customary management institutions that previously performed conservation services. The Velondriake case differs in that, while the intervention was catalysed by outsiders, the planning, establishment and management of the locally managed marine area have been fully participatory since the start. This suggests that externally-initiated conservation interventions do not necessarily erode local customary institutions if management is fully participatory, and indeed that conservation actions can serve to reinvigorate local customs.

Community-based conservation management is likely to continue to increase in popularity around the world as part of local efforts to reach conservation goals. Innovative and creative solutions to increase compliance with rules or laws should be sought, particularly those that are culturally-sensitive and therefore more easily incorporated into society. This requires managers and partner organisations to be well aware of local institutions and conventions that could be applied to conservation activities.

ACKNOWLEDGEMENTS

The authors are grateful to Emma Shephard-Walwyn, Nigel Dudley and Flavien Rebara for information on other cases; to Gildas Andriamalala, Shawn Peabody and Alasdair Harris for ideas, guidance, and constructive comments that

Table 3. Demographic breakdown of 161 respondents in 10 villages of Velondriake during January 2012.

	Migrants	Non-Migrants	Men	Women
Number surveyed	59	98	97	64
Percent of all surveyed	37%	61%	60%	40%
Percent who migrate	100%	0%	46%	14%
Able to identify at least one rule	97%	82%	92%	83%
Aware of ceremony (of those that answered this question)	100%	100%	100%	100%
Believe ceremony increased respect (of those aware of ceremony and answered this question)	38%	51%	47%	31%
Believe ceremony did not increase respect (of those aware of ceremony and answered this question)	59%	46%	50%	54%

helped improve an earlier version of the manuscript; and to the Velondriake Association for their conservation leadership.

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