

# Integrating family planning service provision into community-based marine conservation

ALASDAIR HARRIS, VIK MOHAN, MAGGIE FLANAGAN and REBECCA HILL

**Abstract** Human population growth is one of the primary drivers of biodiversity loss. Throughout much of the developing world growth of human populations is occurring in part as a result of a lack of access to sexual and reproductive health services, and this is having profoundly negative impacts on biodiversity and natural resource-dependent livelihoods. We present experiences of the incorporation of sexual and reproductive health services within a pre-existing community-based marine conservation initiative in Madagascar as part of an integrated population, health and environment (PHE) programme. Our results demonstrate the considerable demand for, and lack of social barriers to, the introduction of sexual and reproductive health services in this region. These findings emphasize the mutually beneficial synergies, supporting both public health and conservation objectives, which can be created by integrating sexual and reproductive health services into more conventional biodiversity conservation activities. This PHE approach demonstrates the inextricable link between reproductive health and resource use by providing practical, immediate and lasting benefits to public health, gender equity, food security and biodiversity conservation.

**Keywords** Coral reefs, family planning, locally-managed marine area, Madagascar, marine protected area, PHE, sexual and reproductive health services

## Introduction

Population and conservation in Madagascar

Madagascar, amongst the hottest of the hot global biodiversity hotspots, exhibits exceptional concentrations of endemic species threatened by habitat loss (Brooks et al., 2006). Unusually for a sub-Saharan African economy, prior to the 2009 military-backed overthrow of the elected government, biodiversity conservation topped the country's donor agenda, with the NGO and international donor community investing heavily in natural

resource management (Horning, 2008). Conservation efforts and mechanisms for sustainable financing of biodiversity conservation, including incentive-based policies and progress towards implementing reducing emissions from deforestation and forest degradation programmes, rank amongst the most progressive in the world (Ferguson, 2009). Multilateral investment in the third phase of Madagascar's National Environmental Action Plan from 2003 to 2008 was c. USD 170 million, with > 70% of externally-generated funds being permanently granted with no requirement for donor repayment. Given the scale of investment the country's powerful donor consortium, comprising bilateral donors, international conservation NGOs and international finance institutions, has played a major role in influencing and promoting Madagascar's environmental policies over the last decade (Horning, 2008; Freudenberger, 2010).

The country also has one of the poorest and fastest-growing populations, > 50% of which depends on exploiting forests and other natural resources for livelihoods (Horning, 2008). Approximately 85% of the population lives in poverty (INSTAT, 2007) and GDP per capita has declined steadily since independence, having never exceeded USD 410 (Horning, 2008). Persistent food insecurity affects 65% of the population (Black-Michaud et al., 2009), > 50% of children < 5 years of age suffer stunted growth because of a chronically inadequate diet (INSTAT & ICF Macro, 2010), and droughts and rising prices for basic necessities in southern Madagascar since 2008 have left many vulnerable families in need of food assistance. With an average fertility rate of 4.8 births per woman and a heavily positively skewed population structure, > 47% of the country's population is < 15 years of age (INSTAT & ICF Macro, 2010), resulting in a population growth rate of 2.8% for 2000–2008 (UNICEF, 2010a). Only 29% of women who are married or in a sexual relationship have access to modern contraception despite the existence of government programmes to promote universal access to family planning and widespread acknowledgement of the effect of human demographic trends on the environment and economic development (MAP, 2007; INSTAT & ICF Macro, 2010). Nationally the incidence of childhood poverty is strongly positively correlated with the number of children in a household (UNICEF, 2010b).

Growth of the country's coastal populations is taking place more rapidly than across the island as a whole, with population doubling times in the coastal south-western

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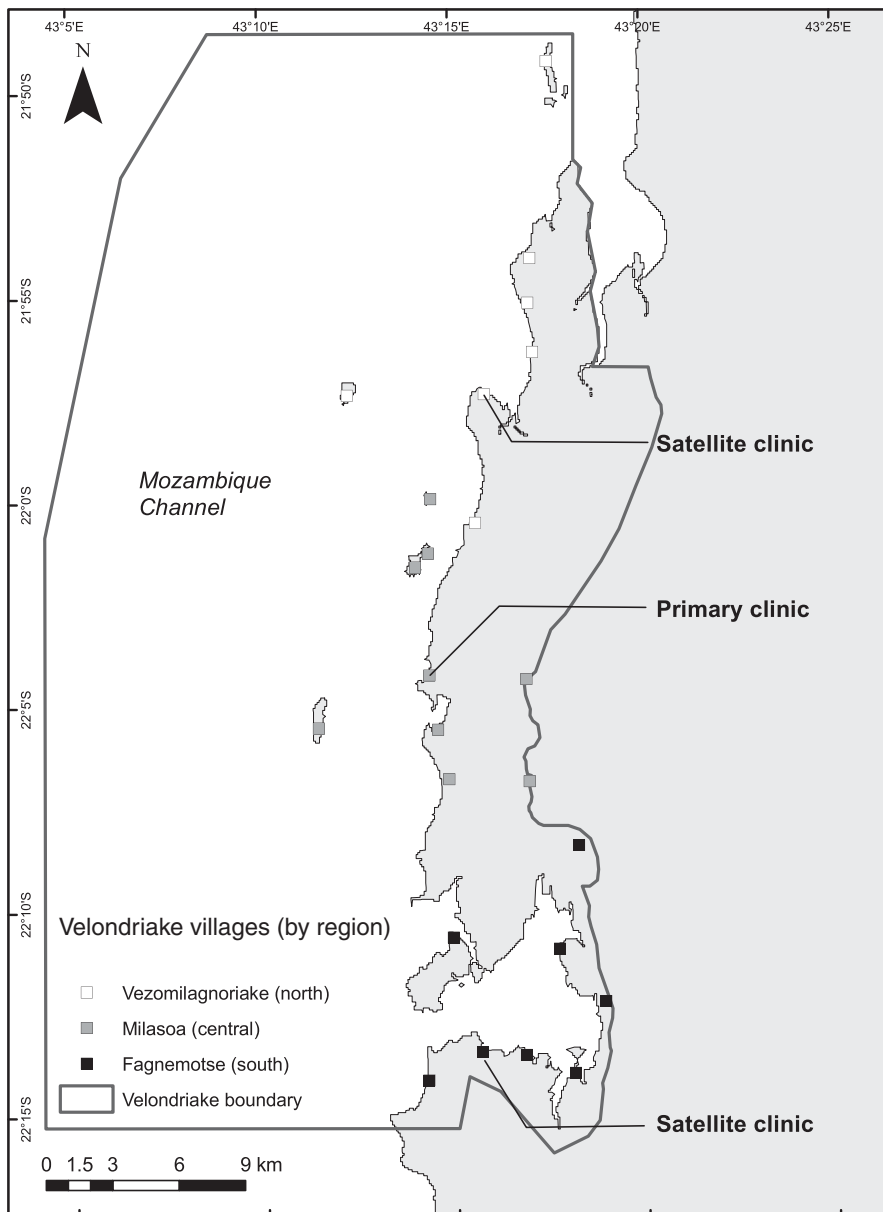


FIG. 1 The Velondriake locally-managed marine area in south-west Madagascar, showing location of villages, by region, and the three family planning clinics.

region of Atsimo Andrefana, the focus of this study, being c. 10–15 years, and women giving birth to a mean of 6.2 children (INSTAT & ICF Macro, 2010). In this region >56% of adolescent girls (aged 15–19 years; the group at highest risk of infant or maternal mortality) have children or are pregnant, and only 20% of women aged 15–49 use a modern method of contraception (INSTAT & ICF Macro, 2010). The region's population increased by 53% over 1993–2008 and is forecast to increase by a further 49% over the next 14 years (INSTAT, 2007). The Atsimo Andrefana region also has the highest level of childhood poverty of all of Madagascar's 22 provinces, with 86% of children living in households earning under the UN's poverty line of USD 2 per day, and 68.7% of the region's children enduring food poverty (UNICEF, 2010b).

Velondriake, an integrated approach to community-based coastal conservation

Marine and coastal research and conservation activities have been developed in and around the remote village of Andavadoaka, in the Atsimo Andrefana region, since 2003 (Fig. 1). This region has extensive coral reefs, mangroves and seagrass ecosystems. These habitats are critical to the livelihoods and income of the region's coastal Vezo population, a semi-nomadic people whose cultural identity and way of life are characterized by a fishing and seafaring existence. The region's geographical isolation, lack of transport or communication infrastructure, together with the arid climate and low agricultural productivity, mean that communities have few economic or subsistence alternatives to traditional fishing and reef gleaning (Harris, 2007).

Marine conservation efforts in Andavadoaka have culminated in the development of Velondriake, a locally-managed marine area encompassing Andavadoaka and 23 surrounding villages whose total population in 2009 was c. 7,260 (Blue Ventures, unpubl. data). The locally-managed marine area covers 40 km of coastline within a total area of > 800 km<sup>2</sup>, predominantly in the coastal commune of Befandefa (Fig. 1; Harris, 2007). Development of this locally-managed marine area has coincided with the introduction of ecotourism, environmental education and community-based holothurian and seaweed aquaculture initiatives designed to provide socially and economically viable alternatives to fishing. The aim of these activities is to reduce poverty, promote sustainable use of the region's vulnerable marine and coastal resources, and in doing so protect Velondriake's threatened marine and coastal biodiversity. These initiatives are led and managed by the locally-elected Velondriake Committee, and are supported and financed by Blue Ventures, an international marine conservation NGO active in the region.

Since 2007 studies have been carried out to understand attitudes to sexual and reproductive health in Velondriake and to assess the extent of unmet needs for family planning. In 2007 couples had little or no access to contraceptive services, or to sexual and reproductive health education. Key informant interviews and informal discussions with community members indicated that condom availability, awareness of issues relating to sexual and reproductive health, and use of contraception were very low. Of the 24 coastal and island villages incorporated within the Velondriake locally-managed marine area condoms were available only in the central village of Andavadoaka. Surveys showed that most girls in the region became pregnant before the age of 16, with 20% of births in the previous year being from mothers under the age of 18 (Blue Ventures, unpubl. data). Families are typically very large, the local maximum being 21 children born to one woman, despite women indicating in focus groups that they do not plan or want to have such large families.

The limited access to contraceptives, combined with a total absence of formal education about sexual and reproductive health, has resulted in the proliferation of misinformation about family planning, including specific concerns such as fears about the safety of hormonal contraception, and speculations that condom use is part of a government conspiracy to promote permanent infertility in rural women. Despite such misconceptions, Velondriake communities generally expressed a need for sexual and reproductive health services and early discussions identified a broad absence of taboos, social barriers or resistance to the distribution of contraception.

The lack of availability of sexual and reproductive health services has profound impacts on maternal and infant health throughout Velondriake and places a huge economic

burden on families. Moreover this problem is directly responsible for gender inequality and marginalization of women in the region, resulting in severe social and economic problems, including reduced development and a paucity of economic opportunities for women. Indirectly these demographic trends pose a severe threat to the sustainability of the region's coral reefs and other marine environments, the health of which has declined dramatically in recent decades (Harris et al., 2010) yet upon which the livelihoods, cultures and economic well-being of many coastal communities depend.

Here we present findings from efforts to integrate provision of sexual and reproductive health services into existing community-based marine conservation activities in Velondriake between 2007 and 2010, presenting results of clinical data and discussing synergies with other biodiversity conservation interventions, and the broader implications of the lessons learned from adopting this integrated approach.

## Methods

### Development of an integrated population, health and environment (PHE) programme

Building on preliminary discussions with community members, a sexual and reproductive health initiative was launched in August 2007 to address the challenges of human population pressures amongst Vezo communities in Velondriake. This was undertaken with approval of community leaders, government health institutions and national public health NGOs. The aim of this health initiative was to address the region's unmet need for family planning services, to reduce the rate of unwanted pregnancies and to enable couples to plan their family size and space their children; a stated goal of the last elected government's *Madagascar Action Plan* (MAP, 2007).

This health initiative was integrated as a permanent core activity alongside ongoing conservation and research activities being undertaken by Blue Ventures in Velondriake, resulting in the formation of an integrated PHE programme within which all activities, from protected area development to aquaculture and public health, were closely coordinated to ensure consistency of messaging and strong collaboration between related initiatives. In its first 2 years of operation the sexual and reproductive health project established and maintained a weekly drop-in family planning clinic serving the needs of the village of Andavadoaka, in the geographical centre of Velondriake. In the third year this clinic was expanded to two additional sites in the north and south of the locally-managed marine area, with all three clinics (Fig. 1) providing services accessible within a day's local transport of all 24 villages within this area.

Clinics were run by trained technicians supervised by specialist family planning medical physicians, and provided contraceptive services and education to women. The clinics offered two types of hormonal oral contraceptives (combined oral and progestogen only), hormonal injections (commonly known as depo-provera), condoms, and long-acting reversible contraceptive implants (implanon, a subdermal contraceptive implant providing 3 years of continuous contraception; and intra-uterine contraceptive devices providing up to 5 years of continuous contraception). Long-acting reversible contraceptives were only introduced in the third year of the programme. As well as serving to broaden the range of contraceptive services on offer, long-acting reversible contraceptives help overcome the significant logistical and resource challenges of providing contraceptive services to remote communities in the region, many of which are only accessible by sea.

Clients contributed to the costs of the contraception (MGA 600, c. USD 0.30, for a 3-month supply of hormonal contraception), which were heavily subsidized and supplied through partner public health NGOs and state health agencies. Women also received counselling at the clinics, entailing a one-to-one introduction to the benefits of family planning to women, children and families, and a full discussion of the range of contraceptive options available. During counselling sessions clinicians helped each woman build a birth plan tailored to her personal choices.

### Monitoring and analysis

Consultation records were kept by the clinical team to enable monitoring and evaluation of clinic activities over the first 3 years of the programme, from August 2007 until July 2010. Records covered the number of services provided and contraceptive methods supplied and the couple-years of protection (CYP) delivered within Velondriake. CYP is a commonly-used measurement of the outcome of a family planning programme, with one CYP being equivalent to 1 year of protection from unintended pregnancy for one couple (Corby et al., 2009), calculated by multiplying the quantity of each contraceptive method distributed to clients by a conversion factor (Stover et al., 2000) to yield an estimate of the duration of contraceptive protection provided per unit of that method. CYP values did not take into account condom use, and should therefore be considered to be conservative underestimates of the true values.

The broader demographic and health impacts of the sexual and reproductive health services programme were analysed using validated formulae and models in the MSI Impact Calculator (Corby et al., 2009). This family planning impact analysis tool enabled estimation of the number of pregnancies and births averted, the number of infant and

under-five mortalities averted, and the number of abortions and unsafe abortions averted. The cost saving impacts of the project were modelled using the MSI Impact Calculator to estimate the costs saved to individual households and national budgets as a result of the abortions and infant and maternal deaths averted by the project (Corby et al., 2009). The environmental impacts of the sexual and reproductive health services programme were estimated using the same tool to calculate the ecological and carbon footprints prevented as a result of the CYP delivered, based on Madagascar-specific coefficients for the two indicators (WWF, 2008; Corby et al., 2009). Ecological footprint was defined as the sum of all the habitat area required to produce the resources each person consumes, to absorb the wastes emitted when each person uses energy, and to provide space for infrastructure; carbon footprint was defined as the bio-capacity needed to absorb CO<sub>2</sub> emissions from fossil-fuel use and land disturbance other than the portion absorbed by the oceans (Corby et al., 2009). Values are expressed in global ha (hectares with world average biological productivity; WWF, 2008).

### Results

Velondriake's sexual and reproductive health service clinics held 1,743 female client consultations from August 2007 to July 2010. During this period the clinics distributed > 1,065 months of oral contraception, administered 740 depo-provera injections, fitted 97 implanons and four intra-uterine contraceptive devices. The clinics saw a rapid increase in contraception uptake in 2009–2010, in particular with the geographical expansion and introduction of the long-acting reversible contraceptives in this third year. Across the 3 years annual CYP increased dramatically from 39.5 years in year one, to 63.2 years in year two and 361.4 years in the third year of the clinics, resulting in a total CYP of 464.1 years.

Use of clinic services increased during the course of the 3-year project period as satellite clinics were opened beyond the central village Andavadoaka and as awareness of the service availability grew. Impact analysis using the MSI Impact Calculator indicates the contraceptive provision averted over 355 unwanted pregnancies and 88 unsafe abortions (Table 1), resulting in total cost savings of at least USD 50,097 (Table 1). The ecological footprint prevented as a result of this initiative amounted to > 267 global ha.

### Discussion

The substantial and increasing CYP during the course of this 3-year programme confirms the scale of the unmet demand for contraceptive services in the region, as well as the social acceptability and growing awareness of the clinics'

TABLE 1 Demographic and health impacts, cost savings and ecological impact of the Velondriake sexual and reproductive health services programme.

	Pregnancies averted	Maternal deaths averted	Births averted	Infant deaths averted	Unsafe abortions averted	Under fives' deaths averted	Total cost savings (USD)	Ecological footprint prevented (global ha)
Year 1	23.0	0.1	15.7	1.1	5.7	1.8	3,236	17.3
Year 2	36.7	0.1	25.1	1.8	9.1	2.8	5,670	27.6
Year 3	296.1	1.0	202.3	14.2	73.4	22.6	41,692	222.5
<i>Cumulative totals</i>	355.7	1.2	243.1	17.0	88.2	27.2	50,097	267.4

services amongst women within the locally-managed marine area. Prior to 2009 long-term client-specific data for the study period were not retained, which accounts for the focus on the number of client consultations as opposed to the number of clients seen. The observed increase in CYP in 2010 coincided with the geographical expansion of the project in this year and, based on the data available from this period, when monitoring systems were still being developed, it is not possible to disaggregate the data retrospectively by village for the third year. However the data confirm increased uptake between the first and second years, when the clinics were restricted to one village, consistent with clinicians' observations of increasing demand year-on-year within this village.

It is important to note that the values of CYP obtained are based on conservative methods (Stover et al., 2000) and probably significantly underestimate the true extent of contraceptive cover obtained as a result of this programme. Moreover, although the methods used do not account for condom use, this is thought to have increased considerably during the 3-year period, based on supplies provided by the clinics.

The impact statistics derived from the MSI Impact Calculator translate the CYP data into more concrete benefits in terms of demographic, health and environmental impacts, providing an accurate means of evaluating the influence of this project in practical terms that are likely to be more meaningful to communities, conservationists and public health practitioners. These impact data are compelling, and indicate that this initiative has given women in Velondriake an opportunity to make their own reproductive health choices, choosing the number and timing of their children, and reducing the number of unwanted pregnancies. It is widely recognized that women with access to family planning and other health services have healthier and smaller families, on average later in their lives, than women without access to these basic human rights (Engleman, 2009). From the perspective of biodiversity conservation the results are equally persuasive, as the reduction in direct anthropogenic pressure on the region's dwindling marine and coastal resources brought about by this PHE project will

be instrumental in conservation of Velondriake's marine and coastal ecosystems.

By developing reproductive health programmes in parallel with existing conservation efforts the health initiative benefited from established working partnerships and relationships between communities and NGO representatives. As clinic staff worked alongside conservation practitioners involved in supporting Velondriake, working relationships between clinicians, conservationists and community members helped reinforce awareness of related conservation activities. In particular the clinics served to improve contact with groups of women who might not otherwise attend community meetings to discuss conservation issues, thus enabling conservation messages to reach a wider audience.

The role of Velondriake's clinics in engaging women in conservation is of profound importance. Experiences elsewhere in the developing world have shown considerable empirical evidence of the benefits of promoting women's participation in community-based conservation and development (Agarwal, 2009). Yet the goal of achieving inclusive participatory management based on gender equity remains a challenge to many conservation programmes, and women remain underrepresented in biodiversity conservation activities from local to international levels (Edmond, 2008). The developmental potential of communities can only be reached when all citizens are able to play a role in directing their futures. By providing access to sexual and reproductive health services, Velondriake's clinics are empowering women to take control of their own future with expanded life opportunities, whilst also engaging them in conservation. In this way the programme has strong potential to be transformative, not only through its own intrinsic public health and environmental benefits but also through its effects on attitudes, aspirations and self-confidence, all of which are fundamental to helping women participate as key stakeholders in conservation efforts.

Many of the challenges to achieving effective community-based conservation in Velondriake are linked to the difficulties of inter-village communication. The lack of road, electricity, telephone and motorized transport

infrastructure creates enormous communication barriers between villages and is one of the major difficulties encountered by communities in attempts to manage their marine resources collaboratively. It can take up to 2 days to travel by local canoe between certain villages, and consequently synchronization and coordination of activities across the locally-managed marine area is challenging. The necessity of maintaining regular weekly clinics at up to three sites, to ensure clinical services remain accessible to even the remotest villages within the network, provided a new channel for communication between villages. Servicing clinics also created a new opportunity to bring conservation practitioners into communities, working publicly alongside their clinical colleagues, with a frequency and regularity that was not previously feasible.

One of the most pressing threats to resource management in Velondriake is from poaching by fishermen from villages outside the locally-managed marine area, in particular through the use of destructive fishing techniques such as beach seine nets, the practice of which is forbidden by local conventions within Velondriake (Andriamalala & Gardner, 2010). Engaging with these groups has presented a serious challenge to the management committees and conflicts have repeatedly required arbitration by fisheries surveillance and law enforcement agencies. The health initiative has presented a new opportunity for engagement as many women travel into Velondriake from these peripheral villages to receive services available at sexual and reproductive health service clinics, and clinicians occasionally travel to these outer villages.

Integration of the clinics within conservation activities enabled the project's social marketing and awareness raising activities to reach a much broader audience, and at lower cost, than would have been possible had the family planning initiative been introduced independently of concurrent conservation programmes. For example, information about family planning may be integrated within communication and training activities whose primary focus may be on other themes. In its first 3 years of operation annual costs for Velondriake's sexual and reproductive health service activities, including purchase of contraceptives, employment of full-time project personnel, logistics and transport, were < USD 12,000 per annum. This is a modest sum compared to the c. USD 85,000 per annum for maintaining the core natural resource management activities of Velondriake. More detailed analysis will be required to gauge the true cost effectiveness of this sexual and reproductive health services project as a means of achieving conservation objectives but initial observations suggest this strategy represents a highly cost-effective complementary conservation intervention.

As well as improving efficiency and reducing operational costs through economies of scale, this integration of population, health and environment themes enabled

conservationists to illustrate the connections between reproductive health, population growth, food security and the sustainability of resource use. Unwanted population growth represents a huge economic and food security challenge to Velondriake communities. For example, in the case of a family with 16 children on the remote island of Andranomboala, a minimum of 6 kg of fish, 10 cups of rice and 3 kg of cassava are required per day for basic family food, a total cost in 2009 of c. USD 7 per day. On this island there is no freshwater, fuel wood, electricity, motorized transport, telephone, school or communications infrastructure. To purchase the required food, fuel and water (brought by sailing or paddling canoe c. 12 km from the mainland) in 2007 the family needed to catch c. 20 kg of fish per day. Nine family members were able to contribute their skills as fishermen but boats and fishing gear were limited.

By providing sexual and reproductive health services through an integrated PHE approach Blue Ventures has been able to address what Velondriake's communities recognize to be a serious problem affecting both economic and food security and marine resource sustainability. Rapid population growth places unsustainable pressure on the coastal resources upon which the livelihoods and culture of these Vezo communities depend, and fishers commonly express concerns that catches are declining not just because of overfishing but because of the pressures from overpopulation. Prior to the integration of sexual and reproductive health service provision into Velondriake, communities regularly questioned why conservationists working in the region favoured proposing access or gear restrictions, such as the creation of marine reserves or reduction of destructive fishing practices, without helping villages address what many perceived to be the root, local demographic cause of resource degradation. Communities in the region have long recognized that population pressures threaten to undermine ongoing conservation efforts being developed to enable these communities to manage their marine and coastal resources sustainably. The provision of sexual and reproductive health services is thus accepted by Velondriake communities as a logical natural resource management measure, and is seen by many villagers as a more rational, pragmatic and relevant conservation intervention than managing marine resource use through gear restrictions or spatial or temporal access controls.

Given the severely impoverished condition of Vezo communities and the daily challenge of feeding large families from dwindling fisheries, local motivations for the use of family planning services are inevitably more likely to be based on health benefits and short-term economic incentives than on long-term collective planning to bring about more sustainable marine resource use. Unlike other concurrent conservation activities in Velondriake, such as livelihood diversification projects or campaigns to curtail

destructive fishing practices, the perceived health and economic benefits of sexual and reproductive health services are often immediate, enabling couples who take control of their fertility to recognize quickly the impacts of the choices they make. Similarly visible short-term impacts have been seen by Velondriake's communities in response to concurrent efforts to manage local fisheries, and the rapid rewards seen by fishers from seasonal marine no-take-zones have been instrumental in garnering broad community support for expansion of increasingly ambitious fisheries management efforts regionally. Fisheries no-take-zones piloted in Andavadoaka in 2004 were perceived by communities to have been highly effective in enhancing catches, and Andavadoaka's model for short-term fisheries closures has since been replicated by other Vezo communities at > 140 sites along > 300 km of coastline in southern Madagascar (Harris, 2011).

This rapid feedback of the tangible benefits of PHE activities (whether through making birth plans for the future and exercising choice in family planning, or through taking local responsibility for fisheries management) has the potential for facilitating profound and lasting changes in the perceptions of individuals of their ability to influence their futures. Conversely, unrealized expectations and a lack of short-term benefits from conservation interventions have elsewhere been identified as factors leading to failure of conservation initiatives (Songorwa, 1999). Thus the integration of family planning services into conservation activities may prove to be a powerful and compelling demonstration of the short-term benefits of local action in achieving sustainable local marine resource management.

The previously unmet need for sexual and reproductive health services expressed by Velondriake's Vezo communities is not unique to this coastal region. Many of Madagascar's priority biodiversity conservation areas, whether marine or terrestrial, lie in some of the country's remotest and most inaccessible regions, where there is a lack of basic services, including education and public health facilities. In all Madagascar's sites of conservation importance mitigation of threats to biodiversity caused by increasing human impacts and resource-use needs is the dominant theme of biodiversity conservation.

Efforts have been made in similar coastal PHE programmes to measure the added value brought by this integrated approach to conservation (Castro & D'Agnes, 2008; D'Agnes et al., 2010). Yet, despite convincing findings from such studies the incorporation of sexual and reproductive health services into conventional biodiversity conservation activities remains the exception. The experiences of the first 3 years of Velondriake's sexual and reproductive health services programme provide a further compelling case for the potential for this integrated approach to be replicated across other conservation sites where communities face similar challenges and where

women in particular suffer from a lack of means to choose their own family size. Our findings provide a clear indication of the likely synergistic benefits of mainstreaming the PHE approach in terms of achieving public health, social and economic development, and biodiversity conservation objectives.

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