Darwin Initiative Main Project Annual Report

Darwin Project Information

Project Reference	22-016
Project Title	Securing livelihoods, health and biodiversity through seascape-scale sustainable fisheries co-management
Host Country/ies	Madagascar
Contract Holder Institution	Wildlife Conservation Society
Partner institutions	Groupe de Recherches et d'Echanges Technologiques (GRET) Harvard T.H. Chan School of Public Health
Darwin Grant Value	£300,000
Funder (DFID/Defra)	DFID
Start/end dates of project	1st of April 2015 to 30th of September 2017
Reporting period (e.g., Apr 2015 – Mar 2016) and number (e.g., Annual Report 1, 2, 3)	1st of April 2015 to 31st of March 2016 Annual Report 1
Project Leader name	Harvard School of Public Health
Project website/blog/Twitter	-
Report author(s) and date	Stéphanie D'agata (WCS) Aurélie Vogel (GRET) Christopher Golden (Harvard T.H. Chan School of Public Health)

1. Project Rationale

Antongil Bay in northeastern Madagascar, covering an area of 3,660 km^2 embodies the challenge of balancing conservation and development priorities. Being the largest bay in Madagascar with a length of 60km and width of 30km, the Bay supports spectacular coral reefs, 13 marine mammal species, 3 marine turtle species, such as the endangered Green Sea Turtle (*Chelonia mydas*) and the critically endangered Hawksbill Sea Turtle (*Eretmochelys imbricate*), and over 140 fish species, including 19 shark species including the endangered Scalloped Hammerhead (*Sphyrna lewini*).

Currently, around 100,000 poor and mostly rural people live in approximately 100 communities along the 360 km coast and rely strongly on aquatic resources to sustain their health and livelihoods. Fish is their primary source of iron, zinc, vitamin B12 and fatty acids. Nevertheless, these people experience anaemia rates above 40% and stunting rates (short stature from chronic malnutrition) above 30% due to inadequate dietary intake and diet diversity.

Overexploitation due to an increasing human population, decreasing availability of productive agricultural land, destructive fishing practices and lack of compliance with gear restrictions are driving degradation of coastal habitat and the Bay's fisheries, loss of coral reefs and declines in fish and invertebrate abundance. In addition to the biodiversity impacts that will occur if current trends

continue, eventually the Bay will fail to deliver optimal economic and health benefits to local communities if immediate action is not taken.

With this project we aim to reverse the decline in fisheries resources and consequently improve livelihoods, food security and health aspects for 11,000 coastal people dependent upon Antongil Bay's resources, and help to ensure improved sustainable fishing and farming practices that will have an overall positive impact on the marine and terrestrial environment of the Bay. At least 250 coastal households (1,350 people) will benefit from improved rice production, reducing their need to catch and sell fish to purchase rice. In addition, around 250 women will benefit from an additional regular source of income and we aim to improve the nutritional status and reduce the rates of low birth weight for at least 100 measured households (500 people, 250 women and girls). Although we will only measure impact in 100 households, these results will be generalizable to the 11,000 inhabitants of the 24 villages managing LMMAs and over the long term to the entire landscape, affecting a population of 100,000 people.

In addition, the project aims at increasing resources and economic returns from fisheries for coastal communities, through improved management capacities, and an increased engagement of communities and government to reduce overexploitation, illegal fishing and the utilisation of destructive fishing gear.

2. Project Partnerships

Groupe de Recherches et d'Echanges Technologiques (GRET): As part of the project, will provide technical training of farmers to increase rice production, improve diversification of income, especially for women through vegetable farming, poultry raising, and fish processing and marketing in 5 pilot LMMAs. In addition, GRET is helping farmers to shift from erosive slash-and-burn cropping systems in watersheds to more sustainable rice farming practices, thus reducing sedimentation in coastal habitats.

Ministry of Marine Resources and Fisheries (MRHP): Through collaborative efforts with WCS and local natural resource users in 2013, MRHP developed the Antongil Bay Fisheries Co-management Plan (ABFMP), which is the first national-level plan in Madagascar to empower local communities and locally-managed marine areas in securing sustainable fisheries management. Currently, the agreement between MRHP and WCS encompasses: **1)** joint supervision, coordination and monitoring of the implementation process of the ABFMP; **2)** support from the fisheries surveillance centre of MRHP to legalize the control, patrol and monitoring of fisheries activities conducted by community control and surveillance committees including destruction of illegal gears; and **3)** support for local small-scale fishers to apply for and obtain official fishing licenses and facilitation of the issuing of these licenses..

Ministry of Public Health (MSP): WCS has partnered with MSP to provide health status information to garner support for local health initiatives. The MSP Director has guaranteed collaborative efforts with MRHP and the Ministry of the Environment, understanding the environmental underpinning of local health. Representatives from MSP attend project related meetings and support the cooperation and coordination with regional health officials for activities. This positively contributes to the sustainability and long-term support of our work.

Ministry of Agriculture and Rural Development (MINAGRI): Through the Analanjirofo Regional Directorate of Rural Development (DRDR), the MINAGRI collaborates with the project team and GRET in particular to develop environmentally sensitive small-scale agriculture schemes benefitting at least 500 households in the project area. They are also involved in training activities through the Centre for Agricultural Services (CAS), which was created in 2008 to act as a technical partner for farmers by connecting them with service providers and donors. MINAGRI representatives are regularly updated about project activities and outcomes.

Committee for the Sustainable Development of Antongil Bay (PCDDBA): PCDDBA is a Malagasy association that was created in 2003 with the support of WCS. PCDDBA's mission is to ensure the integrity of the biological, ecological, socioeconomic functions of Antongil Bay and promote the sustainable development of its surrounding areas through consistent actions and consultations. PCCDBA brings together local officials, private sector representatives, fishermen and other relevant stakeholders. The collaboration with PCDDBA supports the institutionalization of the prohibition of unsustainable fishing techniques through the "Dina". The 25 community associations managing the

LMMAs are all members of the PCDDBA, and are working with government authorities to ensure law enforcement in the LMMAs. In addition, PCDDBA plays a lead role on advocating the LMMAs interests at local and regional levels and is about to set up a platform to facilitate improved local government engagement and to encourage the regular dialogue among resource users. Specifically, the PCDDBA participates in the ABFMP Steering Committee and co-organizes the Antongil Bay annual LMMA forum.

Harvard T.H. Chan School of Public Health: Through collaboration with the Harvard T.H. Chan School of Public Health, existing research relationships with WCS were strengthened which will enable the project to empirically quantify the current status of livelihood and nutritional dependencies on small-scale fisheries and to calculate the potential nutritional burden of disease averted through sustainable fisheries management. We have successfully installed research extension agents in five villages along the coast of the Antongil Bay to collect continuous data over the course of the project. We are now actively monitoring 230 households and have moved from paper to electronic data collection. This has been enormously useful to remotely monitor the program and catch any errors in data entry or processing. Complementary funding has been received from the Wellcome Trust to further modelling efforts and create the capacity and staffing to run relatively robust and complex models of how changes in access to fisheries will affect human nutrition through a range of future management scenarios, parameterized with on-going data collection efforts.

3. Project Progress

3.1 Progress in carrying out project activities

Output 1 - Nearshore fish and invertebrate abundance are increased and endangered species of sharks and marine turtles are protected

To improve engagement and accountability of all stakeholders in the Antongil Bay Fisheries Co-Management Plan (ABFMP) implementation, the ABFMP Steering Committee organized its first annual meeting in Fenerive Est on 15 July 2015 with 26 participants from the Ministry of Fisheries, WCS, Antongil Bay LMMAs, Madagascar National Parks, Maroantsetra and Mananara Federations of fishers, local authorities and two fishing industry representatives (Réfrigépêche and SPSM). During this event, participants reviewed the progress of the implementation of the ABFMP and reached the following decisions: (1) the need for MRPH to create a database of all traditional fishermen of the Antongil Bay with the support of WCS, (2) the need to develop an MoU between WCS and marine national patrol (CSP-Centre de Surveillance des Pêches)) to facilitate law enforcement activities and (3) an increase in the number of representatives of small-scale fishers in the Committee.

To strengthen the ability of coastal communities to more effectively manage the network of 24 LMMAs, we supported the MRHP to empower the LMMAs to be officially authorized to manage local fishery resources, and in this context 2926 fishing licenses to traditional fishermen of 65 communities were issued, meaning that currently about 75% of traditional fishermen are recorded in official associations and have exclusive access to Antongil Bay marine resources. In addition, we helped MRHP to hold workshops in Mananara in April 27-28 and Maroantsetra in June 2-4, 2015 to develop and adopt tools for LMMA patrols. Volunteer rangers of local communities from 25 LMMAs have been trained in law enforcement best practices by the CSP and received guidelines and an official ranger badge to facilitate their work in the field. This formalization of local rangers by government authorities will sustain this pilot community-led law enforcement model. A training session on fishery management tools was offered to all WCS field staff by a senior fishery expert from 3 to 6 of August 2015 in Antananarivo and specific guidelines were developed to facilitate the work of field staff on supporting the implementation of community-based fisheries management. In September 18-19, three LMMAs meetings were held in the municipalities of Mananara Nord, Antanambe and Manambolosy, and a regional forum of Antongil Bay LMMAs was held in Mananara with the participation of 65 community representatives, the CIRHP (Fisheries Department) in Maroantsetra, the PCDDBA, the Ad'hoc Committee (District, Gendarmerie, National Police), and WCS. In addition, the national LMMA network forum "MIHARI", held its annual meeting in Mananara in October 12-16 regrouping all LMMAs in Madagascar - including Antongil Bay's, NGOs, local, regional and national authorities, NGOs, and other stakeholders.

To raise knowledge and awareness about existing fishing regulations, unsustainability of destructive fishing practices and benefits of LMMAs, a video was produced highlighting community-based fishery management in Maintimbato and Rantohely LMMAs (https://www.youtube.com/watch?v=6ikTP2VPykI) in May 2015 in partnership with UNDP and PCDDBA. On June 2, 2015 in Maroantsetra, a public meeting with representatives of the Antongil Bay LMMAs communities and MRHP was held to raise awareness about ABFMP and fisheries regulations in Antongil Bay. In addition, another meeting with representatives of artisanal fishermen (different from traditional fishermen as artisanal fishermen use motorized boats and target specifically sharks) was held on June 4, 2015 in Maroantsetra with MRHP, CSP, and the Analanjirofo Regional Directorate of Fisheries in order to particularly raise awareness on the existing shark fishing ban in Antongil Bay.

Organize joint community and local authority patrols: five joint patrols by community members and local authorities were organized in 7 LMMAs, which led to the seizure of 28 illegal fishing nets. In addition, a Memorandum of Understanding between WCS and CSP was signed in September 2015 to facilitate the collaboration between the two institutions regarding fishery law enforcement in Antongil Bay.

Conduct reef surveys and fish catch monitoring to assess impacts of LMMA on coral reef health and fisheries: Participatory fish catch landing monitoring (CPUE) was carried out around Antongil Bay with 748 surveys. In addition, reef surveys were conducted in 4 LMMAs in April 2015. For each site, surveys were conducted within the no-take area and just outside of the no-take area. The monitoring indicated that the 4 surveyed LMMAs have reef fish biomass well over the regional average for fished areas (760 kg/ha in Antongil Bay vs. a regional average of 314 kg/ha). Finally, 53 interviews with fishermen from 7 LMMAs were conducted in April 2015 in order to assess the level of poaching and by-catch of endangered marine species (sharks and marine turtles). We found that neither of these species was listed as being caught by local fishers see Outcome Indicator 3). Two reef fish surveys were conducted in the 12 LMMAs in the western part of Antongil Bay in April 2015 and December 2015. Surveys were conducted in no-take areas as well as fishing restricted areas for each site, and based on coral reef fish biomass and coral cover, both of which are indicators for coral reef health. To date, those two years monitoring have allowed us to evaluate our current methodology regarding its feasibility within the local context and regarding potential biases. We are currently adapting the sampling approach as described more fully in Section 9 below. For instance, we are currently assessing the sample design and methodology for the CPUE monitoring so as to improve the precision of the method and reliability of the data collected.

Output 2 - Livelihoods are diversified and food security is improved

Train and support a network of 50 pilot farmers on rice production. Prepare technical leaflets, organise trainings, exchange visits and cropping cycle collective assessments, and facilitate access to equipment to facilitate the adoption of tested and approved practices by 200 additional households: 66 famers (39 during the counter season and 27 during the main season), including 14 women, were trained on improved rice production practices. Among them, 6 farmers applied ameliorated rice cropping system during the counter season and 7 farmers are now testing these practices on their plots during the main season (December 2015-June 2016). The inauguration of the Micro-Irrigated-Perimeter (MIP) that is located in Hoalampano was organized on March 24, 2016. Thanks to the rehabilitation work, the irrigated area grew from 4ha to 7ha. The number of water users grew from 46 to 75, who are now able to intensify their rice production. A technical study is actually on-going to assess the feasibility of MIP extension.

Train 2 village vaccinators in each site to organize vaccination campaign and perform injections. Support the creation of a village vaccinators network to organise the vaccines supply: 4 village vaccinators were trained to perform injections and collect vaccine bottles at the GRET office in Mananara. They were provided with iceboxes to store vaccines during transportation. During the year, one vaccination campaign was organized by trained vaccinators and a total of 650 chickens were vaccinated against avian pasteurellosis (“avian cholera”) and Newcastle disease.

Identify vulnerable households/women and give them technical and financial support (but with a financial share form beneficiary) to develop a new income generating activity (gardening or production of smoked fish). Implement two supply-chain studies to define a strategy to improve the commercialization of these products, targeting the local market: Terms of reference were elaborated for a study on the fish supply-chain and submitted by three different experts. However, due to the remoteness of the area, only one consultant submitted a technical offer, which was rejected by the two evaluators from GRET and WCS. Thus, a new consultation will be organized soon. In addition, meetings were organized with women fish wholesalers and transformers to choose the selection criteria for the new fish smoking oven to be built.

Provide training and technical support (with regular visits from field agents) on production, processing and/or marketing of products to at least 250 women. Organize exchange visits among women and support them to get organized to facilitate marketing: 9 people, including 6 women, were trained on vegetable gardening. They were provided with seeds (tomato and leafy green leaves vegetable) and started their first growing season, which will be harvested in June 2016.

Output 3 - The human health and livelihood effects in local populations are determined by analysing linkages between expected improvements in dietary intake, nutritional status and commercial transactions and observing the role of fisheries co-management in facilitating these health effects in 100 households across five LMMAs

In five communities adjacent to the LMMAs, train female heads of households to record their diets using kitchen scales into standardized dietary journals.
Data collection was started in September 2015. As noted in our Half-year Report from October 2015, we have increased our sample size from 100 households to 230 households in five villages (2 LMMAs, 1 Marine National Park, and 2 "unmanaged areas" as controls). After a review of existing data and other information, we decided to increase the number of households sampled to increase the robustness of our health assessments. This change in sampling design will not add expense to the analyses as the remaining samples will be in-kind or targeted at vulnerable populations. However, it has increased the time it has taken us to conduct the surveys. Data is also currently being uploaded into an electronic format, which takes additional time. As a result, the data have not yet been analysed. Going forward, we will input data directly into the electronic format in order to minimize duplication of effort and thus increase the speed of this process.

Train local health professionals to obtain blood samples from local participants to test for iron and zinc deficiency every six months. These blood samples will benefit local participants as our agreement with MSP allows us to determine infections with malaria and provide Point of Care treatment.
Local health professionals have been identified and selected. Training and data collection is planned for August/September 2016 and November/December 2016. This time frame has been changed based on our improved understanding of seasonal peaks (Nov/Dec) and lulls (Aug/Sept) in fish access in local communities. Timing our blood sampling to these cycles of seasonal fish accessibility, we will be able to collect data that can better inform the predictive model that will be developed later in the project.

Conduct anthropometric assessments every 3 months to determine how growth trajectories (both stunting and wasting) are affected by the availability and access to nutritious diets.
Obtaining household enrolment for these assessments has taken longer than originally expected, primarily due to the increased sample size. Other unexpected delays were encountered when it took additional time to replace damaged equipment and identify and hire additional staff. We have now gathered enough baseline socio-economic data and survey information, and will next gather anthropometric baseline data. The assessment itself will begin in June 2016.

Communicate results to LMMAs, regional and national networks and the CBD/World Health Organization (WHO) joint task force.
Not realized yet. Study and the consequent analyses need to be conducted prior to results dissemination.

3.2 Progress towards project outputs

Output 1 - Nearshore fish and invertebrate abundance are increased and endangered species of sharks and marine turtles are protected

Indicator 1: By year 3, in each village the number of fishers that are active members of the LMMA associations increases from 50% to 75%. As a baseline, 850 fishers were registered as members of LMMA. Currently, 1850 fishers have been registered representing 75% of traditional fishermen who are now are officially authorized to participate to in local fishery management.

Indicator 2: By year 3, beach seines in the Bay Antongil fall from 229 to less than 100. Previously, there were a total of 229 beach seines recorded. Current observation records show that beach seines have fallen to just 164 (Source: Patrol records).

Indicator 3: By year 3, a measured increased in compliance with LMMA restrictions. WCS initiated the development of the Dinabe (local social convention between all villages bordering Antongil Bay), which consists of a set of rules and regulations on sustainable management of Antongil Bay small-scale fisheries. The Dinabe was validated by local communities and government authorities during a workshop in Maroantsetra in June 2-3, 2015. The final step of formalization would be its approval by the Court. Unfortunately, the Court rejected the Dinabe due to the pressure applied by illegal fishermen who are in conflict with local villagers. WCS is currently working with the MRHP to find a solution to this issue. We have been advised to have the General Secretary of MRHP introduce the request to the Ministry of Justice directly.

Output 2 - Livelihoods are diversified and food security is improved through the development of environmentally sensitive small-scale agriculture, economically benefitting at least 500 households across five LMMAs

Indicator 1 : By year 3, at least 250 households adopt environment sensitive techniques for rice production, allowing an increase of yield of at least 20 % (measured on demonstration plots).

For rice yield, baseline data still need to be established. As for environment sensitive techniques, we noted that only one farmer was practicing Intensive Rice Cropping at the beginning of the project, while in 2016 two farmers were recorded to practice intensive Rice Cropping system, and 6 farmers were recorded to practice ameliorated rice cropping system with an average yield of about 5 tons/ha (Source : Project monitoring baseline)

Indicator 2 : By year 3, poultry for at least 250 households benefit from regular vaccination minimising the risk of zoonotic diseases, and reducing the mortality rate by 85%

The baseline has yet to be established and data collection will start in June 2016 (people who vaccinated their chickens have not started to sell them). There was no monitoring of the mortality of chickens outside the project actions or before 2015. We began the first session of immunizations in December and the second in March. Village vaccinators are keeping track of the number of chickens vaccinated and the number of mortalities. Data will be collected and analysed during the second quarter of 2016.

Indicator 3: At least 250 women adopt a new income generating activity (gardening, production of smoked or dried fish). The baseline has yet to be established because data is still being collected at project sites. For 2016 we have recorded 7 women practising gardening and 23 women using the fish smoking oven (Source : Project monitoring baseline).

Output 3 - The human health and livelihood effects in local populations are determined by analysing linkages between expected improvements in dietary intake, nutritional status and commercial transactions and observing the role of fisheries co-management in facilitating these health effects in 100 households across five LMMAs.

As described above, the baselines have yet to be established for the three indicators of Output 3. Data collection will start in September 2016 when the team leader will lead training sessions for local staff and data collection of the 230 targeted households. Lack of staff capacity and time intensive data entry contributed to delays for this objective as explained earlier (see 3.1, Output 3). However, we originally

anticipated that there might be little baseline data at the start of this project, and planned to use modelling as a way to determine health outcomes as related to the fisheries co-management outcomes.. One reason we have increased the scope of our data collection under this objective is so we will be able to build a more realistic model in the third year of this project, and thus be better able to link health and marine conservation outcomes.

3.3 Progress towards the project Outcome

Outcome: "Sustainable fisheries management and livelihoods diversification in northeastern Madagascar protects coral reefs (7,000 hectares), improves food security, livelihoods and health for 11,000 people, and becomes a model for the region"

Indicator 1: By 2017, improved coral reef health, measured by a 20% increase in coral cover and fish biomass in at least one third of Antongil Bay LMMAs

It was planned that the baseline would be determined during the first month of the project by conducting underwater reef surveys in the Antongil Bay's LMMAs, but difficult meteorological conditions hampered the survey activities in December 2015. Data of the second ecological survey are still being analysed and will be described in the 2016 half year report in November 2016 and will form the baseline for comparison in the future.

The ecological monitoring results from 2015 showed that the average hard coral cover was 27% for LMMAs. Otherwise, in April 2015, coral cover in no-take areas ranged between 16% to 40%, and from 12% to 38% in the restricted areas, with no significant difference between no-take and restricted areas. Concerning the coral reef fish, the biomass in no-take areas ranged from 476 to 911 kg/ha, and from 658 to 1003 kg/ha in restricted areas ("Ecological survey of the coral reef fish communities in the North East of Madagascar". 2015 – WCS)

Indicator 2 : By 2017, improved fisheries yield, measured by a 20% increase in fish and macro-invertebrate catch per unit of effort in 24 Antongil Bay LMMAs

The baseline was set at 6.4 kg/day/fisherman (Source: Ecological survey of the coral reef fish communities in the North East of Madagascar. 2015 – WCS).
Difficulties that we have experienced have been: i) a lack of commitment from fishermen to be part of the CPUE monitoring as many fishermen are not willing to have their catch weighed since it is time-consuming; ii) under-sampling and risk of bias since only a small percentage of fishermen have been taking part in sampling; and iii) the people in charge of the CPUE monitoring cannot stay long enough at each session to sample a sufficient percentage of fishermen at each landing site. We are currently revising the CPUE monitoring system to address these issues.

Indicator 3 : By 2017, a 50% decrease in poaching and by-catch of endangered marine species (sharks and marine turtles) in 24 Antongil Bay LMMAs.

As a baseline, we identified the scalloped hammerhead as the most commonly encountered species in Antongil Bay's shark fishery. The by-catch assessment of two endangered species (turtles and sharks) that was conducted in April 2015 in 7 LMMA villages has not revealed any catch of these species, which leads to the assumption that they are no longer hunted. Furthermore, the analysis of CPUE data sets showed a decreasing trend of shark catches. We will continue to monitor this situation to ensure that this remains a long-term result.

Indicators 4, 5 and 6: Data for baselines will be collected starting in August 2016 as described more fully above.

3.4 Monitoring of assumptions

	Assumption	Comments
Assumption 1	Government authorities have sufficient authority and	WCS's strategy is to provide logistical support to the local government by contributing to the costs for governmental

	motivation to control illegal activities and enforce the rules in Antongil Bay LMMAs.	interventions (CSP, licenses). We feel that the local government has sufficiently taking ownership over supporting all law enforcement activities within this project and has demonstrated good motivation on enforcing rules and empowering the structures of the LMMAs.
Assumption 2	Strengthening small-scale fisheries co-management will be supported by all stakeholders from local to national levels as tangible benefits are perceived.	The benefits of small-scale fisheries co-management are recognized by most relevant stakeholders at all levels, such as MRHP at local and at national level, local communities, and local administration). So far, the co-management approach has improved fishermen's ownership over fishery resources resulting in more sustainable fishing practices. Further on, the involvement of communities on fisheries resources management (mainly through Community patrolling and local administration) has reduced the cost of governmental interventions at the national level.
Assumption 3	The fishery will recover fast enough to deliver nutritional and health benefits. Outcomes like iron and zinc deficiency can recover quickly, but we may not see changes in stunting and low birth weight, which have a longer etiology and trajectory.	Sufficient data sets are not available yet
Assumption 4	Local institutions and economies allow for the development of new income generating activities for poor people and the lack of infrastructure does not hinder the development of changes within supply chains.	Vanilla and cloves production and yields were exceptionally high in 2015 (both due to international market price fluctuation and under the effect of illegal traffic money laundering), increasing the demand for seasonal workforce. Poor people could easily find short-term jobs and were less interested in developing their own income generating activity. The accessibility of the area remains poor, as regular flights have not been ensured by the national companies since October 2015. The national road keeps on degrading.

3.5 Impact: achievement of positive impact on biodiversity and poverty alleviation

The greatest contribution of the project on biodiversity conservation is related to the successful implementation of Fishery Management Plans that are following the principles of ecosystem-based fishery management approaches and hereby ensuring biodiversity conservation

The project's contribution to poverty alleviation is essentially through the impacts of improved fisheries management that would be reflected by the improvement of catch per unit effort. So far an improved income situation is not measurable but the increase in CPUE reveals a promising trend. Additional quantitative information on this trend will be presented in future reports.

4. Contribution to SDGs

The project contributes to the SDG 2 by supporting more sustainable fishing and agricultural practices and to the SDG 14 by contributing to the protection and sustainable utilisation of marine resources through co-management approaches.

Improved local fisheries management plans and co-management approaches to improve the management of small-scale fisheries have been developed and are under implementation leading to more sustainable fishing practices. Training sessions have been conducted to improved agricultural practises.

5. Project support to the Conventions, Treaties or Agreements

The project directly contributed to the CBD's Strategic Plan for Biodiversity's (2011-2020) strategic goals:

- Improved local fisheries management plans and co-management approaches to improve the management of small-scale fisheries have been developed and are under implementation leading to more sustainable fishing practices
- Patrolling committees are in place ensuring a better law enforcement for marine protected areas resulting in improved biodiversity protection.
- Alternative livelihood opportunities are under development and implementation, such as poultry and improved rice cultivation.

6. Project support to poverty alleviation

This project aims to reverse the decline in fisheries resources and aim to achieve an improved catch per unit effort (CPUE) for fishermen through fisheries' co-management approaches. An improved CPUE, in addition to the development and implementation of alternative livelihoods for fishing communities, will result in more secure livelihoods and increased economic return for the local population in the long term. So far, an improved income situation is not measurable but the increase in CPUE reveals a promising trend.

7. Project support to gender equity issues

250 women are supposed to benefit directly from project activities by training activity and establishing an additional regular source of income. Women are traditionally the controllers of gardening and poultry assets. Thus, improving gardening and poultry production helps to shift increased power and economic control to women and improve household well-being.

During the first year of action in the villages, the project targets a few number of 7 pilot women farmers for gardening. Currently, 23 women are using the fish smoking oven in Imorona but this number will increase after the construction of new oven during the second year of project implementation.

8. Monitoring and evaluation

No additional comments.

9. Lessons learnt

We learned that better planning processes, a prioritization of actions, and more importantly the strengthening of collaborations and relationships with local authorities, are the best approaches to obtain the issuing of official licenses for traditional fishermen.

We learned that the operationalization of community control was best facilitated by the existence of a legal framework for decentralised management. This could also be successfully utilised to increase the management across the country with its limited monitoring and surveillance capacity.

In addition, voluntary compliance of all fishermen to licensing and access laws is still limited and it is necessary to continue to apply existing regulations to ensure compliance of all fishermen in the Bay. So far no real control of access to the fishery has been put forth by the Fisheries Administration. As a result, WCS plans to organize an enforcement "blitz" with the support of the MRHP, to demonstrate to recalcitrant fishers that fishing licenses are indeed required for them to operate as fisherman.

The adoption of Dinabe requires the support of all stakeholders in its development. We noted resistance from fishermen who are using beach seines (generally, these were fishermen from outside the local communities). Strong lobbying at the Ministry of Justice for effective enforcement is necessary

since this practice is already prohibited by regulation. We are in the process of working with the MRHP to move in this direction.

Our ecological monitoring sampling design had to be updated to sufficiently enable sampling of all no-take and restricted zones in Antongil Bay's growing network of LMMAs. We noted that there is environmental variability that needed to be accounted for: some LMMAs do not have proper coral reefs and three LMMAs are isolated in the eastern part of the Bay, all of which require an adapted sampling approach that is currently underway.

We learned that data entry and data analysis of ecological and health surveys are more time consuming than was expected. We are currently in the process of hiring a technician who will support the process of data entry and data analysis.

The Catch per Unit Effort Monitoring (CPUE) has been hampered by the lack of willingness of most fishermen to take part as it is regarded as too time consuming. Further, we discovered a potential risk of sample biases due to an under-representative number of fishermen and small sample size. In response, we are now evaluating the best possible approach to deal with these issues. So far, the main solutions appear to be to (i) reduce the number of CPUE sessions from 3-4 times/week to once a week; (ii) focus on fewer sites; and (iii) improve the communication to build awareness on the importance of this data to the sustainability of fishery resources.

Finally, this project is benefiting from in-kind help from Harvard Medical School, made possible through our co-PI Dr. Chris Golden. He is using this Darwin-funded work to try to create a more sustainable overall health system and delivery approach for Madagascar, outside of the benefits that can be obtained nutritionally from improving fisheries management. In August and November 2016, three Harvard Medical School residents will travel to Madagascar to work with Dr. Golden to train the Maroantsetra regional health staff and participate in the surveying, biological sample collection and on-site health observations. In November, the director of the Harvard Humanitarian Initiative, Parveen Parmar, will join them in the field to help with the health system and delivery assessments and help determine how to move beyond standard practices of care, while ensuring that all interventions that we do locally can be made sustainable over the long term, rather than simply components of specific projects. After this visit, they hope to initiate discussions to make the Maroantsetra regional health facilities a sister site for the Harvard Humanitarian Initiative.

10. Actions taken in response to previous reviews (if applicable)

Not applicable

11. Other comments on progress not covered elsewhere

No additional comment.

12. Sustainability and legacy

Fisheries co-management in Antongil Bay is the first of its kind in Madagascar and is acting as a pilot project for the MRHP. Since the recognition of the ABFMP, two similar fisheries management plans are currently in preparation (Melaky in west central Madagascar, Ambaro Bay in the northwest)

Long-term sustainability is the key project driver. The activities aim to improve local and self-sufficient coastal resource management over the long-term as well as ensure financial sustainability of the community control and surveillance committees' (CCS) activities. Our activities are designed to achieve and maintain an active participation of local communities in the management of LMMAs. The institutionalization of local and community involvement in the management of LMMAs is important, for they are recognized from the beginning as partners. Community empowerment is a very long process, but these activities constitute its necessary and essential basis. Currently, we are strengthening the capacities of the CCS on activity planning, data collection, and reporting in preparation of future self-management and technical autonomy.

13. Darwin Identity

With a global contribution of 30% to the development of the ABFMP, Darwin Initiative is the most significant funding source without which the objective achievement would be compromised.

To acknowledge Darwin Initiative funding, we have publicised Darwin Initiative's logo in each official activity report or presentation on Antongil Bay including the international symposium on biodiversity in Antananarivo September 2015 and the WIOMSA symposium in October 2015.

14. Project Expenditure

Table 1 Project expenditure during the reporting period (1 April 2015 – 31 March 2016)

Project spend (indicative) since last annual report	2015/16 Grant (£)	2015/16 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)			9%	
Consultancy costs	-	-	-	
Overhead Costs			-2%	
Travel and subsistence			-10%	
Operating Costs			-8%	
Capital items (see below)			-2%	
Others (see below)	-	-	-	
TOTAL				

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2015-2016

Project summary	Measurable Indicators	Progress and Achievements April 2015 - March 2016	Actions required/planned for next period
Impact Madagascar's artisanal fisheries are effectively managed to simultaneously optimize coral reef biodiversity protection and sustainable harvests that deliver benefits for human health and livelihoods.			[redacted]
Outcome Sustainable fisheries management and livelihoods diversification in northeastern Madagascar protects coral reefs (7,000 hectares), improves food security, livelihoods and health for 11,000 people, and becomes a model for the region	By 2017, improved coral reef health, measured by a 20% increase in coral cover and fish biomass in at least one third of Antongil Bay LMMAs.	2015 Baseline data have been determined	Further data collection and data analysis are required to measure the trend
	By 2017, improved fisheries yield, measured by a 20% increase in fish and macro-invertebrate catch (especially species from the following families and groups: carangidae, lethrinidae, siganidae, nemipteridae, sphyraenidae, scaridae, mulidae, lutjanidae, serranidae and octopus) per unit of effort in 24 Antongil Bay LMMAs.	2015 Baseline data have been determined	Further data collection and data analysis are required to measure the trend
	By 2017, a 50% decrease in poaching and by-catch of endangered marine species (sharks and marine turtles) in 24 Antongil Bay LMMAs	2015 Baseline data have been determined	Further data collection and data analysis are required to measure the trend
	By 2017, a 15% increase in dietary diversity, a 30% increase in food security and a 15% increase in income diversity in 100 households across the five targeted LMMAs.	2015 Baseline data have been determined	
	By 2017, a 20% decrease in iron and	Baseline data have been not collected	

	zinc deficiency and a 20% decrease in low birth weight in 100 households across the five targeted LMMAs. By 2017, a 20% increase of rice productivity in plots in 250 households applying improved practices; an 85% decrease in poultry mortality and a 20% increase in income from poultry raising and gardening in 250 households in the villages of the five targeted LMMAs.	yet Baseline data have not been collected yet	Baseline data collection to be started in August 2016 For rice productivity, baseline data collection to be started in June 2016 Poultry mortality and increase in income will be assessed three months after vaccination, starting in April 2016
Output 1. Nearshore fish and invertebrate abundance are increased and endangered species of sharks and marine turtles are protected through improved management capacities and engagement of communities and government in reducing overexploitation, illegal fishing and use of destructive gears in Antongil Bay.	By year 3, in each village the number of fishers that are active members of the LMMA associations increases from 50% to 75% By year 3, beach seines used in Antongil Bay drop from 229 to less than 100 By year 3, a measured increased in compliance with LMMA restrictions	850 fishers were registered as members of the LMMA at project start – to date 1850 fishermen are registered The number of beach seines dropped from originally 229 to 164. The Dinabe (local social convention between all villages bordering Antongil Bay) was validated by local communities and government authorities but has not received the court's official approval.	
Activity 1.1 Improve engagement and accountability of all stakeholders in ABFMP implementation by organizing annual meetings of the ABFMP Steering Committee		The first annual meeting of the ABFMP Steering Committee" was held in Fenerive Est on July 15, 2015.	

Activity 1.2 Strengthen the ability of coastal communities to more effectively manage the network of 24 LMMAs through capacity building activities	A regional forum of the LMMA network of Antongil Bay was organized at the 18th and 19th of September 2015 in Mananara. Workshops were held in Mananara (April 27-28, 2015) and Maroantsetra (June 2-4, 2015) by the Fisheries and Marine Ministry in order to develop and adopt tools for the Patrol Committees of the LMMAs. Voluntary rangers of local communities from a total of 25 LMMAs were trained in law enforcement best practices by the Madagascar Fisheries Surveillance Centre.
Activity 1.3 Raise knowledge and awareness about existing fishing regulations, unsustainability of destructive fishing practices and benefits of LMMAs	A video was produced to highlight community-based fishery management approaches in Maintimbato and Rantohely LMMAs (https://www.youtube.com/watch?v=6ikTP2VPykI). In June 2015, a public meeting with representatives of the Antongil Bay LMMAs communities and MRHP was held in Maroantsetra to build general public awareness on the ABFMP and fisheries regulations approaches in and around the Antongil Bay. A meeting with representatives of artisanal fishermen groups and associations was held in June 2015 together with MRHP in order to raise awareness on the existing shark fishing ban in and around the Antongil Bay.
Activity 1.4 Organize joint community and local authority patrols to enforce fishery regulations in LMMAs, and trial the use of SMART (Spatial Monitoring and Reporting Tool - http://www.smartconservationsoftware.org) to support collection and analysis of threat data in real-time and optimize planning of enforcement patrols.	Five joint patrols, composed of community members and local authorities, were organized in seven LMMAs, which led to the confiscation of 28 illegal nets.
Activity 1.5 Conduct reef surveys and fish catch monitoring to assess impacts of LMMA on coral reef health and fisheries.	Participatory monitoring of fish catch landing has been continuously conducted around the Antongil Bay resulting in a total of 748 surveys. In addition, reef surveys were conducted in 4 LMMAs in April 2015. 53 interviews with fishermen from 7 LMMAs were conducted in April 2015 in order to assess the level of poaching activities and the quantity of unwanted by-catch of endangered marine species (sharks and marine turtles). Two reef fish surveys were conducted in April 2015 and December 2015 in the 12 LMMAs of the western part of the Antongil Bay where coral reefs occur. No-take areas as well as fishing restricted areas have been surveyed for each of the

		12 LMMAs.
Output 2. Livelihoods are diversified and food security is improved through the development of environmentally sensitive small-scale agriculture, economically benefitting at least 500 households across five LMMAs.	By year 3, at least 250 households adopt environment sensitive techniques for rice production, allowing an increase of yield of at least 20 % (measured on demonstration plots) By year 3, poultry for at least 250 households benefit from regular vaccination minimising the risk of zoonotic diseases, and reducing the mortality rate by 85% At least 250 women adopt a new income generating activity (gardening, production of smoked or dried fish)	For this first demonstration year, 6 farmers tested intensive and ameliorated rice cropping system during the counter season and 7 during the main season. In the counter season, the average yield was 5 tons/hectare.
Activity 2.1. Train and support a network of 50 pilot farmers on rice production. Prepare technical leaflets, organize trainings, exchange visits and cropping cycle collective assessments, and facilitate access to equipment to facilitate the adoption of tested and approved practices by 200 additional households.		66 farmers (39 during the counter season, 27 during the main one), including 14 women, were trained on rice improved rice production practices. The final reception of the Micro-Irrigated-Perimeter (MIP) located in Hoalampano was organized the 24 March 2016. Secured command area grew from 4ha to 7ha. The number of water users grew from 46 to 75 who are now able to intensify their rice production. A technical study is on-going to assess the feasibility of extending the MIP.
Activity 2.2. Train 2 village vaccinators in each site to organize vaccination campaign and perform injections. Support the creation of a village vaccinators network to organize the vaccines supply.		4 village vaccinators were trained in two sites. They performed one vaccination campaigns and vaccinated 650 chickens.
Activity 2.3 Identify vulnerable households/women and give them technical and financial support (but with a financial share form beneficiary) to develop a new income generating activity (gardening or production of smoked-fish). Implement two supply-chain studies to define a strategy to improve the commercialization of these products, targeting the local market. Provide training and technical support (with regular visits from animators) on production, processing and/or marketing of products to at least 250 women. Organize exchange visits among women and support them to get organized to facilitate marketing.		Terms of references were elaborated for a study on the fish supply-chain and submitted to three different experts. However, due to the remoteness of the area, only one consultant submitted a technical offer that was rejected by the two evaluators from GRET and WCS. A new consultation will be organized soon. Meetings were organized with women fish wholesalers and transformers to choose the selection criteria for the new fish-smoke-oven to be built.
Activity 2.4 Provide training and technical support (with regular visits from animators) on production, processing and/or marketing of products to at least 250 women. Organize exchange visits among women and support them to get		9 people, including 6 women were trained on vegetable gardening. They were provided with seeds (tomato, leafy green vegetable) and started their first growing season, which will be harvested in June 2016.

organized to facilitate marketing.		
Output 3. The human health and livelihood effects in local populations are determined by analysing linkages between expected improvements in dietary intake, nutritional status and commercial transactions and observing the role of fisheries co-management in facilitating these health effects in 100 households across five LMMAs. Madagascar is the 6th most stunted country in the world and this output will be hugely influential for demonstrating potential impacts of fisheries management on human health. The findings are disseminated and inform management and policy decisions of LMMAs, relevant local and regional networks and decision-making bodies, and the CBD/WHO task force	By year 3, there will be a 15% increase in dietary diversity at the household level and a 30% increase in food security through measurement of the number of food categories utilized and through adoption of regular consumption of dried and smoked fish during periods of hardship. By year 3, there will be a 20% decrease in iron and zinc deficiency as measured by nutritional status from venous blood draws. This is the most comprehensive method for understanding real health effects of changes in fishery access. By year 3, there will be a 20% decrease in low birth weight as measured by anthropometry.	Collection of data will start in August 2016
Activity 3.1 In five communities adjacent to the LMMAs, train female heads of households to record their diets using kitchen scales into standardized dietary journals.		Data collection has started in September 2015 with a sample size of 230 households.
Activity 3.2 Train local health professionals to obtain blood samples from local participants to test for iron and zinc deficiency every six months. These blood samples will benefit local participants as our agreement with MSP allows us to determine infections with malaria and provide Point of Care treatment.		Not realized yet. Local health professionals have been already selected and training and data collection is planned for August/September 2016 and November/December 2016. The time frame of the health assessments has been changed based on our improved understanding of peaks and lulls in fish access in local communities.
Activity 3.3 Conduct anthropometric assessments every 3 months to determine how growth trajectories (both stunting and wasting) are affected by the availability and access to nutritious diets.		Not realized yet. Assessment will begin starting in June 2016.
Activity 3.4 Communicate results to LMMAs, regional and national networks and the CBD/World Health Organization (WHO) joint task force.		Not realized yet. Study and the consequent analyses need to be conducted prior to results dissemination.

Annex 2. Project's full current logframe as presented in the application form (unless changes have been agreed)

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: Madagascar's artisanal fisheries are effectively managed to simultaneously optimize coral reef biodiversity protection and sustainable harvests that deliver benefits for human health and livelihoods.			
Outcome: Sustainable fisheries management and livelihoods diversification in Northeastern Madagascar protects coral reefs (7,000 hectares), improves food security, livelihoods and health for 11,000 people, and becomes a model for the region	By 2017, improved coral reef health, measured by a 20% increase in coral cover and fish biomass in at least one third of Antongil Bay LMMAs. By 2017, improved fisheries yield, measured by a 20% increase in fish and macro-invertebrate catch (especially species from the following families and groups: carangidae, lethrinidae, siganidae, nemipteridae, sphyraenidae, scaridae, mulidae, lutjanidae, serranidae and octopus) per unit of effort in 24 Antongil Bay LMMAs. By 2017, a 50% decrease in poaching and by-catch of endangered marine species (sharks and marine turtles) in 24 Antongil Bay LMMAs By 2017, a 15% increase in dietary diversity, a 30% increase in food security and a 15% increase in income diversity in 100 households across the five targeted LMMAs. By 2017, a 20% decrease in iron and zinc deficiency and a 20% decrease in low birth weight in 100 households across the five targeted LMMAs. By 2017, a 20% increase of rice	Indicator 1: Coral reef health reports (see attached). Indicator 2 & 3: LMMAs fish landing surveys and fishers interviews (see attached summary document). Indicator 4: Household survey data and dietary record analysis (not yet produced). Indicator 5: Anthropometry and clinical nutrition results (not yet produced) Indicator 6: Rice yields surveys, poultry mortality monitoring, and poultry and gardening income surveys (not yet produced).	Assumption 1: Government authorities have sufficient authority and motivation to control illegal activities and enforce the rules in Antongil Bay LMMAs. Assumption 2: Strengthening small-scale fisheries co-management will be supported by all stakeholders from local to national levels as tangible benefits are perceived. Assumption 3: The fishery will recover fast enough to deliver nutritional and health benefits. Outcomes like iron and zinc deficiency can recover quickly, but we may not see changes in stunting and low birth weight which have a longer etiology and trajectory. Assumption 4: Local institutions and economies allow for the development of new income generating activities for poor people and the lack of infrastructure does not hinder the development of changes within supply chains

	productivity in plots in 250 households applying improved practices; an 85% decrease in poultry mortality and a 20% increase in income from poultry raising and gardening in 250 households in the villages of the five targeted LMMAs.		
Outputs: **1**. Nearshore fish and invertebrate abundance are increased and endangered species of sharks and marine turtles are protected through improved management capacities and engagement of communities and government in reducing overexploitation, illegal fishing and use of destructive gears in Antongil Bay.	Indicator 1: By year 3, in each village the number of fishers that are active members of the LMMA associations increases from 50% to 75%. Indicator 2: By year 3, beach seines used in Antongil Bay drop from 229 to less than 100. Indicator 3: By year 3, a measured increased in compliance with LMMA restrictions. Indicator 4: By year 3, 24 LMMA communities will have significantly increased motivation, knowledge, skills, confidence and independence in managing their LMMA and in interacting with fisheries managers from the government and other stakeholders.	Output 1 Indicator 1: LMMA association registration books (see attached). Indicator 2: Report of the census of fishing gears in year 3 (not yet produced). Indicator 3: Data collected using SMART software (not yet produced). Indicator 4: ABFMP Steering Committee annual meetings reports, community learning exchanges reports, Antongil Bay LMMA network annual forum reports (see attached).	Assumption 1: Compliance with management interventions such as gear restrictions and no-take zones won't be impaired by political instability.
2. Livelihoods are diversified and food security is improved through the development of environmentally sensitive small-scale agriculture, economically **benefitting at least 500 households across five LMMAs.**	Indicator 1: By year 3, at least 250 households adopt environment sensitive techniques for rice production, allowing an increase of yield of at least 20 % (measured on demonstration plots). Indicator 2: By year 3, poultry for at least 250 households benefit from regular vaccination minimising the risk	Output 2 Indicator 1 : Household agricultural surveys (on yields and practices), pilot plot yield measurements carried out every cropping season (initial data attached). Indicator 2 : Vaccination records (by project first, then progressively by village-vaccinators) carried out at every	Assumption 2: Potential natural disasters (such as hurricanes) do not impair the development of sustainable livelihoods.

	of zoonotic diseases, and reducing the mortality rate by 85%. Indicator 3: At least 250 women adopt a new income generating activity (gardening, production of smoked or dried fish).	vaccination campaign (see attached). Indicator 3: Project monthly survey on a sample of women (on number and amount of sales) (not yet produced).	
3. The human health and livelihood effects in local populations are determined by analysing linkages between expected improvements in dietary intake, nutritional status and commercial transactions and observing the role of fisheries co-management in facilitating these health effects in 100 households across five LMMAs. Madagascar is the 6th most stunted country in the world and this output will be hugely influential for demonstrating potential impacts of fisheries management on human health. The findings are disseminated and inform management and policy decisions of LMMAs, relevant local and regional networks and decision-making bodies, and the CBD/WHO task force	Indicator 1 : By year 3, there will be a 15% increase in dietary diversity at the household level and a 30% increase in food security through measurement of the number of food categories utilized and through adoption of regular consumption of dried and smoked fish during periods of hardship. Indicator 2 : By year 3, there will be a 20% decrease in iron and zinc deficiency as measured by nutritional status from venous blood draws. This is the most comprehensive method for understanding real health effects of changes in fishery access. Indicator 3 : By year 3, there will be a 20% decrease in low birth weight as measured by anthropometry.	Output 3 Indicator 1 : Household surveys that will include coping strategies indices, food security ratings, dietary and income diversity scoring, and social and economic wellbeing measures. Each of the 100 households enrolled in the health study will maintain a dietary calendar so that we can observe the ways in which food consumption changes based on our intervention. We will use a BACI (Before After Control Intervention) study design where we work both inside and outside of areas where the intervention is taking place to determine impact (not yet produced). Indicator 2: Clinical visits with healthcare professionals will include blood draws. The blood will be analysed for a suite of nutritional markers to understand changes in the levels of iron and zinc deficiency within individuals over time (not yet produced). Indicator 3 : Clinical visits with healthcare professionals will also include anthropometric assessments to understand changes in birth weight, stunting and wasting (not yet	Assumption 3: The time over which the project occurs will allow for the realization of the observation of fishery effects and the indirect effects of fishery conservation on health and livelihoods.

		produced).	

Activities

1.1-Improve engagement and accountability of all stakeholders in ABFMP implementation by organizing annual meetings of the ABFMP Steering Committee.

1.2-Strengthen the ability of coastal communities to more effectively manage the network of 24 LMMAs through capacity building activities (formal training in administration, financial management, leadership, fisheries management and enforcement; organization of debates and networking between LMMA representatives and local authorities at an annual Antongil Bay LMMA network forum and national LMMA network forum).
1.3-Raise knowledge and awareness about existing fishing regulations, unsustainability of destructive fishing practices and benefits of LMMAs through learning visits for fishers at the newly inaugurated WCS-managed environmental campus in Maroantsetra, exchange visits to LMMA sites, production of regular issues of the Malagasy language 'Dalaly' magazine and radio broadcasts.
1.4-Organize joint community and local authority patrols to enforce fishery regulations in LMMAs, and trial the use of SMART (Spatial Monitoring and Reporting Tool - http://www.smartconservationsoftware.org) to support collection and analysis of threat data in real-time and optimize planning of enforcement patrols.
1.5-Conduct reef surveys and fish catch monitoring to assess impacts of LMMA on coral reef health and fisheries.
2.1-Train and support a network of 50 pilot farmers on rice production. Prepare technical leaflets, organize trainings, exchange visits and cropping cycle collective assessments, and facilitate access to equipment to facilitate the adoption of tested and approved practices by 200 additional households.
2.2-Train 2 village vaccinators in each site to organize vaccination campaign and perform injections. Support the creation of a village vaccinators network to organize the vaccines supply.
2.3-Identify vulnerable households/women and give them technical and financial support (but with a financial share form beneficiary) to develop a new income generating activity (gardening or production of smoked-fish). Implement two supply-chain studies to define a strategy to improve the commercialization of these products, targeting the local market. Provide training and technical support (with regular visits from animators) on production, processing and/or marketing of products to at least 250 women. Organize exchange visits among women and support them to get organized to facilitate marketing.
2.4-Provide training and technical support (with regular visits from animators) on production, processing and/or marketing of products to at least 250 women. Organize exchange visits among women and support them to get organized to facilitate marketing.
3.1-In five communities adjacent to the LMMAs, train female heads of households to record their diets using kitchen scales into standardized dietary journals.
3.2-Train local health professionals to obtain blood samples from local participants to test for iron and zinc deficiency every six months. These blood samples will benefit local participants as our agreement with MSP allows us to determine infections with malaria and provide Point of Care treatment.
3.3-Conduct anthropometric assessments every 3 months to determine how growth trajectories (both stunting and wasting) are affected by the availability and access to nutritious diets.
3.4-Communicate results to LMMAs, regional and national networks and the CBD/World Health Organization (WHO) joint task force.

Annex 3 Standard Measures

Table 1 Project Standard Output Measures

Code No.	Description	Gender of people (if relevant)	Nationality of people (if relevant)	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
9	Fishery management plans progress reports			1			1	3
12	Data base coral reef (1)							3
14B	presentations at international forums (2)			2				3

(1) The project will provide data to a new global coral reef monitoring effort led by WCS and funded by the John D. and Catherine T. MacArthur Foundation

(2) Lead WCS staff will participate in and make presentations at international forums (such as the International Marine Conservation Congress). These highly attended conferences will allow for the results of the project to be shared with the larger marine science and conservation community.

Table 2 Publications

Title	Type (e.g. journals, manual, CDs)	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g.weblink or publisher if not available online)
Arrêté ministeriel du Plan Amenagement Concerté des Pecheries de la baie Antongil (en francais et en malgache).	Juridic text	MRHP, 2015		Malagasy		
Instauration et renforcement de la surveillance communautaire dans la baie d'Antongil.	manual	WCS, 2015				
Guide pratique de terrain à l'attention des Comités de Contrôle et de Surveillance locaux de la baie d'Antongil.	manual	WCS, 2015				

Ecological survey of the coral reef communities in the North East of Madagascar (Antongil Bay LMMAs and MPAs).	report	WCS, Juin 2015				
Aire de Pêche Gérée Localement (APGL) : un veitable outil pour la promotion d'une pêche responsable et durable.	Poster	WCS, 2015				
Les dix commandements du PAP-BA (Plan d'Aménagement Concerté des Pêcheries de la Baie d'Antongil)	Poster	WCS, 2015				
surveillance communautaire Baie Antongil (en malgache).	Poster	WCS, 2015				
Half year report 2015	report	WCS, 2015				