

**Darwin Initiative Main/Post/D+ Project
Half Year Report
(due 31 October 2016)**

Project Ref No	22-016
Project Title	Securing livelihoods, health and biodiversity through seascape-scale sustainable fisheries co-management
Country(ies)/Territory(ies)	Madagascar
Lead Organisation	Wildlife Conservation Society
Partner(s)	GRET, Ministry of Marine Resources and Fisheries (MRHP), Ministry of Public Health (MSP), Ministry of Agriculture and Rural Development (MINAGRI), Committee for the Sustainable Development of Antongil Bay (PCDDBA)
Project Leader	Stéphanie D'agata
Report date and number (e.g., HYR3)	October 31, 2016; HYR2
Project website/ Twitter/ Blog/ Instagram etc	
Funder (DFID/Defra)	DFID

1. Outline progress over the last 6 months (April – Sept) against the agreed baseline timetable for the project (if your project has started less than 6 months ago, please report on the period since start up to end September).

Output 1 (Increase enforcement and compliance of marine use policies for a more productive fishery):

Strengthen the ability of coastal communities to more effectively manage the network of 24 LMMAs through capacity building activities:

Dinabe Homologation

Since 2009, we have helped local fishers to develop a 'Dinabe' (a 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. Local communities and government authorities validated this Dinabe in Maroantsetra in June 2015 but the Court has rejected it, due to the pressure of illegal fishers. Following suggestions from the Court of Maroantsetra, WCS and PCDDBA are currently modifying the Dinabe and plan to have a new version submitted to the Court in December 2016. In addition, local authorities, stakeholders and beach seine fishermen organized three workshops in August 2016 to continue the formalization process of the Dinabe.

Establishment of the Antongil Bay Fishermen's Federation (FPBA)

As part of the implementation of the Antongil Bay Fisheries Co-Management Plan (ABFMP), WCS established a professional organization, the Antongil Bay Fishermen's Federation (FPBA), unifying traditional fishing associations and officially recognized and authorized to engage in fisheries management. Preliminary phases conducted by WCS consisted of establishment of fishermen associations and the identification of two representatives for each association for 15 villages in the bay. The objectives of the FPBA are to implement the management plan of Antongil Bay, which aims to improve livelihoods through good governance practices. The MRHP recognized the FPBA by Legal Order 37069 (December 18, 2014). A ceremony formalizing the FPBA was held on 21 and 22 July 2016 in Maroantsetra.

Fishers licenses

We also started working with MRHP and local communities managing LMMAs to record all fishers and their fishing gears, to empower the local association managing LMMAs to be officially authorized to participate in local fishery management, and to start issuing official traditional fisher's licenses. This traditional fisher's license gives privileged access to Antongil Bay marine resources to its owner. As of September, 3280 licenses have been distributed, 86 percent of the fisher's communities. We will continue to work with MRHP until all fishing communities have been reached.

Raise knowledge and awareness about existing fishing regulations, unsustainability of destructive fishing practices and benefits of LMMAs

Control and Surveillance Committees (CCS) Patrols

Since April 2016, eleven (11) patrols were organized by the CCS, who recorded 13 cases of offenses, including: use of beach seine, use of illegal nets, coral extraction, mangrove cutting, and fishing in no-take areas (where fishing is not allowed). These patrols led to the seizure of 13 illegal nets and the pursuit of one (1) offender by local authorities.

SMART Training and Implementation

From May to August 2016, members of the CCS in Antongil Bay received training on the use of cybertracker for data collection. Data from cybertracker are available for the period of April to August 2016 in the Mananara area. In total, 40 offenses have been registered, the most common being fishing without fisher's license.

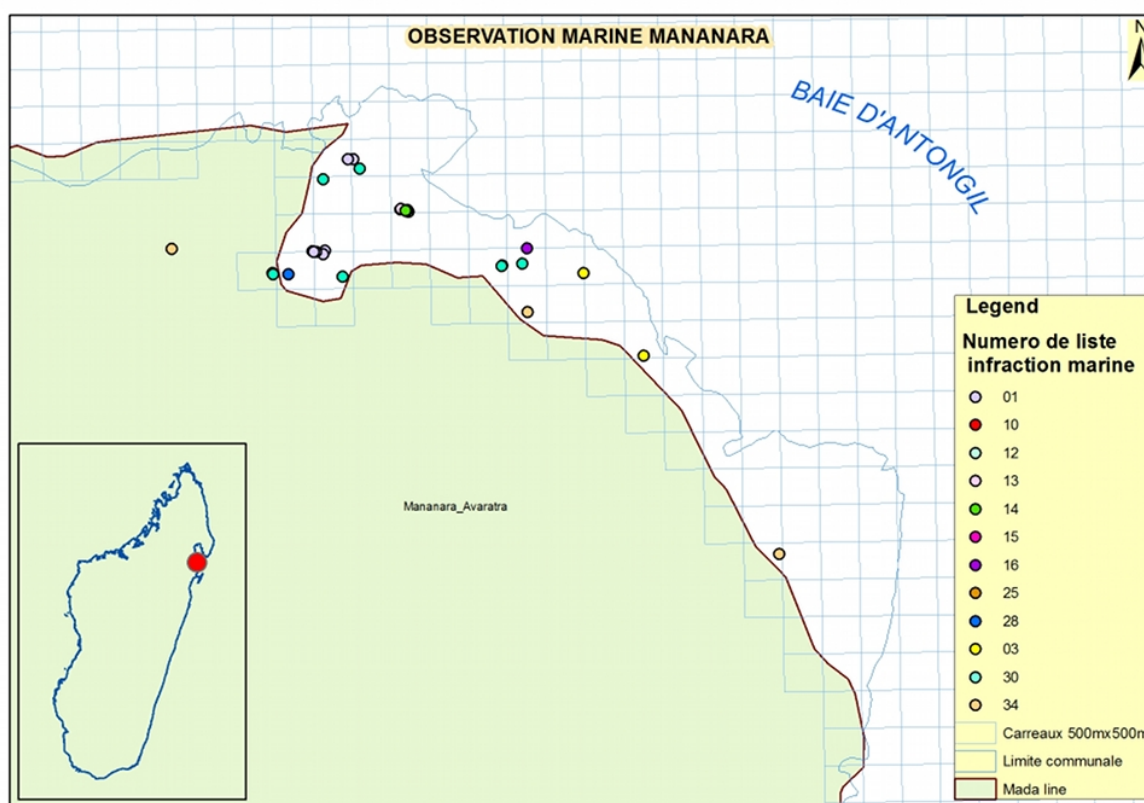


Figure 1. Mapping of the 40 infractions in Mananara area from June to August 2016.

01. No fishing card; **03.** Fishing gear not declared in fishing card; **10.** Mosquito fishing nets; **12.** Beach seines; **13.** Nets > 25mm; **14.** Dam; **15.** Fishing traps; **16.** Longline cable; **25.** Shark finning detention or selling; **28.** Research without permit; **30.** Fishing in no-take areas; **34** Mangrove cutting.

Providing CCS with materials

In September 2016, 26 LMMAs in Antongil Bay received 22 lamps, 26 waterproof vests and 11 long-range binoculars to be used for LMMA patrols.

Beach seine elimination

Three workshops on the elimination of beach seines were held in August 2016 in three villages of Antongil Bay, that gathered together 86 beach seine fishermen, ad hoc committee in charge of law enforcement, three members of the FPBA, two mayors, six chiefs of fokontany, and two WCS staff. The objective of the workshops was to develop a common strategy to eradicate the use, sale and possession of beach seines in Antongil Bay. Several resolutions were adopted: 1) beach seine fishermen cannot obtain fishing licenses and are therefore not allowed to fish in Antongil Bay; 2) within the next three months, CCS will begin tracking beach seine fishermen in each village in collaboration with competent authorities; and 3) within the next three months, beach seine fishermen will sign a commitment letter requiring them to stop using beach seines, which will enable them to obtain licenses for legal types of fishing activities. It was suggested that the Ad hoc committee take actions to have the Dinabe, in which the use of beach seines is forbidden, approved by the Court. It was also suggested that LMMAs be established in villages where beach seines fishermen are numerous.

Organize joint community and local authority patrols

Eleven (11) joint patrols were organized by the Ad hoc Committee with the CCS. During those patrols, thirteen (13) cases of offenses were identified, including: use of beach seine, use of illegal nets, coral extraction, mangrove cutting, fishing in no-take area, and fishing without license. Those missions led to the seizing of 30 illegal nets, including four beach seines, and to the pursuit of two offenders by local authorities. Since the Dinabe is still not applicable, it is sometimes difficult to apply fines, which explains the low numbers of pursuits vs. the number of recorded offenses.

Conduct reef surveys and fish catch monitoring to assess impacts of LMMA on coral reef health and fisheries:

Participatory fish catch landing monitoring

Monitoring has been carried out in Antongil Bay since the end of 2013. Over the past six months, local fishermen who are members of the Catch Per Unit Effort (CPUE) committee conducted over 110 surveys. We are refining and standardizing the monitoring methods to obtain more accurate results, as shown below.

Baselines 2014: 6.16 ± 7.92 kg/fishermen/day

Baselines 2015: 18.87 ± 76.26 kg/fishermen/day (206% increase compare to 2014)

Baselines 2016: 14.75 ± 27.32 kg/fishermen/day, (22% decrease compare to 2015)

The sharp increase in landings between 2014 and 2015 (and a smaller increase in 2016) is due to an increase of sampling effort throughout all study sites and, in particular, the addition of pelagic species compared to 2014. The CPUE sampling design still needs improvement. In particular, we are increasing the number of fishermen being sampled. The sampling design is also being stratified to separate reef and pelagic fisheries to better capture the CPUE for each ecosystem.

Participatory octopus catch landing

The 2015 baseline for octopus catch was estimated at $12.45 (\pm 14.92)$ kg/fishermen/day. In 2016, we observed an increase of 11% compared to 2015, with the octopus catch reaching $13.88 (\pm 8.36)$ kg/fishermen/day.

Ecological reef surveys were conducted in 13 LMMAs in Antongil Bay in December 2015 in no-take and restricted areas (where only LMMA community members having fishing licenses are allowed to practice fishing activities). The 2015 baseline for fish biomass was 974.7 ± 555.6 kg/ha in no-take areas and 665.5 ± 394.1 kg/ha in restricted areas.

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, 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:

During the reporting period, Gret surveyed 14 households that were growing rice on Hoalampano Micro irrigation Scheme (MIS). Surveys focussed on yield and income generated from their rice fields

during the main season 2015 (harvested in June 2015) and the counter season 2015 (harvested in January 2016).

Table 1. Rice yield survey results

	Main season 2014-2015		Counter season 2015	
	Number of households surveyed	Average yield (kg/ha)	Number of households surveyed	Average yield (kg/ha)
Intensified rice cropping	4	4321	5	5128
Traditional rice cropping	10	2513	9	2319
Additional harvest kg/ha and %		1808 (158%)		2809 (145%)

The farmers who practised intensified rice system during the main season of 2015-2016 harvested rice in June 2016. One of them was surveyed and his yield has proved to be a bit lower than in previous season, with an average of 3.8 tons/hectare for intensified rice cropping. Therefore, in the counter-season of 2016, a new arrangement was made between farmers and the use of farmer field schools (FFS) was adopted. Farmers organized themselves into two groups (9-15 members) and each group worked regularly together on a same plot to test new techniques and discussed about advantages and limits, and tried to solve problems or seek for improvements. Most members also tested the techniques on their own plots. Seven other farmers, non-members of FFS, will also practice intensified rice cropping, giving a total of 32 farmers. Rice was sowed between August and September and will be harvested in January 2017. Within the frame of FFS, 26 people, including 22 women were trained on intensified practices.

In January 2016, Gret, the Regional rural engineering service, the water user association, and local authorities took delivery of work on the micro irrigation scheme (MIS) of Hoalampano. The MIS allows better regulation of irrigation (less shortage or overflow) on 7 hectares to benefit to 75 households. Farmers requested for support from the project on an extension to allow irrigation of two additional hectares. Technical studies were undertaken for this work and discussions are going on as proposed costs were estimated as too high for such a small area.

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:

One training session was organized in each of the 5 LMMA, benefiting to a total of 23 people including 13 new trainees. They were provided with iceboxes to store vaccines during transportation. During the year, vaccination campaigns were organized by trained vaccinators and a total of 740 chickens, which were owned by 85 households, 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 area remoteness, only one consultant submitted a technical offer, which was rejected by the two evaluators from GRET and WCS. Discussions are going on to identify a team that is skilled in both supply chain and fisheries. Regarding the second supply chain study, commercialization appeared not to be the main limit to gardening. The main issue is currently pests and disease. It is proposed to switch to a study from an expert in organic gardening, who will identify the main pest and propose organic treatments that can be prepared from local products.

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

We trained 19 people, including 15 women, on vegetable gardening. They were provided with seeds (tomato and leafy green leaves vegetable) and started their second growing season. Currently, 54 people are practicing gardening: 10 of them are growing more than 15 different varieties.

Output 3 (Demonstrate the health and livelihood benefits of sustainable fisheries co-management).

In 5 communities, collect information on dietary intake:

Data on the dietary diversity and food security status of 225 households were collected in five communities over the past six months to characterize these households. We also have limited individual-level dietary intake assessments to understand what individuals consume outside their household. Finally, a subset of households (5) are being observed once a week during the three meals to understand the weights of all foods consumed so we can create generalizing principles of how food is cooked, consumed, and allocated.

Between April and August 2016, we recorded dietary recall information so that we can understand dietary diversity and food security metrics according to FANTA guidelines (<http://www.fantaproject.org/monitoring-and-evaluation/household-dietary-diversity-score>), which rate diets with scores ranging from 0 to 12, with score 12 being for the highest dietary diversity.

Less than 2% of households were found to have low dietary diversity (0-4), with 75% of all households falling into the medium dietary diversity category (5-8), and the remaining households having high dietary diversity (9-12). We found that locally managed marine areas (LMMAs) had nearly doubled the percentage of highest household dietary diversity scores (30% of households) whereas the traditionally managed communities (17%) and marine national park community (19%) had a lower prevalence of high dietary diversity.

Monthly socio-economic surveys (SES) interviews of all household heads (225) are being performed in the 5 villages. On average between April and August 2016, through detailed SES of income generating activities, we calculated that approximately 21% of income is derived from selling fish in 2016.

3.2. Train local health professionals to obtain blood samples from local participants

Between August 8 and September 12, a team of medical residents from Harvard Medical School, researchers from Harvard T.H. Chan School of Public Health, physicians from the Maroantsetra regional hospital, and other local Malagasy researchers and technical specialists conducted clinical assessments of the people in our five target health communities. We processed 848 individuals of a possible total pool of 935 individuals –more than 90% adherence to our health study. This was very successful given that some folks were unable to be assessed at the time due to being out of town, or missing for reasons other than withdrawing from the study. We trained 2 physicians, 2 EMTs, 1 laboratory technician, and 1 nurse during this survey.

Conduct anthropometric assessments every 3 months:

In May 2016, we established a baseline for anthropometric measurements at all five of our health tracking sites (Indicator 3.3): two traditionally managed communities, two LMMA communities, and one Marine National Park community (see Table 2).

Data from August and September 2016 are being cleaned and will be ready for presentation soon. Additional data will be collected in November 2016 and February 2017.

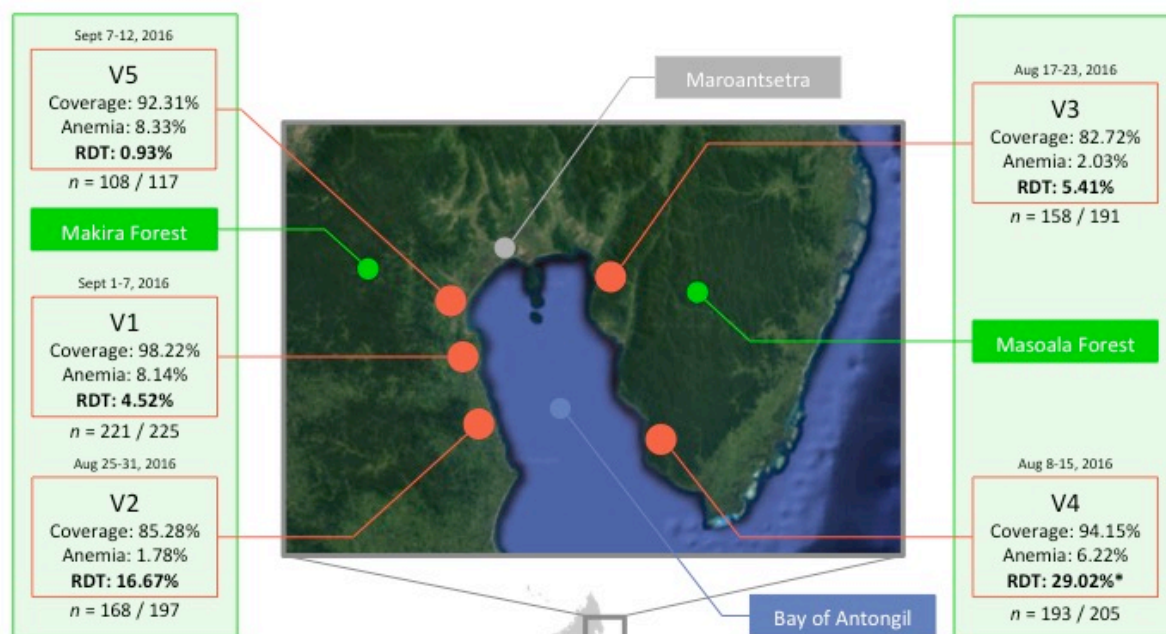
Table 2. Anthropometrics measurements baselines (May 2016)

Village Type	2-5 yrs			6-11 yrs			12-20 yrs			0-20 yrs		
	% weight	Under% Stunted	% Wasted	% weight	Under% Stunted	% Wasted	% weight	Under% Stunted	% Wasted	% weight	Under% Stunted	% Wasted
Traditional Management	27	20	6	21	31	2	21	29	0	24	32	2
LMMA	29	36	7	28	29	5	26	39	7	29	35	6
MNP	9	5	5	15	18	6	8	12	4	11	12	5

We have on-site measurement, diagnosis and treatment for any subject with a current malarial infection, and we are also treating anyone with severe anaemia (haemoglobin <9.0 g/dL). Please see the map and statistics for average prevalence baseline of severe anaemia in each community. When conducting analyses in the future, we will likely use haemoglobin as a continuous variable to observe change over time. All other nutritional results (i.e. iron, zinc, ferritin, and fatty acid profiles) will be analysed once we transport the biological samples to the US for analysis in late December 2016 following the second health assessment. These laboratory analyses require substantial time for processing and results dissemination. It is not possible to provide baseline results at the moment, but we have collected samples to provide these baseline results in the future (Indicator 3.2). Faecal samples were also collected and will be analysed for intestinal parasites to untangle potential mediating factors that could affect nutritional status.

Darwin Project
Time Point 1 Summary Stats

Figure 2: Study Sites – Coverage, sample size, RDT prevalence and anemia



Coverage and sample size (n) refers to the number of active enrollees per site (does not include withdrawals)

*Prevalence results will be subjected to confirmation by RT-PCR

2a. Give details of any notable problems or unexpected developments/lessons learnt that the project has encountered over the last 6 months. Explain what impact these could have on the project and whether the changes will affect the budget and timetable of project activities.

(Output 1)

In February 2016 and without informing WCS, the Development and Environmental Law Center (DELIC), a Malagasy non-governmental organization (NGO), proceeded to restructure the Bureau of Fishermen's Federation Maroantsetra that was established in 2011 by WCS. However, since the institutionalization of Antongil Bay Fisheries Co-Management Plan (ABFMP) in December 2014, it was stipulated that a single unifying entity of traditional fishermen in Antongil Bay would be established, unifying the two fishermen federations in Antongil Bay, the Maroantsetra and Mananara Nord fishermen federations. Under the supervision of MRHP and PCDDBA, WCS was in charge of facilitating the process toward the formalization of the unified Antongil Bay fishermen association.

The restructuring imposed by DELIC created tensions among the associations, WCS and DELIC. On October 5, 2016, a meeting was held between WCS, the Chef Circonscription des Ressources Halieutiques et de la pêche (CIRRHP), PCDDBA, the FPBA, Madagascar National Parks (MNP), the district of Maroantsetra, the police of Maroantsetra, and DELIC, to discuss the role of each NGO in the establishment of the fishermen federation. Three main decisions were made: 1) DELIC will have to comply to the ABFMP coordination structure as established, co-managed by WCS and CIRRHP; 2) quarterly meetings will be held to discuss the progresses of the ABFMP implementation; 3) DELIC will have to inform the ABFMP coordination structure concerning their objectives (to align with the three main objectives of the ABFMP), and the villages in which they are willing to work.

(Output 2)

The commercialisation appeared not to be the main limit to gardening. The main issue is currently pests and disease. Therefore, it is proposed to switch the second supply chain study to a study from an expert in organic gardening, who will identify the main pests and propose organic treatments that can be prepared from local products.

(Output 3)

We changed our research protocol for the health portion of the study. We had initially proposed to work in 100 total households in 4 communities and have now successfully worked for the past year in 225 households in 5 communities. This increase in sample size will provide greater statistical power to understand the nutritional impacts of fisheries management.

We have decided to abandon the low birth weight aspect in indicator 3.3 and only maintain underweight, stunting, and wasting. We have been unable to measure the newborns weight immediately after birth because so few of births occurred in hospitals or coincided with health team visits. However, we can collect data other than those initially proposed. For example, in addition to measuring iron and zinc, we will also be collecting data on anaemia, ferritin, vitamin A, vitamin B12, and fatty acid profiles. In fact, these metrics are far more compelling indicators of changing access to seafood than birth weight. We have already requested and received approval for changing the timetable so that we can complete the nutritional analyses earlier than expected (in 2017). This will allow us to measure differences in nutritional status in low and high fish seasons and then model what the potential nutritional consequences would be of permanent, long term changes in access to fish. To improve health, we will determine whether or not LMMAs are able to provide more access to fish to local communities, whether that would enhance nutrition, and whether traditionally managed areas may lose access to fish in the long-run and thus have reduced nutrition. We do not anticipate any changes to the budget but just changes to the timetable. Much of these new analyses were provided through supplementary grant support from the Harvard T.H. Chan School of Public Health.

2b. Have any of these issues been discussed with LTS International and if so, have changes been made to the original agreement?

Discussed with LTS:	Yes/No
Formal change request submitted:	Yes/No
Received confirmation of change acceptance	Yes/No

3a. Do you currently expect to have any significant (e.g., more than £5,000) underspend in your budget for this year?

Yes No Estimated underspend: £

3b. If yes, then you need to consider your project budget needs carefully. Please remember that any funds agreed for this financial year are only available to the project in this financial year.

If you anticipate a significant underspend because of justifiable changes within the project, please submit a rebudget Change Request as soon as possible. There is no guarantee that Defra will agree a rebudget so please ensure you have enough time to make appropriate changes if necessary.

4. Are there any other issues you wish to raise relating to the project or to Darwin's management, monitoring, or financial procedures?

No

If you were asked to provide a response to this year's annual report review with your next half year report, please attach your response to this document.

Please note: Any planned modifications to your project schedule/workplan can be discussed in this report but **should also be raised with LTS International through a Change Request.**

Please send your **completed report by email** to Eilidh Young at Darwin-Projects@ltsi.co.uk . The report should be between 2-3 pages maximum. **Please state your project reference number in the header of your email message e.g., Subject: 22-035 Darwin Half Year Report**