Department for Environment Food & Rural Affairs

DARWIN INITIATIVE

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Darwin Initiative
Final Report

*To be completed with reference to the Reporting Guidance Notes for Project Leaders (http://darwin.defra.gov.uk/resources/) it is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)*

Darwin project information

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Host country(ies)	Madagascar
Contract Holder Institution	Blue Ventures Conservation
Partner Institution(s)	Direction Régionale des Ecologie, l'Environnement, Mer et des Forêts (DREEMF); Centre Nationale de Recherche Océanographie (CNRO); Honko Mangrove Conservation and Education
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Project Leader Name	Dr. Alasdair Harris
Project Website	www.blueventures.org
Report Author(s) and date	Leah Glass, Aude Carro, Lalao Aigrette, Xi Chen, Frances Humber, Alasdair Harris

1 Project Rationale

Mangrove forests are extremely valuable ecosystems, not only for the critical biodiversity that they support. Additionally, there is now international recognition of the exceptional capacity of mangrove forests to sequester carbon[1], as well as the key role that they will play in climate change adaptation through providing a host of other vital ecosystem goods and services. These include timber, supporting high-value fisheries and providing protection against storms. Yet, for the very reason that they provide so many valuable products, mangroves are under increasing threat.

Madagascar has the fourth largest extent of mangrove forests in Africa, however their loss is severe and occurring more rapidly than in any terrestrial forest habitat. A study by Blue Ventures has revealed that from 1990-2010, Madagascar lost approximately 21% of its mangroves[2]. Socioeconomic surveys at numerous sites on the west coast of Madagascar highlight that much of this loss was anthropogenic[3]. Not only has this loss put thousands of

[1] Donato, D. C., Kauffman, J. B., Murdiyarso, D., Kurnianto, S. and Stidham, M. Mangroves among the most carbon-rich forests in the tropics. *Nat. Geosci.,* 4, 1–5 (2011).
[2] Jones, T. J. Shining a light on Madagascar's mangroves. *Madag. Conserv. Dev., 8. 4-6* (2013).
[3] Jones, T. J., Glass, L., Carro, A., Ravaoarinorotsihoarana, L., Benson, L., Ratsimba, H. R., Giri, C., Ghandi, S. and Cripps, G. Madagascar's mangroves: national dynamics and localized mapping of four distinct ecosystems. *In publication* (2015).

people's lives and property at risk by diminishing the capacity of mangroves to protect them from the regular cyclones that affect the coastline; it has also had a devastating impact on marine biodiversity and the fisheries that coastal communities are reliant upon for both food and income.

While local coastal people are often the primary agents of mangrove deforestation, they also stand to lose the most from this destruction and the consequent loss of mangrove ecosystem goods and services. Coastal people are the key to tackling mangrove deforestation.

Raising local capacity for community-led, sustainable mangrove management and restoration, along with ensuring that communities have legally recognised rights to enforce this management, has the potential to go a long way towards easing mangrove deforestation in Madagascar. However, in a country where almost 80% of rural people live below the national poverty line, for any conservation strategies to be sustainable, financial incentives must be developed.

The carbon sequestered by mangroves has a value on the international carbon market. If this value can be realised and transferred to the people whose livelihoods depend on the exploitation of mangroves, this benefit has the potential to both incentivise and fund sustainable, locally-led mangrove management. Thus, preventing the continued wholesale loss of these invaluable ecosystems and ensuring the long-term sustainability of coastal livelihoods.

A key component of Madagascar's National Policy on Climate Change (2011) is the promotion of voluntary carbon projects for climate change mitigation, the conservation of important ecosystems, and as a means of promoting economic development. This project aimed to feed in to this wider context, working to conserve mangrove biodiversity by alleviating poverty in impoverished coastal areas of Madagascar using the international voluntary carbon market alongside local markets for sustainably sourced mangrove products such as timber and charcoal.

The sale of carbon credits and sustainably sourced mangrove wood products will provide substantial income to local people, and enable them to conserve their primary mangrove habitats.

The five key outputs which the project worked to achieve in order to work towards this aim were:

1) Communities have clear and uncontested land and user rights to their customary mangrove areas; and give their Free Prior & Informed Consent (FPIC) to use these areas for a forest carbon project.

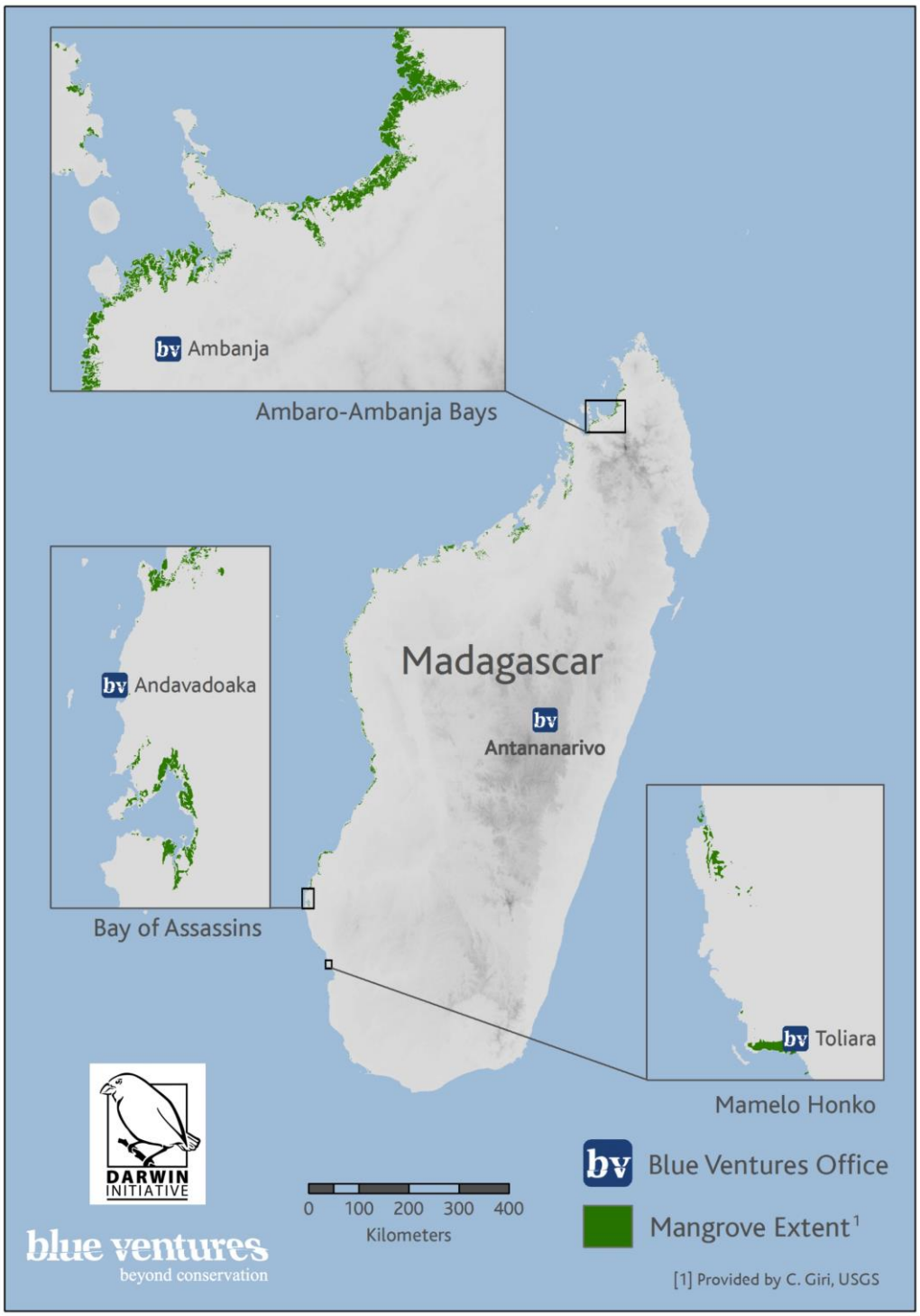
2) Communities have established mangrove afforestation/reforestation areas, sustainable forest management areas, and conservation areas; and are competently managing these areas.

3) Communities are producing sustainable charcoal and timber.

4) The carbon stocks and harvestable timber of the community mangroves have been measured and are being adequately monitored.

5) The requirements for a forest carbon project that will generate carbon offsets are fulfilled.

The project's activities were implemented at three sites on the west coast of Madagascar (*Figure One*):



- The **Ambaro and Ambanja Bays** (AAB) in northwest Madgascar.

With 25,000 hectares of mangrove forest, these two bays host Madagscar's largest mangrove complex. Additionally, this region is currently experiencing the most rapid rates of mangrove deforestation nationwide: from 1990 to 2000, 20% of the areas mangroves were lost[4], primarily due to charcoal production.

Carbon projects validated under the Verified Carbon Standard (VCS), which is the regarded as the most robust validation body and the industry benchmark, are thus most sought after on the voluntary carbon market. When dual validated under the Climate, Community and Biodiversity Alliance Standard (CCB), net positive benefits for climate change mitigation, local communities and biodiversity are ensured, further increasing credit desirability. However, VCS project start-

[4] Jones, T. J., Ratsimba, H. R., Ravaoarinorotsihoarana, L., Cripps, G. and Bey, A. Ecological Variability and Carbon Stock Estimates of Mangrove Ecosystems in Northwestern Madagascar. *Forests*, 5, 177-205 (2014).

up and on-going monitoring costs are high, so levels of baseline deforestation and project scale, which equate to eventual levels of project revenue, must be high enough to offset these costs. Due to the extent and rapid rate of mangrove loss in AAB, this project has piloted VCS+CCB mangrove carbon project at this site, along with the community mangrove management activities necessary for this project's outputs and the success of a carbon project.

This project worked with 5 community management associations (*Communautés Locales de Base*, CLBs) (Annex 7) who manage 6,106 ha of intact and degraded mangrove habitat. Approximately 16,000 people live in the fifteen coastal villages within the pilot site.

- The **Bay of Assassins** (BOA) in the Velondriake Locally-managed Marine Area.

BOA is a vast, remote mangrove embayment in the southwest of the country. Deforestation rates here are comparatively low compared to Ambaro-Ambanja, but the local market demand for timber has risen significantly in recent years and this trend looks set to continue. With the communities of BOA, we are developing a project to be verified under the Plan Vivo (PV) Standard. This standard is a certification framework for community-based PES programmes supporting rural smallholders and community groups with improved natural resource management. The standard is designed to ensure that PV projects benefit livelihoods, enhance ecosystems and protect biodiversity. PV provides a framework for the equitable transaction of ecosystem services with communities and enables access to a range of funding sources and markets for ecosystem services, including voluntary carbon credits. PV project costs are significantly lower than for VCS, making this a more appropriate model for small-scale projects or regions with lower deforestation rates, such as BOA.

Approximately 3,000 people reside within the project area, which includes 3,800 ha of intact and degraded mangroves (Annex 8).

- **Mamelo Honko** (MH) in Ambondrolava

In this small mangrove ecosystem in southwest Madagsacar, the project tested the feasibility of a PV project. 4,529 people live within the project site (Annex 9), which includes 500 ha of mixed mangroves and brackish wetland dominated by reeds. Mangrove loss in MH is mainly driven by timber extraction and charcoal production for commercial and subsistence use.

Both the BOA and MH sites were chosen based on strong community links already existing with Blue Ventures (BV) and our partner, Honko Mangrove Conservation and Education (Honko).

2 Project Achievements

2.1 Outcome

The intended Outcome of this project was:

Coastal communities are earning income from the sale of carbon credits, charcoal and timber that they supply through mangrove reforestation and sustainable forest management, so enabling them to improve their livelihoods and conserve mangrove forests in the long term.

It was made clear in the project proposal that this might not necessarily be fully realised within the three years of the requested funding given that:

- forest carbon projects normally work on a 5-year verification cycle and take several years to develop;

- First generation planted trees will take several years to attain a harvestable size.

However, the project made substantial progress towards achieving this outcome. The foundations for community-focused mangrove carbon projects were laid in both AAB and BOA. At both project sites, we are on target to achieve fully developed carbon projects within two to four years following this project, in keeping with most forest carbon projects. Of significant relevance to this was the review and publication of the Project Idea Note (PIN) for the BOA project in February 2015 (Annex 10). The project is attractive to buyers as it is the largest

mangrove Plan Vivo project in the world and Madagascar's first Plan Vivo project; and has promise to sell "boutique" credits due to the knock-on benefits the project will have to broader ecological resilience.

In AAB we are striving to develop what will be the world's first VCS mangrove conservation project. The science required for this is novel and there is still no methodology outlining a protocol for VCS mangrove conservation projects. Our assumption that a suitable methodology would be available by 2014 has proven incorrect. To work towards a resolution to this major constraint, throughout the duration of this project BV has been collaborating with two separate groups that are developing VCS conservation methodologies. While progress has been slow due to funding challenges outside of the scope of this project, full funding has now been secured by one of these groups, so we are confident that this challenge will be overcome within the next year.

Furthermore, in AAB we are aiming to include the soil carbon pool - the most carbon-rich pool in mangrove ecosystems - in project emission reduction calculations. Finalising the science necessary to do this has taken much longer than anticipated. To overcome this, with funding from the GEF/UNEP Blue Forests project, internationally renowned mangrove carbon scientist Prof. Boone Kauffman has been contracted to help finalise the science and conducted a field mission in AAB in June 2015 (Annex 11).

Despite these challenges, a draft PIN and financial analysis for the AAB project was released in November 2014 (Annex 12).

At MH, the feasibility of a mangrove carbon project was fully tested, including establishing the amount of carbon stored within the mangroves of MH and the drafting of a PIN (Annex 13). This assessment revealed that the low amount of carbon in MH's small mangrove system would result in the project being financially infeasible. Additionally, partner NGO, Honko Mangrove Conservation and Education (Honko), experienced funding and human resource shortfalls beyond the means of this project during the implementation period. Despite the infeasibility of the carbon project and Honko's administrative challenges, the project has continued to support the work in MH by providing technical support to Honko relating to mangrove and activity monitoring, and co-organising community knowledge exchange trips.

For community-focused carbon projects to be a success, the locally-led management underpinning habitat conservation and restoration must be established and strong community-buy-in is essential. Through securing mangrove management rights for the 19,000 people within the AAB and BOA project areas and developing community-designed sustainable mangrove management plans covering 9,900 ha of mangroves, significant inroads have been made towards these necessities. 2,650 ha of these management areas are strict conservation zones, governed by legally recognised local laws that prevent all forms of mangrove exploitation.

Over the course of the project, a total of 74 ha of mangrove have been restored across AAB, BOA and MH. This reforestation has generally been very successful, with an average success rate of 91% in BOA and 95% success rate in AAB. In AAB 4,900 *Avicennia marina* seedlings have been planted in nurseries run by local women's associations and in MH the local community association has been successfully running an *A. marina* since January 2014.

Final reforested areas are significantly smaller than those predicted in the original proposal (2,500 ha). Various challenges have led to this; as stated in annual reports, one being lack of staff to adequately support such a large reforestation effort. Mangrove reforestation is notorious for having low success rates if poorly managed - in particular in relation to planning suitable locations and tidal times. In both AAB and BOA, tidal patterns constrain effective reforestation efforts to twice a month. By strategically reforesting small areas with a high success rate, we have ensured communities' ongoing support for reforestation efforts. Also, out of choice, we have been working under a voluntary model, with a strong focus on women's engagement, and this depends greatly on the social dynamic in each village. While paying people to replant no doubt leads to faster results, the sustainability of this model beyond donor/carbon finance is questionable. By concurrently running awareness-raising campaigns, educating in the importance of mangrove restoration and how to do it correctly, we have developed a sustainable model that is largely community-run, with assistance from BV mainly regarding ongoing monitoring. Around 69% of the reforestation in AAB has been performed with no

assistance from BV. The clear definition of reforestation zones in the management plans will allow for more focused and efficient community reforestation efforts in the future.

Formal user rights and management plans in AAB were only finalised in Y3 of the project, due to the complex legal framework governing mangrove management in Madagascar and delays in collecting the forest inventory data necessary for the calculation of robust and realistic sustainable harvest quotas. The management plans in BOA were also only finalised in Y3. This means that reductions in the deforestation rates at either site are yet to be monitored. However, in addition to the formalisation of management rights and the development of mangrove management plans, whilst working through the delays the project has significantly raised the capacity of communities in sustainable and transparent management practices at both sites. With this additional capacity and knowledge, we are confident that, irrelevant of carbon project development, mangrove deforestation rates at both sites will decrease in the future. Full details and supporting annexes can be found in Section 2.3 and Annex 2 of this report.

The delay in the calculation of sustainable harvest quotas led to significant delays in communities earning money through the sustainable harvesting of mangrove timber and thus seeing an increase in household income. However, quotas now exist for all 5 CLBs in AAB (Annex 14).

The timber and charcoal sales aspect of the Outcome has also faced a barrier in that, while commercial extraction of mangroves is widespread, national and local laws do not permit communities to use mangroves for commercial gain (Order No. 12.704/2000). Despite our consultation efforts at both the regional and national level in Y2 and Y3, sustainable commercial exploitation of mangroves still faces legal barriers. As per our change request in July 2014, the project has overcome this challenge through the development of terrestrial fuelwood plantations in AAB to legally and sustainably supply local urban markets while continuing to provide local communities with a crucial income source. In AAB, 3 ha of plantations have been established and 5 local producers trained in the set-up and maintenance of these plantations (Annex 15). In BOA, preliminary zoning has been completed and ongoing funding from the Helmsley Trust has been secured to scale-up the plantations in AAB and develop them in BOA.

To overcome these legislative challenges, BV continues to work closely with the national and regional authorities to reform and simplify mangrove management regulations, making them easier to navigate for local management associations and favouring careful amendments that allow community associations to financially gain from the sustainable exploitation of mangroves. Of critical relevance to this is our place on the recently formed National Integrated Mangrove Management Commission (CNGIM) (Annex 16).

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

The goal/impact of this project was to:
Make effective contributions in support of the implementation of the objectives of the Convention on Biological Diversity (CBD), the Convention on Trade in Endangered Species (CITES), and the Convention on the Conservation of Migratory Species (CMS), as well as related targets set by countries rich in biodiversity but constrained in resources.

The sub-goal of this project was to achieve conservation of Madagascar's mangrove habitats and their associated biodiversity.

By securing mangrove areas in some of the poorest regions of Madagascar, this project has directly contributed to the welfare of coastal communities in Madagascar whose livelihoods are directly dependent on mangrove forests. Simultaneously, our core project activities built community capacity to govern natural resources, contributing directly to Madagascar's targets under the CBD for 1) the conservation and sustainable use of biodiversity, and, 2) fair and equitable sharing of the benefits from biodiversity.

As stated in the original proposal, changes in household incomes attributable to sustainable forest management would not occur within the project lifetime. However, the draft business plan

for AAB indicates that, even without accounting for the soil carbon pool, the carbon project has the potential to bring $1.2 million of net revenue to the CLBs and community members that are project participants over the 30 year project. By conducting detailed socioeconomic surveys in AAB in 2013 (Annex 17) and BOA in 2014 (Annex 18), baselines have been established for tracking the positive impact of the sustainable management practices as they come into effect through the forest carbon project cycle. The Integrated Social Survey (ISS) currently being developed by BV, as described in Section 5.1, will support the future monitoring and assessment of the impact on poverty due to the activities and schemes initiated by this project.

Similarly, due to the fact that mangrove management plans were only finalised in AAB and BOA in Y3 of the project, it is not yet possible to establish changes in biodiversity indices due to this project. However, the management plans developed through this project, and the community capacity building for mangrove monitoring, management, and reforestation in Madagascar that has occurred concurrently, will directly contribute to the conservation and restoration of biodiversity by protecting 2,650 ha of mangrove habitat, placing 4,671 ha under sustainable management regimes and zoning 2,589 ha for reforestation. As the AAB carbon project will be validated under the CCB standard, the impact of the community mangrove management on biodiversity in the project area will be monitored. In order to assess this impact in the future, a biodiversity baseline assessment has been completed in BOA (Annex 19) and was initialised for the AAB site in Y3. Funding has been secured through the GEF/UNEP Blue Forests project to finalise the AAB baseline.

A biodiversity survey, focusing on bird and lemurs, was completed in AAB in April 2015 (Annex 20). This survey revealed that 28.7% of all bird species in Madagascar exist either directly in the mangroves of AAB, or immediately adjacent to, on the seaward side. Of the 73 species directly observed, four are listed as globally threatened on the IUCN Red List (*Haliaeetus vociferoides*, CR; *Ardea humbloti*, EN; *Ardeola idae*, EN and *Anas bernieri*, EN), while two additional EN species are also known to inhabit the region (*Threskiornis bernieri* and *Xenopirostris damii*). Eighteen observed species are endemic to Madagascar, including four species belonging to endemic genera (*Neomixis tenella*, *N. striatigula*, *Hartlaubius auratus* and *Lepidopygia nana*), one belonging to an endemic subfamily (*Coua cristata*) and five belonging to the endemic family Vangidae (*Newtonia brunneicauda*, *Leptopterus chabert*, *Vanga curvirostris*, *Artamella viridis* and *Falculea palliata*). In addition to these bird observations, the survey also recorded a sighting of the Endangered, nocturnal northern giant mouse lemur, *Mirza zaza,* and the Critically Endangered Claire's mouse lemur *Microcebus mamiratra*.

By maintaining healthy mangrove ecosystems, going forward, this project will also contribute directly to securing the livelihoods of the estimated 10,000 people relying primarily on mangrove fisheries in AAB and BOA.

While this project has faced considerable challenges to provide current mangrove charcoal and timber producers with a sustainable alternative within its timeframe due to legal constraints (e.g. the ban on commercial mangrove exploitation), it allowed for identifying locally-adapted integrated conservation and poverty reduction strategies and secure financing to implement them (eg. alternative fuelwood plantations). A three year grant from the Helmsley Trust will allow our team to scale up fuelwood plantations and launch timber plantations, in order to reduce pressure on mangroves and to provide new alternative livelihoods for charcoal and timber producers in beekeeping and aquaculture.

2.3 Outputs

Output 1. Communities have clear and uncontested land and user rights to their customary mangrove areas; and give their Free Prior & Informed Consent to use these areas for a forest carbon project

Within the constraints of the carbon project development cycle, the project has fully achieved this output.

In AAB, following the successful re-evaluation of the 3 CLB contracts that required renewing, all 5 CLBs and the 16,000 people within the project site have management rights to their mangroves through the GELOSE Act 96-025 ('Gestion Locale Sécurisée' - the 'Secured local

management of natural resources') (Annex 21). At the start of this project only 2 CLBs had valid contracts.

In BOA, management and carbon rights have been transferred to communities through Madagascar's Protected Areas Act. Definitive protection status was granted to the Velondriake MPA, which encompasses the PV project area, in May 2015 (Annex 22). The management plan for BOA was submitted to the System of Protected Areas for Madagascar (SAPM) as part of the overall Velondriake management plan (Annex 23).

An analysis of private tenure conflicts in AAB using official government GIS tenure data revealed 200 ha of tenure conflicts in the project site and these areas have been removed from the community management plans. However, BV are currently working with the regional government to resolve these conflicts and following initial consultations a potential resolution has been defined for 68 ha of these conflicts. In BOA, private tenure conflicts were analysed through verification at the cadastral services of Tulear and the advertising of the Plan Vivo delimitation at Befandrefa Commune, and no conflicts were identified.

In addition to this tenure analysis, in AAB, 34 villages covering a further 21 CLBs were surveyed to establish community management rights across the two bays, along with the management capabilities of those CLBs (Annex 24). This database was validated and shared with regional officials at a workshop in December 2014.

In both AAB and BOA, awareness-raising campaigns, critical to building the foundations of the "Informed" aspect of FPIC, have provided communities the background necessary to understand forest carbon projects. 40 educational sessions involving approximately 950 people were held in AAB and 40 sessions involving 550 people were held in BOA.

Following 4 rounds of consultations in the 10 villages that for the PV project, the FPIC process is complete in BOA, with all participating communities confirming their consent to be a part of the project (Annex 25). Preliminary FPIC has been gained in AAB following 2 rounds of consultations in the 21 villages that form the carbon project area. However, the results of the votes and knowledge assessments carried out immediately after the second campaign highlighted the need for further educational sessions to ensure communities have an adequate level of understanding of REDD+ (Annex 26). Due to the delays in carbon project development, this process is on hold until the soil carbon science issues have been resolved, to ensure communities go into the project with this information fresh and clear in their minds.

All procedures followed by this project conform to the UN-REDD FPIC standard. Experience from both sites on the FPIC process were synthesised in a report (Annex 27).

Gaining FPIC took longer than predicted in the project proposal. Community buy-in and, crucially, understanding is critical to the long term success and legacy of this project. Explaining climate change and the broad details of carbon projects to remote coastal communities, often with limited formal education and literacy skills, was a challenging but rewarding experience. Tailored presentations and poster comics (Annex 28) in the regional dialects were developed to aid this process. The increased understanding that resulted from a more extensive community awareness-raising and consultation sessions were definitely worth the delays caused to the project's progression.

Output 2. Communities have established mangrove A/R, SFM and conservation areas; and are competently managing these areas

At the end of this project, all partner communities in AAB (Annex 29) and BOA (Annex 30) had validated mangrove management plans (with no management plans at the start of the project).

In AAB 1,820 ha of mangrove have been placed under a conservation regime and 1494 ha have been zoned for reforestation. A further 2,794 ha have been placed under a sustainable forest management (SFM) regime.

In BOA, 877 ha of mangrove have been placed under a SFM regime by communities, 830 ha have been placed under conservation regimes and a further 1,095 ha have been zoned for reforestation. The local laws governing the conservation and reforestation zones have been

validated by the communities. The law relating to the SFM areas is pending calculation of the sustainable harvest quotas (see Output 3 below).

All management zones have been delimited on the ground in AAB. Demarcation is ongoing in BOA.

In both AAB and BOA, management plan development was fully participatory, starting with a Theory of Change investigation, to establish drivers of mangrove destruction and potential solutions, and participatory land-use mapping (Annex 31), before moving onto management zoning (Annex 32) and validation.

In AAB, community capacities in mangrove management have been raised through 1 community education session on sustainable mangrove management practices and 1 reforestation training in each of the 15 villages of the pilot site. 47% of the 60 management association board members were trained in GELOSE and mangrove legal framework, as well as dina enforcement procedures, through two trainings organized in collaboration with the local forestry service (Annex 33).

Reforestation activities occurred throughout the duration of the project. These activities resulted in 53 ha of mangroves being replanted in AAB (Annex 34) with a success rate of 95%, and 7.8 ha being reforested in BOA (Annex 35) with a success rate of 91%. In MH, over the course of this project community-based restoration efforts undertaken by Honko and the local community resulted in over 200,000 mangroves planted over 13 ha. Species planted at all sites were a mixture of *Rhizophora mucronata, Ceriops tagal*, *Bruguieira gymnorhyza* and *Avicennia marina*.

The project trained and supported women's association members from 2 villages in AAB to manage and maintain *A. marina* nurseries. A knowledge exchange visit was organised in Y3 to facilitate the development of the nursery in the second village. Over the course of the project 4,900 seedlings were successfully established.

Reforestation training has formed a large part of the project, with community members at all sites trained in the same standardised protocol (Annex 36). In July 2014, in partnership with Honko, an exchange trip was organised for community members of BOA with the management and reforestation committees of MH.

The challenges encountered by the reforestation activities, how the project dealt them and the effect these challenges had on expected project output are outlined in detail in Section 2.1.

A strong emphasis has been placed on women and youth involvement in reforestation. Most of the reforestation in AAB has been done by local women's associations and these associations also maintain and manage the nurseries. In AAB, two reforestation sessions were organised with 2 primary schools, involving about 300 children (Annex 37). About a hundred young people from 9 local football teams were involved in 2 mangrove reforestation contests. In BOA, mangrove reforestation has been incorporated as an activity in the Velondriake-wide *Ampela Tsimanavake* women's empowerment campaign and the reforestation event organised for International Women's Day in March 2015 was the largest single mangrove reforestation event ever to be held in Madagascar.

Output 3. Communities are producing sustainable charcoal and timber

As explained in Section 2.1, due to legal issues surrounding the commercial exploitation of mangroves in Madagascar, the activities for this output were changed during the project implementation period. Specifically, the Activity 3.2 was changed from '*Training & production of charcoal using improved kilns; continued technical support*' to '*Identify and develop community-run alternative fuelwood plantations*' and Activity 3.3, '*Linking of sellers to urban buyers through simple mobile phone messaging*', was removed. These legal challenges were not anticipated in the project's assumptions and prevented the project from fulfilling this outcome within the project timeframe, but solid progress has been made towards sustainable charcoal and timber production.

Following the inventory of 92 forest plots and a mangrove wood use survey in Y3, sustainable harvest quotas for subsistence use have been calculated for all 5 CLBs in AAB. Quotas are currently being validated at the village level. These, and the associated local by-laws, will be

incorporated into the GELOSE management plans and ratified by the regional forestry authorities by the end of 2015

In BOA, 23 forest plots were inventoried in Y3. A mangrove wood use survey has been completed and a further 38 plots have been measured since the end of the project, in order to collect a wide enough sample to calculate robust quotas; and these quotas will be established before the end of 2015.

A quota-tax toolkit for communities has been developed and refined, to assist them with the transparent implementation and management of quota-taxes collected from the SFM areas (Annex 38). All 5 CLBs in AAB will be trained to use this toolkit and implementing quotas by the end of 2015. This toolkit will be implemented in BOA once the quotas are established.

In AAB a study on 27 kilns carried out by two Ecole D'application Des Sciences Et Techniques Agricoles Et De La Promotion Rurale (EASTA-PRO) D`Ambanja students in October 2013 showed that the current conversion yield (dry mass of charcoal/dry mass of wood) of local mangrove charcoal production is between 11% and 19% (Annex 39). These results suggest that little can be gained from the introduction of improved kilns, which typically yield between 14% and 20%. The study suggests that the main improvement to current practices is the lengthening of wood drying period prior to carbonisation. While BV cannot condone sustainable mangrove charcoal production within Madagascar's legislation, it did feed this information back to charcoal producers in Y2.

In AAB, a study carried out in July-August 2014 by a Master's student from Yale University assessed small-holders' preference for alternative fuelwood and timber species in the project area and identified 17 species adapted to local conditions that could replace mangrove as a charcoal source while providing other co-benefits (fertilisation, soil conservation, fodder, beekeeping etc.) (Annex 40). Following this important step, 5 producers were identified in one village and a community nursery was established in October 2014. In total, 1,300 seedlings of *Eucalyptus camaldulensis* and 1,000 seedlings of *Acacia mangium* were planted from February to March 2015 on the land of these five producers, totalling 3 ha of plantations (Annex 41). Following the recommendations of the Darwin Initiative, BV is working towards diversifying the fuelwood species mix to avoid mono-culture of exotic species and provide other goods and services than timber and fuelwood. The plantation campaign in 2015/16, funded by the Helmsley Trust, will test 4 endemic (*Khaya madagascariensis* and *Cordyla madagascariensis*) and naturalized species (*Inga dulcis* and *Tamarindus indica*).

In BOA, areas eligible to establish alternative timber plantation were defined through a participatory zoning exercise in May 2014 and candidate species were identified in partnership with a technician from the DREEMF during a mission in January 2015 (Annex 42). The characteristics (naturalized, native, fast or slow growing) and the availability of the seeds for the species identified were investigated at the SGNF (National bank of Forestry seeds) Antananarivo in February 2015.

Output 4: The carbon stocks and harvestable timber of the community mangroves have been measured and are being accurately monitored

Through this project, a draft measurement and monitoring methodology comprising of two levels – forest inventory and scientifically rigorous carbon measurement – has been developed (Annex 43). The rigorous carbon protocol meets both the VCS Project Standards v.3.0 and Plan Vivo Foundation 2013 Standards.

Using this methodology, carbon stocks have been successfully been measured in AAB, BOA and MH.

In AAB, 164 plots measuring both vegetation and soil carbon were established (Annex 44). Above- and below-ground carbon stocks have consequently been calculated and published in a peer-reviewed journal (Annex 45), which represents the first publication of whole ecosystem carbon stocks for Madagascar mangroves. The vegetation carbon stocks have a relative standard error of just 4.35%. However, the soil carbon stock values have a higher standard error of 20.56%, appear low compared to literature and present an inconsistent trend between forested and deforested plots, which might be the result of several methodological biases. As

described in Section 2.1, this is be addressed beyond the timeframe of this project through additional research financed by the GEF-funded Blue Forests project.

In BOA, above- and below-ground vegetation carbon stocks have been calculated following the measurement of 61 carbon plots. The overall relative standard error of these carbon stocks is 4.18%.

In MH, as outlined in the PIN, a baseline carbon inventory was conducted in both intact mangrove areas (34 plots) and mangrove plantations (22 plots), and above- and below-ground carbon stocks were calculated from this data to a relative standard error of 11.3%. With the support of BV, this inventory was consequently used to define a mangrove ecosystem monitoring programme of 100 permanent monitoring plots (Annex 46). These plots are stratified across intact, degraded, deforested and replanted mangroves. Within each 10m x 10m plot, Honko's local staff and international volunteers collect data relating to above- and below-ground forest structure, dead organic material, and abiotic factors once every 3 months. All plots were successfully established by July 2014.

Co-financed by the MacArthur Foundation, a soil carbon laboratory specialising in the Loss on Ignition (LOI) method has been established at the Université d'Antananarivo (ESSA-Forêts) (Annex 47). This is an important legacy of the project, as it allows for mangrove soil carbon stocks to be analysed in-country using the simple yet effective LOI method; something that was not possible prior to this project. 3 BV staff members and 4 Malagasy ESSA-Forêts graduate students have been fully trained in the operation of this laboratory. Through this project we have also set up an important collaborative relationship with Bangor University, where a sub-set of our soil carbon samples are being analysed to calibrate the LOI results and ensure their accuracy.

All of the data described above are centrally housed in a transparent manner online and has been shared with communities, academic partners and relevant government authorities.

Training and involvement of community members in this work has been an important focus of this project, to ensure community involvement in and understanding of the carbon projects, and also so they can see first-hand the impact of their sustainable management efforts. In AAB, 61 men and 30 women, plus four staff from the partner NGO l'Homme et l'Environnement, were trained in the forest inventory methodology. Carbon monitoring training has been postponed in AAB until the carbon project is further developed. In BOA, 22 women were trained in the carbon monitoring protocol, often using community co-trainers from previous carbon monitoring training sessions.

In partnership with the United States Forestry Service, our rigorous carbon monitoring methodology has been harmonised with other regional protocols to form the 'East African Mangrove Carbon Fieldwork Protocol' (Annex 48), which was released at a workshop in Mozambique in April 2015.

While carbon measurement has been fully achieved by the project, due to the delays in the development of the management plans and carbon project initialisation, carbon monitoring will only occur post-project.

Because the sustainable harvest quotas were only calculated at the end of Y3 for AAB and are still be developed for BOA, harvestable timber is yet to be monitored. Monitoring will be implemented by CLB boards, who will deliver logging permits and track quota delivery using the quota-tax toolkit, and community forest guards who will ensure that community mangrove loggers have a valid permit through bi-monthly patrols.

Output 5. The requirements for a forest carbon project that will generate carbon offsets are fulfilled

In AAB, significant advances have been made towards the development of the world's first VCS+CCB mangrove conservation carbon project that will protect 12,000 ha of the most critically threatened mangrove complex in Madagascar. The project area has been defined through community consultations and validated through a workshop held in December 2014 in Ambanja; and a draft PIN was released in November 2014. However, more research is needed

to assess the organic carbon content in mangrove soils, which has put the finalisation of the PIN and the development of the PDD temporarily on standby.

Following multiple national and regional consultations (Annex 49), both national and regional governmental support has been secured for both the AAB and BOA projects.

Through collaboration with the Tuck Business School, a preliminary business model was developed for the AAB project (Annex 50). This analysis shows that even without the inclusion of avoided soil carbon emissions the project has the potential to bring US$1.2 million to the community and CLB project participants over a 30 year period. Critically, this study showed that this money is enough to offset the opportunity costs borne to the community due to the project.

Through the review and publication of the PIN by the PV Foundation in February 2015, major progress has been made toward the development of a PV project in BOA. The PDD for this project is currently in development and it is hoped that the project will be validated in late 2016.

As a means to attract investors/funders to the BOA project, a short promotional documentary was filmed and released in 2015, outlining the activities that form the project, the resulting benefits to the local communities and why the project is worthy of investment.

While it was acknowledged in the proposal that carbon projects typically take 5 years to set up and significant advances have been made toward carbon project development through this project, neither the AAB nor BOA projects are as far along as anticipated. This is due to a number of factors, including the length of time required to secure FPIC and challenges with the carbon science in AAB. However, of particular note for other organisations looking to develop community-focused conservation carbon projects is the length of time necessary to secure management rights for communities, especially in a legal settings similar to Madagascar, and establish the management structures and plans that underpin and guarantee the success of truly community-focused schemes. Irrelevant of scientific rigour, if these structures are not effective the carbon project will fail. This time was something that was underestimated in this project's proposal.

Throughout the duration of this project, staff shortages have frequently been referenced as causing delays in deliverables, particularly relating to this output. The project lacked a technical Blue Carbon Manager for 1.5 years of the 3 year project. This position was challenging to fill within the constraints of the project budget. The lack of personnel had a knock-on effect to many activities, as this position's extensive responsibilities had to be delegated to other project staff. The position was filled in January 2015 and since then progress has been as predicted in the project proposal. This challenge was not anticipated in the project's assumptions and forms an important lesson for other NGOs planning to develop a carbon project.

3 Project Partnerships

While not without its challenges, this project has both developed new partnerships for BV and significantly strengthened existing ones.

Main Partner Institutions:

Direction Régionale des Ecologie, l'Environnement, Mer et des Forêts (DREEMF)

BV's close collaboration with the DREEMF in AAB (DIANA) and BOA (Atsimo-Andrefana) has been pivotal to the success of this project. In Madagascar, the DREEMF administer public forest land and manage the transfer of management rights to community associations. It has only been through close partnership with the DREEMF in the DIANA region that this project has secured management rights for the 3 CLBs in AAB. The Atsimo-Andrefana DREEMF are supporting the development of alternative fuelwood plantations in BOA, through advice and supply of suitable tree species.

This partnership also stemmed from demand from the DREEMF and local communities. Across Madagascar, the DREEMF is limited in its ability to support community associations through the process of management transfer due to a lack of both financial and staff capacity. While it has been beyond this project to financially support the DREEMF, it has provided extensive capacity support through acting as a liaison between the DREEMF and communities, supporting punctual missions of local DREEMF staff when judged necessary, and partnering with them to carry out certain activities such as GELOSE and mangrove legal framework training for CLBs.

Due to the intrinsic link between the DREEMF and forestry management in Madagascar, this partnership will undoubtedly continue beyond this project.

Honko Mangrove Conservation and Education

Honko is a NGO based at the MH project site, where they undertake education and mangrove forest management, and aim to grow social capital. In particular, they possess mangrove reforestation expertise and local knowledge. Through this project, BV established a partnership with Honko to provide technical support and funding to cover the feasibility testing of a PV project in MH. The Memorandum of Understanding signed by both partners in 2012 outlined Honko as the project lead and BV as the technical advisor. The early stages of this partnership resulted in the PIN for a MH PV project.

However, the partnership with Honko has been significantly scaled back since May 2013, when Honko experienced funding and staffing shortfalls beyond the scope of this project, which limited community activities on the ground. High staff turnover throughout the duration of this project in Honko has presented significant challenges. To successfully implement a PV project it is necessary for Honko to build their internal capacity and BV communicated this to the Honko board of directors. Due to the low financial potential of the project, it was jointly decided that plans to implement the PV project would be put on hold.

Nonetheless, BV and Honko have remained in close communication, conducting bi-annual meetings to track project status. BV has offered the use of the PIN, or other intellectual support given to Honko through this project, to conduct fundraising or secure the staff necessary to develop a PV project at this site. We have also continued collaborating through field visits, exchange trips, and providing technical advice on mangrove monitoring, to share knowledge between the BOA PV participants and the MH community-based association. Honko continues to work on community-based mangrove conservation but is not currently in a position to pursue sustainable financing options for mangroves.

Département Forêt de l'Ecole Supérieure des Sciences Agronomiques of the Université de Antananarivo (ESSA-Forêts) and Institut Halieutique et des Sciences Marines (IHSM) of the Université de Toliara

Throughout this project, BV has collaborated closely with ESSA-Forêts and IHSM. Through this project we have supported 6 students to gain post-graduate degrees from these institutions. 1 IHSM PhD student continues his research with BV following the completion of this project. Research proposals, terms of reference for academic studies, data analysis, and final deliverables were developed in cooperation with students and supervisors to ensure that the work conducted contributes to the overall Darwin project objectives. BV reviewed all of their theses and upon defence, one of our staff members always sat on the jury as a thesis examiner.

ESSA-Forêts faculty member, Harify Rakoto Ratsimba, was a key contributor and co-author on all peer-reviewed publications relating to the research conducted through this project.

As described for Output 4 in Section 2.3, a soil analysis laboratory at ESSA-Forêts will be a significant legacy of this project.

BV works closely with both of these institutions through all of its broader projects, so these collaborations will certainly continue beyond this project.

Centre Nationale de Recherche Océanographie (CNRO)

Unfortunately, our partnership with the in AAB did not yield significant results. The CNRO has been undergoing a management transition since 2013. Due to lack of funding from the Malagasy Government, the CNRO has put in standby its research activities and management restructuration. To support them through this time of change, this project has employed their technicians on a part time basis when their expertise has been required to carry out fieldwork and research.

A collaboration plan will be established as soon as the CNRO starts functioning again.

Principal Additional Partnerships:

Other Government Authorities:

Throughout the project BV have maintained close communication and collaboration with the authorities overseeing the national REDD+ programme. Our membership in Madagascar's national Monitoring, Reporting, and Verification Group (GT-MRV) for REDD+ meets the demand for mangrove carbon experts at the national-level within Madagascar. Regular consultations and workshops enabled us to ensure that mangrove forests are properly taken into account by, and contribute meaningfully to, Madagascar's Readiness Preparation Proposal (R-PP) for REDD+, notably with the inclusion of AAB carbon stock data. This collaboration has led to mangroves being included in the R-PP; one of the few countries in the world where this is the case. With the cooperation of all members of the GT-MRV, the R-PP was approved by the Forest Carbon Partnership Facility on 4 July, 2014.

See Annex 49 for a comprehensive list of the 86 government meetings attended throughout the duration of this project.

Private partners

Discussions with UNIMA re-started in November 2014 as a result of increased interest from one of their distributors, Carrefour, to finance a large-scale mangrove and fishery management project in Mahajamba Bay. A draft proposal was submitted to UNIMA in January 2015 (Annex xxx), and following a prospection mission in Mahajamba Bay in March 2015, a revised proposal was submitted to them in April 2015. We are hopeful that this collaboration will lead to the replication of some of this project's work at another site in Madagascar.

East Africa Forum for Payments for Ecosystem Services (EAFPES)

One of our project managers is the EAFPES Madagascar focal point, and leads communications with this forum of stakeholders working on PES projects in East Africa. This partnership has been important to the dissemination of the work resulting from this project at the East Africa regional scale.

Plan Vivo Foundation

The Plan Vivo Foundation supported the technical development and evaluation of our BOA and MH projects. One Plan Vivo stakeholder meeting was attended in Edinburgh, UK, in October 2014. During this meeting, Charlie Gough, BV's Monitoring and Evaluation Coordinator, explained our blue carbon projects and this interview was included in a Plan Vivo video.

Worldwide Fund for Nature

Our formal partnership with Worldwide Fund for Nature, Madagascar and Western Indian Ocean Programme Office (WWF MWIOPO) to conduct a feasibility study for blue carbon in the Tsiribihina and Manambolo Deltas. Following the completion of this study BV has been working closely with WWF MWIOPO regarding the potential development of a blue carbon project in the Tsiribihina Delta and continues to provide technical advice when requested. BV also partnered with WWF MWIOPO on several occasions to carry out management association inventories and REDD+ FPIC consultation in AAB. A formal agreement of principle was obtained from WWF MWIOPO to integrate two of their sites, Antsatrana and Ankazomborona, into the AAB carbon project area, ensuring this partnership continues into the future.

International Academic Institutions

As outlined for Output 4 in Section 2.3, through the carbon science component of this project, productive collaborations with the United States Forestry Service and Bangor University have been established through this project. BV's close links to national research institutions ensures these are lasting relationships for Madagascar.

4 Contribution to Darwin Initiative Programme Outputs

4.1 Project support to the Conventions (CBD, CMS and/or CITES)

Madagascar's National Strategy for Sustainable Management of Biodiversity (NSSMB) was established in 1996 under the CBD. Outputs 1 and 2 of this Darwin project contributed directly to the NSSMB objective of promoting a common welfare and ownership and involving local people in development processes. By implementing the building blocks for carbon projects, we have worked to promote alternatives to deforestation and the inclusion of mangroves in Madagascar's national REDD+ strategy. By supporting the development of the national REDD+ strategy for Madagascar, this project has also directly contributed to the NSSMB goal to account for international trade (in this case for carbon credits) in biodiversity conservation.

The mangrove reforestation activities contributed directly to the Aichi Biodiversity 2020 targets of increasing forest areas in Madagascar. Additionally, the protection and monitoring of mangroves under this project directly contribute to action plans for several known threatened species in Madagascar who spend at least part of their life history in mangroves at our project sites (Annex 20).

This project has actively engaged with the focal point for the CBD, the DIE at Madagascar's ONE, by providing data and regular updates on project activities. BV collaborated with the UN and BirdLife International on the Toolkit for Ecosystem Service Site-Based Assessment (TESSA) through a kick-off training workshop in April 2013, application of this toolkit at the BOA project site (Annex 52), and presentation of the results to TESSA partners in the UK in March 2014. This work (detailed in this blog) contributes directly to the CBD goal of evaluating the economic value of biodiversity by clearly demonstrating the net economic value of mangrove ecosystems.

Conservation of Migratory Species of Wild Animals
The CMS action plan in Madagascar focuses on the Sooty Falcon (*Falco concolor,* Near Threatened) and Eleanora's Falcon (*Falco eleonorae,* Least Concern). Both species winter on Madagascar's west coast, and have been observed in the mangroves of the southwest. This project's work contributed directly to the action plan for their conservation under CMS by promoting local engagement in conservation and protecting mangroves as part of their habitat.

4.2 Project support to poverty alleviation

The communities impacted by this project are some of the most vulnerable in the Western Indian Ocean. Socioeconomic surveys have revealed that and over 90% of households in AAB and BOA earn less than 2 US$/person/day and these people are critically reliant upon the natural resources provided by their mangroves. Madagascar is also ranked amongst tropical countries with the lowest climate change adaptive capacity.

As outlined in Section 2.2, this project's activities are yet to have a measurable impact of poverty. However, by establishing sustainable mangrove management plans and supporting mangrove reforestation, and thus safeguarding and restoring the mangrove ecosystem goods and services that local people are crucially reliant upon, this project's legacy will have a long term impact on the livelihoods of people living within the project areas. Of particular importance is the continued provision of the mangrove fisheries which coastal communities are strongly reliant upon as a source of both income and food.

This project contributed directly to improving gender equality in the project sites through the promotion of women's participation in mangrove management (Activities 2.2, 2.3. and 4.2). At all sites, women are under-represented in traditional governance structures. By training women in mangrove reforestation, carbon stock and forest inventories, this project has provided them with the skills and legitimacy to take an active role in mangrove management. This is already a reality in AAB where two out of the five management associations' presidents are women.

4.2.1 Programme indicators

- Did the project lead to greater representation of local poor in management structures of biodiversity?

This project has secured legal natural resource management rights for 19,000 coastal people in Madagascar. Socioeconomic surveys have revealed that over 90% of households in AAB and

BOA earn less than 2 US$/person/day and over half of this population lives under the national poverty line of 0.5 US$/person/day.

- Were any management plans for biodiversity developed?

Specific biodiversity management plans were not developed, but a biodiversity baseline was established for BOA and a biodiversity assessment was initialised for the AAB in Y3, and funding has been secured through the GEF/UNEP Blue Forests project to finalise this. As the AAB carbon project will be validated under the CCB standard, the impact of the community mangrove management on biodiversity in the regions will be monitored.

- Were these formally accepted?

N/A

- Were they participatory in nature or were they 'top-down'? How well represented are the local poor and women, in any proposed management structures?

All mangrove management plans developed through this project have been done so in a fully participatory manner, as outlined in Section 2.3.

- Were there any positive gains in HH income as a result of this project?

This project is yet to cause positive gains in HH income. This is discussed in depth in Section 2.2.

- How many HH saw an increase in their HH income?

N/A

- How much did their HH income increase (e.g. x% above baseline, x% above national average)? How was this measured?

N/A

4.3 Transfer of knowledge

Did the project result in any formal qualifications?

i. How many people achieved formal qualifications?

13

ii. Were they from developing countries or developed countries?

9 were from developing countries. 4 were from developed countries.

iii. What gender were they?

5 were female. 8 were male.

BV's active participation in relevant national platforms, particularly the GT-MRV and CNGIM groups, has assisted the transfer of knowledge gained by this project at a national level. The biannual publication of a 'Blue Forests' newsletter (Annex 53), sent to key national Malagasy partners and authorities, has also supported knowledge sharing at the national scale.

Also critical to national-scale knowledge transfer, but with a community focus, is the project's participation in the national Mihari LMMA (Locally Managed Marine Area) network. Through this network, BV and community members involved with this project have presented the lessons learnt through this project at regional and national forums. The possibility of blue carbon as a means to fund LMMAs has frequently raised interest at these forums.

BV's strong online presence has aided knowledge transfer on an international level, in particular the Blue Forests webpage and factsheet, and the 28 posts relating to this project that were posted on BV's 'Beyond Conservation' blog. The film funded by this project is central to our strategies of both credit sales and proof of concept.

As detailed in Annexes Three and Five, 3 papers detailing research resulting from this project have been published in peer-reviewed journals and this and other research has been presented at 14 workshops and conferences..

On an international scale, as a result of the research conducted through this project, BV is a participant in the Conservation International/IUCN Blue Carbon Scientific Working Group, to

which we bring our experiences in developing community-focused carbon projects. One BV staff member also presented this project's findings at an IUCN organised blue carbon policy workshop, in Ecuador in June 2015.

4.4 Capacity building

i. Did any staff from developing country partners see an increase in their status nationally, regionally or internationally? For example, have they been invited to participate in any national expert committees, expert panels, have they had a promotion at work?

The main way the capacity of the host country has been supported is through the training and development of staff members and students that have been part of the project team.

For example, one of BV's Malagasy staff members, Lalao Aigrette, is the national focal point for EAFPES. Lalao also led the TESSA work outlined in Section 4.1, which resulted in her being invited to present her work at a TESSA forum in Cambridge in March 2014. Over the implementation period of this project, Lalao has been steadily promoted from field scientist to Plan Vivo Project Manager. At the end of the project she was autonomously managing the development of the PV project and all of the associated field activities. Lalao, along with fellow Malagasy staff member Raymond Raherindray, were invited to participate in the Environment Abu Dhabi (EAD) funded Abu Dhabi Blue Carbon Demonstration Project and the Northern Emirates Carbon Survey in the UAE in January 2013 and November 2014 respectively. They supported local scientists in the establishment of field plots to estimate mangrove carbon stocks; working closely with mangrove carbon expert Prof. Boone Kauffman.

ii. What gender were they?
1 Female. 1 Male.

4.5 Sustainability and Legacy

What will happen to project staff and resources now the project funding has ceased?

With a 13 year in-country presence, despite multiple political crises, BV is committed to a long term presence in Madagascar. Over the 3 years, this project employed and trained a total of 23 full-time Malagasy staff members and 17 continue to be employed on a full-time basis following the project's completion. Sufficient funding has been secured to ensure this employment for at least an additional 3 years. As discussed, staffing challenges were encountered by this project. Blue carbon is a novel science; few experts and virtually no in-country capacity existed at the start of this project. Conservationists/scientists with expertise in the field and, critically, willing to work in remote areas of Madagascar, are rare. By building the blue carbon skills and knowledge of our 17 Malagasy staff members, integrating Malagasy post-graduate research students into the project, and by providing significant support and training to local communities so that they are able to carry out project activities, has resulted in a lasting legacy; ensuring there is a viable exit strategy in terms of local human capacity and preventing future blue carbon projects in Madagascar experiencing the same issues we encountered.

A key legacy of this project is the inclusion of mangroves as an ecosystem in the national REDD+ programme. This will ensure ongoing support from national authorities to both blue carbon and broader mangrove conservation initiatives in Madagascar. This is being aided by BV's work, stemming from this project, towards integrating blue carbon into existing sustainable financing strategies for LMMAs across Madagascar through the Mihari LMMA network.

On the ground, mangrove conservation meets a strong demand from communities, as testified by the large proportion (42%) of mangroves in AAB and BOA that communities have decided to put under conservation regimes. Building on this, the voluntary reforestation model developed during this project, supported by extensive educational and training sessions, assures the sustainability of this project in the long term, independent of donor or market funding.

The development of sustainable financing from voluntary carbon markets ensures the project has a viable financial exit strategy. There is promising evidence that these projects will be

attractive investments and thus leverage sustainable financing for mangrove conservation in the long-term. BV intends to build on mangrove's recent inclusion in the R-PP to catalyse National Authorities' and potential investors' interest, so as to ensure continuous support and funding to this initiative. The unique nature of the projects, the numerous social co-benefits associated with mangrove conservation along with the high biodiversity value and levels of endemicity in our project sites lends the project. Additionally, the International Institute for Economic Development, and other carbon credit resellers at the Plan Vivo stakeholders meeting in October 2013 expressed interest in the unique value of our projects and their relation to coral reef conservation.

The work resulting from this project has led to Madagascar being included as an intervention, led by BV, in the multi-national UNEP/GEF Blue Forests project. This initiative aims to prove the concept of blue carbon and drive adoption through scientific advances and policy change.

As stated in the project proposal, a key objective of the project was to develop a replicable model that can be easily implemented by other organisations and communities. To be scalable, any model must be applicable in different ecological scenarios. By assessing feasibility and developing carbon projects at sites with such distinct contexts deforestation rates, we are fully evaluating the applicability of mangrove carbon as a sustainable financing mechanism for mangrove biodiversity conservation, not only in Madagascar, but throughout the tropics.

5 Lessons learned

The project's management structure was suitable, with an appropriate balance between managers and field staff and a strong focus on raising the management capabilities of our Malagasy staff, but the project would have progressed faster with a larger staff base. The project's objectives required extensive community consultations over large project areas and a larger community liaison team would have been preferable. The right expertise were employed, however, as described in Section 2.3, challenges and delays were encountered in finding a suitable Blue Carbon Manager.

The project was well planned, with activities logically progressing over time, but in hindsight the timeline was overly ambitious given timeframe, finances and staff base. This project was the first of its kind in the world, presenting novel science questions and ambitious project set-up in the often-challenging social context of Madagascar. The proposal showed a good understanding of underlying drivers of mangrove deforestation in Madagascar and the assumptions made have mostly held true. However, the illegality of charcoal production, which was unknown at the project start, resulted in significant changes over the implementation period.

All resources (financial and personnel) available were allocated to solving the problem outlined in the application form, and substantial progress was made toward the goal. As described above, additional staff would have been beneficial, but as described in Section 7.3, this project represents excellent value for money.

Through this project, BV has learnt many important lessons relating to the development of successful community-centred carbon projects. A key lesson learnt is the importance of community-buy in. The success of the AAB and BOA carbon projects relies directly on the effective implementation of the community management plans defined through this project. Central to community buy-in, and the 'I' in FPIC, is understanding. This project has shown that it can take a long time to fully secure FPIC. Explaining climate change and the broad details of carbon projects to rural coastal communities can be challenging.

While initial buy-in is important, continued buy-in is critical. Community-focused forest carbon projects take a long time to set up. In addition to defining the science, establishing the management plans and project activities that in the case of conservation will ease deforestation takes time and effort; especially if done in a participatory manner. Ensuring communities stay enthused by the project can be challenging. This project has recognised the need for shorter term incentives to keep momentum going and as such has secured additional funding to integrate alternative livelihoods, sustainable fisheries management and fisheries value chain improvement at the project sites.

To work, carbon finance has got to be more than an incentive. It needs to offset the opportunity costs borne by the community due to the project, accounting for the co-benefits of mangroves that would cease to continue to exist if the ecosystem were destroyed. The assessment and confirmation of this offset prior to project finalisation is vital for the long term success of a project. Alternative livelihood developed in parallel to a carbon project can support offsetting these costs.

Lastly, where deforestation is caused by market-driven activities, such as charcoal in AAB, alternative sources for these markets - for instance the alternative wood plantations in AAB - must be developed if conservation projects are to have a net positive impact on biodiversity and carbon sequestration.

5.1 Monitoring and evaluation

Detailed workplans were upheld at the site-level and reviewed on a monthly basis. The progress of the project was tracked using an internal project monitoring document developed in Y2, which provided a clear overview of status of activities against the project logframe. This project monitoring document was updated every three months to reflect on progress, identify issues, and devise solutions associated with project activities.

The effectiveness of BV's work is measured not only through our impact on biodiversity, but also through a number of outcomes relating to the well-being of the coastal communities we support. These include poverty alleviation, food security, adaptive capacity to climate change, gender equality, and access to sexual and reproductive health services. Central to this monitoring is the ongoing development of an Integrated Social Survey (ISS), which will measure and monitor key social indicators at all of our intervention sites on a yearly basis. This will enable BV to monitor the legacy of this project.

5.2 Actions taken in response to annual report reviews

All issues raised in the Y1 and Y2 annual report reviews were fully responded to.

Y3 annual report feedback is addressed in this final report, as detailed below:

Discuss the wider implications to the project of any delays in the delivery of activities.
The delays incurred during this project and their wider implications are dealt with in detail in Sections 2.1 and 2.3.

Include a consideration of the wider impacts of the project not fully achieving its outputs within the project timeframe.
The two outputs that this project did not sufficiently deliver on are:
Output 3: Communities are producing sustainable charcoal and timber
Output 5: The requirements for a forest carbon project that will generate carbon offsets are fulfilled.
The main impact of the project not fully achieving output 3 within the timeframe of the project is the delay in community members seeing an increase in their income from sustainable harvesting. While this is unfortunate, this project has strived to deliver outputs that will have permanence. By taking the time necessary to ensure that harvest quotas are realistic and fully approved by the communities, this project has worked to ensure that these harvest plans will be successful in the long-term.
The key impact of the project not fully achieving output 5 within the project timeframe is the delay in communities receiving money from carbon credit sales. While unanticipated science challenges have been the main cause of this delay, establishing the management plans that underpin the carbon projects has also taken longer than anticipated. As detailed in Sections 2.1 and 2.3, this project has worked to develop projects that achieve full community-buy in and understanding and the delays caused by this taking longer than anticipated will be worth it as projects that have full community support are more likely to succeed in conserving carbon in the long-term.

Provide greater detail on the steps taken to address the marginalisation of women from decision making bodies and an assessment of their success.
Please see Section 4.2.

Discuss the sustainable exit strategy to ensure project achievements continue beyond the lifespan of Darwin funding.
This project has been a part of BV Blue Forests programme, to which BV is committed. This programme has full funding to continue all activities necessary to finish developing the BOA project and is seeking funding to upscale and finalise the AAB project. The long term sustainability and legacy of this project is dealt with in detail in Section 4.5.

6 Darwin identity

Darwin Initiative support was always recognised a distinct project with a clear identity, but Blue Ventures' Blue Forests project is a large programme also funded by the Waterloo Foundation, MacArthur Foundation and Helmsley Trust, and is now part of a GEF project. We strived to ensure that Darwin's support is highlighted, with emphasis and priority always placed on the majority funder for the work being presented, which in many cases was the Darwin Initiative. Within this project, the BOA site stands as a distinct Darwin project and is communicated as such to local and international partners.

The Darwin Initiative has been mentioned in relevant tweets on the project; and the Darwin logo on the header of the Blue Forests project newsletter, which is sent twice a year to eighty partner NGOs, national, regional and local authorities as well as research institutes. The logo has also been included in all the presentations and posters presented at the 13 international conferences and 1 national conference attended through the course of this project (See Annex Three). Furthermore, the Darwin logo is included on all maps and reports prepared for the BOA project site.

As the primary funder of the Tahiry Honko film, Darwin's logo features prominently in the credits of this film. As appropriate, the support of the Darwin Initiative has been recognised in 3 papers published in peer-reviewed journals, with one more in review at the end of the project.

Support was also provided to the Darwin Initiative to enable them to use this project as a case study on the Darwin pages of GOV.UK and at the Ramsar COP in Uruguay in June 2015.

Whilst this project has done its best to raise the profile of the Darwin Initiative, within Madagascar, organisations most likely to be familiar with the Darwin Initiative are other international conservation NGOs.

7 Finance and administration

7.1 Project expenditure

Project spend (indicative) since last annual report	2015/16 Grant (£)	2015/16 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)			-3	NA
Consultancy costs			0	NA
Overhead Costs			4	NA
Travel and subsistence			4	NA
Operating Costs			7	NA
Capital items (see below)			100	Equipment required to more accurately record soil carbon stocks as needed fo

				our work with Dr. Kauffman.
Others (see below)			0	NA
TOTAL	**17,902**	**17,898**		

Staff employed (Name and position)	**Cost (£)**
Dr A Harris, Executive Director	
K England, Blue Forests Coordinator	
A Carro, BF Project Coordinator	
Adrian Levrel, Project Coordinator	
L Aigrette, Mangrove Carbon Stock Specialist	
Community Assistants	
Non-staff salaries	
Aina Celéstin, Community Liaison Officer	
Ferdinand Botsy, Driver & Research Assistant Ambanja	
Emmanuel Barijaona, Forest Technician	
Jean-Florent Adamainty, Community Liaison Officer	
Cicelin Rakotomahazo, Socioeconomic Scientist	
Zo Andriamahenina, Geospatial Scientist	
Raymond Raherindray, Blue Carbon Scientist	
TOTAL	£ 10,941

Capital items – description	**Capital items – cost (£)**
SET (surface elevation tables) equipment	
TOTAL	£ 30

Other items – description	**Other items – cost (£)**
NA	
TOTAL	

7.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total (£)
Macarthur Foundation (USD 90,000)	
Waterloo Foundation	
Blue Ventures (in kind)	
TOTAL	

Source of funding for additional work after project lifetime	Total (£)
Helmsley Trust (USD 300,000)	
Waterloo Foundation	
GEF Blue Forests (USD 460,000)	
TOTAL	**600,400**

7.3 Value for Money

This project has provided value for money through several means:

- Building the foundations for long-term sustainable financing strategies for community-based conservation of mangroves through carbon financing, and ultimately becoming self-financing projects.
- Developing income generating alternative livelihoods that offset costs of forest management in the short term, and are low cost for communities to manage themselves.
- Limiting redundancy between team roles whilst hiring the best people possible to fulfil capacity gaps.
- Training and building capacity of Malagasy staff rather than employing more expensive international staff, and in doing so building in long-term sustainability of Blue Forests work in Madagascar.
- Employing students to use this project for their undergraduate and postgraduate thesis where possible to assist in data collection and analysis.
- Building a lab in-country to analysis soil carbon during this project and in the future.
- Sharing of overhead, management and staff costs across Blue Ventures' projects to minimise the burden on any one project, whilst maximising cost-effectiveness.

Annex 1 Project's logframe, including indicators, means of verification and assumptions.

Note: Insert your full logframe. If your logframe was changed since your Stage 2 application and was approved by a Change Request the newest approved version should be inserted here, otherwise insert the Stage 2 logframe.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Goal: Effective contribution in support of the implementation of the objectives of the Convention on Biological Diversity (CBD), the Convention on Trade in Endangered Species (CITES), and the Convention on the Conservation of Migratory Species (CMS), as well as related targets set by countries rich in biodiversity but constrained in resources.			
Sub-Goal: Conservation of Madagascar's mangrove habitats and their associated biodiversity	• Deforestation rates for natural forest habitats of the coastal districts of western Madagascar • % of charcoal and timber that comes from the deforestation of natural forests of the coastal districts of western Madagascar	• Existing CI-MEFT-USAID National deforestation analysis for 1990-2000-2005; present BV & literature analyses of mangrove deforestation; future national deforestation analyses that CI-MEFT plan to undertake • Existing CI, USAID & WWF reports on timber & charcoal consumption in coastal areas; future participative appraisals & research	[redacted]
Purpose Coastal communities are earning income from the sale of carbon credits, charcoal and timber that they supply through mangrove reforestation and sustainable forest management, so enabling them to improve their livelihoods and conserve mangrove forests in the long term.	• Increase in household revenues (male, female) from charcoal, timber and carbon credits* • Area (ha) of restored and conserved mangrove forest that is under effective community management	• Sales figures of charcoal and timber (from participative appraisals done to establish mangrove management plans & uses; project records of sales) • Household revenues, disaggregated by sex • Project GIS, land titles and community management contracts	• Sustainable mangrove timber and charcoal is competitive with those from other sources • Adequate, long term market demand exists for such carbon offsets (or strong donor commitment to REDD+ continues)

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Outputs*			
1. Communities have clear and uncontested land and user rights to their customary mangrove areas; and give their Free Prior & Informed Consent to use these areas for a forest carbon project	• Area (ha) with secure title (RFRs and GCFs) • Number of individuals (male, female) with formalised user & carbon rights • Decrease in the incidence of forest exploitation by outsiders	• Government cadastral records • Land titles and community conservation contract agreements • Project GIS • Community management association records	• No significant land disputes exist so that uncontested ownership can be established • If there are land disputes, these can be resolved • The legal formalisation of user and carbon rights using existing instruments does not marginalise women
2 . Communities have established mangrove A/R, SFM and conservation areas; and are competently managing these areas	• Area of mangrove planted • Area of mangrove under SFM and conservation regimes • % of sites implementing clear management plans and which have sustainable harvesting quotas & rotations set according to output 4 • Participative monitoring shows a decrease in uncontrolled harvesting of mangroves	• Participative maps in community management contracts; project GIS of community management areas • Planting & maintenance schedule; project GIS of planted areas • Community monitoring data books	• Residents can forego immediate exploitation of mangroves long enough to begin earning from A/R and SFM • The community participants agree to robust enough management plans • Growth cycles of target mangrove tree species allow adequate production of seedlings within project schedule
3. Communities are producing sustainable charcoal and timber*	• All participants have been trained in SFM and improved charcoal production • % of sites where timber is harvested according to the sustainable quotas & rotations defined in the management plans • Number of improved charcoal production units in place	• Training workshop reports • Carbon monitoring for each site; verification of rotational harvesting by BV project staff; checked monthly • Existence & use of improved kilns within the target sites as verified by BV staff; project reports	• The combination of individual ownership of A/R and SFM plots with the collective management associations is effective in preventing unsustainable harvesting
4. The carbon stocks and harvestable timberof the community mangroves have been measured and are being accurately monitored	• % of community management units that have been trained to take carbon measurements and have a functioning monitoring team • Biomass and soil carbon measurements have been taken at all sites	• Training workshop reports & Standard Operating Procedures • Carbon stock calculations • Quality Control reports • Project archive; 1st measurements taken by month 9; monitoring checked monthly	• Adequate project finance can be gained from carbon revenues or other sources to support long term monitoring

Project summary	Measurable Indicators	Means of verification	Important Assumptions
	• Quality controls by BV scientists show less than 10% error in the carbon stocks measurements for all sites • % of sites for which complete monitoring reports are archived in a central project database		
5. The requirements for a forest carbon project that will generate carbon offsets are fulfilled	• The government & Designated National Authority (DNA) support the project & are involved in its development • A Project Idea Note (PIN) & business plan prove the viability of the carbon project • A draft Project Design Document (PDD) is written	• Formal letter of support from the government (DNA) for the project • Project Idea Note & business plan submitted to investors • Draft Project Design Document	• A suitable approved methodology specific to mangroves is available by 2014 (this process has already begun, and a CDM A/R methodology has been recently approved) • Formal government support to the project is not jeopardized by changes in government
Note: * - these project outputs will not necessarily be fully realised within the three years of the requested funding given that forest carbon projects normally work on a 5-year verification cycle and can take several years to be developed; 1st generation planted trees will take several years to attain a harvestable size			

Annex 2 Report of progress and achievements against final project logframe for the life of the project

Note: For projects that commenced after 2012 the terminology used for the logframe was changed to reflect DFID's terminology.

Project summary	Measurable Indicators	Progress and Achievements	Actions required/planned for next period
Impact Effective contribution in support of the implementation of the objectives of the Convention on Biological Diversity (CBD), the Convention on Trade in Endangered Species (CITES), and the Convention on the Conservation of Migratory Species (CMS), as well as related targets set by countries rich in biodiversity but constrained in resources.		Mangrove management plans to reduce deforestation and conduct reforestation are well underway, contributing to the Aichi 2020 targets of increasing areas of protected forest and the CMS action plan for the protection of habitat for migratory birds.	[redacted]
Outcome Coastal communities are earning income from the sale of carbon credits, charcoal and timber that they supply through mangrove reforestation and sustainable forest management, so enabling them to improve their livelihoods and conserve mangrove forests in the long term.	• Increase in household revenues (male, female) from charcoal, timber and carbon credits* • Area (ha) of restored and conserved mangrove forest that is under effective community management	• Community management plans were established for 9,990 ha of mangroves in AAB and BOA. 2,650 ha of these areas are strict protection/conservation areas; • 74 ha of mangroves were restored across AAB, BOA and MH; • Sustainable mangrove harvest quotas have been calculated for all 5 CLBs in AAB; • Tax on mangrove products is being collected in 2/5 CLBs in AAB; • 3 ha of alternative fuelwood plantations have been established in AAB to supply urban markets with legal charcoal.	
Output 1. Communities have clear and uncontested land and user rights to their customary mangrove areas; and give their Free Prior & Informed Consent to use these areas for a forest carbon project	• Area (ha) with secure title (RFRs and GCFs) • Number of individuals (male, female) with formalised user & carbon rights	AAB: The re-evaluation of 3 CLB's management contracts by the regional forestry service in May 2014 secured the long-term management rights over 6,106 ha of mangroves to local communities (16,000 people). BOA: Definitive protected area status granted in May 2015 defers carbon rights over an area of 4,612 ha to an estimated 7,300 people in the Velondriake LMMA. This include the 3,800 ha of intact and degraded mangroves in the BOA project area, within which approximately 3,000 people live.	
Activity 1.1 Consultation & project development with the communities so as to fulfil the conditions of gaining their Free, Prior and Informed Consent (FPIC) for the implementation of a forest carbon project		BOA: Formal approval for the PV project was gained in from all 10 participating villages, through three rounds FPIC consultations. AAB: Preliminary approval through two regional workshops and two rounds of community FPIC consultations.	
Activity 1.2 Detailed analyses of land tenure and use rights of the potential mangrove areas with both the government cadastral services and the local communities; and resolution of conflicts		Tenure regimes have been obtained from participatory mapping in both AAB and BOA through focus groups sessions and delineation in Google Earth.	

		AAB: 200 ha of private tenure conflicts have been identified through analysis of government tenure data. A resolution is being worked through for 68 ha of these conflicts through close collaboration with the office of the Prime Minister. BOA: Private tenure conflicts were analysed through verification at the cadastral services of Tulear and the advertising of the Plan Vivo delimitation at Befandrefa Commune. No conflicts were identified.
Activity 1.3 Establishment of legal user and carbon rights for community members participating in the project		AAB: The Natural Resource Management Transfer (TGRN) renewal was completed for the 3/5 CLBs requiring evaluation by DREF and will become permanent after submission of the full management plan (inc. quotas) to the DREEMF before the end of 2015. BOA: Management and carbon rights have been transferred to communities through the definitive protection status granted to the Velondriake MPA in May 2015. The management plan of BOA was submitted to the SAPM as part of overall Velondriake management plan.
Output 2. Communities have established mangrove A/R, SFM and conservation areas; and are competently managing these areas	• Area of mangrove planted • Area of mangrove under SFM and conservation regimes • % of sites implementing clear management plans and which have sustainable harvesting quotas & rotations set according to output 4	AAB: 53 ha of mangrove were reforested to date. 2,794 ha have been placed under a SFM regime by communities. 1,820 ha of mangrove have been placed under conservation regimes. A further 1494 ha have been zoned for reforestation. All local laws governing these zones have been ratified. All 5 CLBs have sustainable harvesting quotas. BOA: 7.8 ha of mangroves reforested. 1,877 ha have been placed under a SFM regime by communities. 830 ha of mangrove have been placed under conservation regimes. A further 1095 ha have been zoned for reforestation. The local laws governing the conservation and reforestation areas have been ratified. Consultations regarding the SFM area will be completed once the sustainable harvest quotas are calculated. MH: 13 ha of mangroves were reforested.
Activity 2.1 Establishment of community management plans, zonings and sustainable harvest quotas		AAB: All 5 CLBs have validated management plans that were created in a fully participatory manner. All management zones are delimited on the ground. All CLBs have sustainable harvest quotas. A mangrove use survey was completed and 92 plots were inventoried so as to define these quotas. BOA: A mangrove management plan for the PV project was established and validated through participatory zoning. Delimitation on the ground is still ongoing. 24 plots were inventoried for the calculation of sustainable harvest quotas. A further 31 plots have consequently been measured since the project end, and mangrove use survey and the consequent calculation of the quotas will be completed before the end of 2015.
Activity 2.2 Establishment and maintenance of mangrove nurseries by female teams		AAB: Two nurseries, totalling 4,900 *Avicennia marina* seedlings, were established and maintained by women associations. 2 women's associations were trained in

		nursery maintenance, partly through village knowledge exchange trips organised by the project.
Activity 2.3 Mangrove planting and maintenance of seedlings by female teams		AAB: 53 ha of mangrove were reforested. 2 ha of survey plots are annually monitored on a monthly basis. Success rate is currently 95% BOA: 7.8 ha of mangrove were reforested by womens association members, youth groups and fishermen. Success rate is currently 91%. 30 survey plots are monitored quarterly. A knowledge exchange trip was organised with Honko between members of BOA and MH, the latter of whom have much more experience in reforesting.
Output 3. Communities are producing sustainable charcoal and timber*	• All participants have been trained in SFM and improved charcoal production • % of sites where timber is harvested according to the sustainable quotas & rotations defined in the management plans • Number of improved charcoal production units in place	AAB: Sustainable harvest quotas exist for 2,794 ha of mangroves. A quota-tax toolkit was developed, and all 5 CLBs will be trained in the use of this and collecting quotas by the end of 2015. BOA: 1,877 ha have been placed under a SFM regime by communities. As per the change request in July 2014, due to legal constraints the sustainable production of commercial timber and charcoal from mangroves was replaced by the establishment of alternative timber and fuelwood plantations at both sites.
Activity 3.1 Training of the community participants in sustainable harvesting and improved management; initial timber harvesting according to sustainable quotas and planned rotations		AAB: A forest mangrove inventory has been carried out in AAB on 92 plots; quotas were calculated and quota validation is ongoing. Quotas will be integrated into management plans and all CLB will be trained to implement them by the end of 2015. BOA: 1,877 ha have been placed under a SFM regime by communities. MH: Project partner Honko conducted training in SFM in all five of the villages within their project area in December 2013.
Activity 3.2 Training & production of charcoal using improved kilns; continued technical support *This activity was changed to "Identify and develop community-run alternative fuelwood plantations" in July 2014.*		AAB: A study on 27 kilns carried out by two Ecole D'application Des Sciences Et Techniques Agricoles Et De La Promotion Rurale (EASTA-PRO) D`Ambanja students in October 2013 showed that the efficiency of current kilns is only marginally lower than typical improved kilns. The results were disseminated to charcoal producers and potential improvements in current practices were explained. 3 ha of *Eucalyptus camaldulensis* and *Acacia mangium* were established in on the land of 5 producers. These alternative fuelwood plantations will be scaled-up to 10 ha and species diversified during the next plantation campaign (July 2015-March 2016).

		BOA: Zoning and species identification was carried out in BOA, in partnership with DREEMF, that will allow for the launching of an alternative timber plantation program in 2016
Output 4. The carbon stocks and harvestable timber of the community mangroves have been measured and are being accurately monitored	• % of community management units that have been trained to take carbon measurements and have a functioning monitoring team • Biomass and soil carbon measurements have been taken at all sites • Quality controls by BV scientists show less than 10% error in the carbon stocks measurements for all sites • % of sites for which complete monitoring reports are archived in a central project database	AAB: 164 carbon plots were measured. Above- and below-ground carbon stocks have been calculated and published in a peer-reviewed journal which was the first publication of whole ecosystem carbon stocks for Madagascar's mangroves. Relative standard error of the Total Vegetation carbon data is 4.35%. All up-to-date carbon data are centralised and housed in a transparent manner online. 61 men and 30 women have been trained in the forest inventory protocol. BOA: 61 carbon plots were measured. Vegetation carbon stocks have been calculated. Relative standard error of these data is 4.18%. All up-to-date carbon data are centralised and housed in a transparent manner online. 22 women were trained in carbon stock inventory protocol. MH: 56 carbon plots were measured and vegetation carbon stock were calculated to a relative standard error of 11.3%.
Activity 4.1. Development of a measurement & monitoring plan which meets the requirements of the selected approved methodology for the generation of carbon offsets (this monitoring will include mangrove planting, timber harvesting & charcoal production)		A draft monitoring methodology comprising two levels (forest inventory and scientifically rigorous carbon monitoring) of methodologies meeting the VCS Project Standards v.3.0 and Plan Vivo Foundation Standards, 2013 has been established. In partnership with the United States Forestry Service, our rigorous carbon monitoring methodology has been harmonised with other regional protocols to form the 'East African Mangrove Carbon Fieldwork Protocol', which was released at a workshop in Mozambique in April 2015.
Activity 4.2. Creation & training of female monitoring teams in the use of appropriate forest inventories, carbon stock measurements and monitoring protocols		AAB: Carbon stock monitoring was replaced by forest inventory training. 61 men and 30 women were trained, as well as four staff from the partner NGO l'Homme et l'Environnement BOA: 22 women were trained in carbon monitoring.
Activity 4.3 Stock measurements, continuous monitoring and analysis of the data; integration into management plans; and continued technical support & quality control by BV scientists		AAB: 164 carbon plots were measured. Above- and below-ground carbon stocks have been calculated and published in a peer-reviewed journal. Soil organic carbon was estimated using the Loss on Ignition (LOI) methodology at a laboratory BV has established at the Université d'Antananarivo (ESSA-Forêts), funded mainly by the MacArthur Foundation. Additional Carbon-Nitrogen soil analysis was done in partnership with Bangor University, to further refine soil carbon estimates. Soil carbon stock values calculated appear low compared to literature and present an inconsistent trend between forested and deforested plots, which might be the result of methodological biases. This is being addressed through additional research financed by the GEF/UNEP Blue Forests project (2015-2018).

		BOA: 61 carbon plots were measured. Above-ground carbon stocks were calculated. These results have been aggregated into a community carbon database. Additional carbon stock data was collected post-project (August 2015) to reach an adequate standard error through increased sample size. MH: 56 carbon plots were measured in intact mangroves (34 plots) and mangrove plantations (22 plots), and vegetation carbon stock were calculated. 100 permanent plots were established and monitored by Honko on a quarterly basis since October 2014.
Output 5. The requirements for a forest carbon project that will generate carbon offsets are fulfilled	• The government & Designated National Authority (DNA) support the project & are involved in its development • A Project Idea Note (PIN) & business plan prove the viability of the carbon project • A draft Project Design Document (PDD) is written	AAB: Initial national and regional governmental support for the project was gained. A 12,000 ha project area was defined through community consultations and validated through a regional workshop held in December 2014. Draft business plan produced and draft PIN published. BOA: National and regional governmental support for the PV project gained. PIN successfully evaluated by the PV Foundation and published on their website. PDD and business plan was being drafted at the end of the project. MH: A PV PIN was drafted and the feasibility of a carbon project tested.
Activity 5.1. Consultation with the government & Designated National Authority (DNA) in the project development; gaining of DNA support for the project		AAB: Initial national and regional governmental support for the project was gained following two workshops. BOA: a meeting with the DGF and two regional consultations held in July and September 2014 regarding the Plan Vivo project.
Activity 5.2. Production of a Project Idea Note (PIN) and business plan based on actual monitoring; submission to investors / funders		AAB: A draft VCS PIN was released in November 2014 accompanied by a detailed financial analysis. BOA: A PV PIN was successfully evaluated by the PV Foundation and published on their project register webpage in February 2015. A short promotional documentary to attract investors' interests filmed and released in June 2015. Drafting of a business plan began at the end of the project. MH: A PV PIN was drafted and the feasibility of a carbon project tested.
5.3 Production of monitoring reports and a draft project design document		AAB: Due to the amount of research still required to finalise the carbon stock measurements (see Activity 4.3.), the preparation of the PDD did not commence before the end of the project. In BOA, the PV PDD will be submitted to the PV Foundation by December 2016.

Annex 3 Standard Measures

Code	Description	Total	Nationality	Gender	Theme	Language	Comments
Training Measures							
1a	Number of people to submit PhD thesis	0	Malagasy	M	Social science	French/English	One student currently doing his PhD
1b	Number of PhD qualifications obtained	0					
2	Number of Masters qualifications obtained	9 Malagasy 4 International	Malagasy, English, French	4F/5M	Mangrove carbon science, biodiversity and ecosystem services	French/English	
3	Number of other qualifications obtained	1	Malagasy	M	GIS	English	One staff member undertook GIS training to become certified with the Society for Conservation GIS
4a	Number of undergraduate students receiving training	9	American	M&F			
4b	Number of training weeks provided to undergraduate students	0					
4c	Number of postgraduate students receiving training (not 1-3 above)	0					
4d	Number of training weeks for postgraduate students	0					
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification(e.g., not categories 1-4 above)	1	Malagasy	F	Ecosystem services	English	One Malagasy staff member conducted one year of training in use of TESSA toolkit

Code	Description	Total	Nationality	Gender	Theme	Language	Comments
6a	Number of people receiving other forms of short-term education/training (e.g., not categories 1-5 above)	113	Malagasy	52 F / 61 M	Carbon stock inventories and forest inventories	Malagasy	91 people trained in forest inventories; 22 women trained in carbon stock inventories
6b	Number of training weeks not leading to formal qualification	28	Malagasy	M&F	Forest inventories ; Carbon inventories ; Excel training	Malagasy	Community training
7	Number of types of training materials produced for use by host country(s) (describe training materials)	9	Malagasy	M&F	Community educationa l material	Malagasy	1 mangrove importance ppt; 1 mangrove management ppt; 1 mangrove planting and monitoring protocol; 1 Am nursery maintenance toolkit; 1 mangrove inventory protocole; 2 REDD ppt; 1 CLB tax toolkit; 1 mangrove ID toolkit

Research Measures		Total	Nationality	Gender	Theme	Language	Comments
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (ies)	4	Malagasy/French/ English	N/A	Sustainable mangrove management plans	Malagasy/English	Created with communities in a participatory manner
10	Number of formal documents produced to assist work related to species identification, classification and recording.	1	English/French/ Malagasy	N/A	Mangrove identification	English/French/ Malagasy	Mangrove ID toolkit

11a	Number of papers published or accepted for publication in peer reviewed journals	3	English	M&F	Mangrove carbon; Mangrove ecosystem services		
11b	Number of papers published or accepted for publication elsewhere	5	English	M&F	Mangrove carbon; Mangrove ecosystem services; Mangrove policy		
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	3	Malagasy	N/A	Carbon stocks	English	Carbon stock databases, including species
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	0					
13a	Number of species reference collections established and handed over to host country(s)	0					
13b	Number of species reference collections enhanced and handed over to host country(s)	0					

Dissemination Measures		**Total**	**Nationality**	**Gender**	**Theme**	**Language**	**Comments**
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	7	Malagasy	M&F	Carbon project workshops	Malagasy/French	National and regional workshops

14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	14	English/French/ Malagasy	M&F	Blue Carbon, Ecosystem Services, Mangrove Policy	English/French/ Malagasy	Madagascar and International Conferences/ Workshops

Physical Measures		**Total**	**Comments**
20	Estimated value (£s) of physical assets handed over to host country(s)		
21	Number of permanent educational, training, research facilities or organisation established	1	Loss on Ignition mangrove soil analysis laboratory established at the Université d'Antananarivo (ESSA-Forêts) (mostly funded by the MacArthur Foundation)
22	Number of permanent field plots established	281	Permanent carbon stock inventory plots

Financial Measures		**Total**	**Nationality**	**Gender**	**Theme**	**Language**	**Comments**
23	Value of additional resources raised from other sources (e.g., in addition to Darwin funding) for project work	£600,400					MacArthur Foundation; Waterloo Foundation; Helmsley Trust; GEF/UNEP

Annex 4 Aichi Targets

	Aichi Target	Tick if applicable to your project
1	People are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	X
2	Biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	
3	Incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.	X
4	Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	X
5	The rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	X
6	All fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	
7	Areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	X
8	Pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	
9	Invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	
10	The multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	X
11	At least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	X
12	The extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	
13	The genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	

14	Ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	X
15	Ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	X
16	The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	
17	Each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	
18	The traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	X
19	Knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	X
20	The mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.	

Annex 5 Publications

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Nationality of lead author	Nationality of institution of lead author	Gender of lead author	Publishers (name, city)	Available from (e.g. contact address, website)
PIN	Tahiry Honko: Community Mangrove Carbon Project, Southwest Madagascar	Malagasy	British	Female	Plan Vivo Foundation, Scotland	http://www.planvivo.org/docs/PIN_Tahiry_Honko_Project__PUBLISHED.pdf
Factsheet	Blue forests: Community-led mangrove management to protect coastal ecosystems and livelihoods; Leah Glass, Garth Cripps, Trevor G. Jones, Lalao Aigrette, Aude Carro. 2015	British	British	Female	Blue Ventures, London	http://blueventures.org/conservation/blue-forests/
Poster	Empowering communities to conserve the mangroves of Madagascar: challenges and opportunities; Aude Carro, Leah Glass	French, British	British	Female	World Forestry Conference/FAO	http://foris.fao.org/wfc2015/api/file/5555efcdf842363144d617ec/contents/6e557a32-8c4d-4e86-831a-36635fd75841.pdf
Chapter	The mangroves of Ambanja and Ambaro Bays, northwest Madagascar: Historical dynamics, current status and deforestation mitigation strategy. In Estuaries: a Lifeline of	American	British	Male	Diop, S., Scheren, P., Eds.; Springer: Berlin, Germany.	In publication

	Ecosystem Services in Western Indian Ocean; Numerous authors, 2015					
Manual	Mangrove Carbon Stock Inventory: Field Methods. Christina Stringer, Carl Trettin, Trevor Jones, Lalao Aigrette, Leah Glass and Raymond Raherindray, 2015	American	American	Female	USDA Forestry Services	Attached as Annex 48.
Documentary	Tahiry Honko: Community-led Mangrove Carbon Project. Lalao Aigrette, Christopher Scarffe, Leah Glass. 2015	Malagasy	British	Female	Blue Ventures, London	https://vimeo.com/131638557
Blog	Communities Leading the Way to Save Madagascar's Mangroves; Brian Jones. 2015	American	British	Male	National Geographic	http://voices.nationalgeographic.com/2015/03/17/communities-leading-the-way-to-save-madagascars-mangroves/
Blog	Mangrove deforestation in Madagascar: What are the options?, Brian Jones. 2014	American	British	Male	National Geographic	http://voices.nationalgeographic.com/2014/12/16/mangrove-deforestation-in-madagascar-what-are-the-options/
Article	From BC's Gulf Islands to Madagascar's mangroves; Jones, T.G. 2014	American	British	Male	Branchlines, UBC, Canada	http://www.blueventures.org/images/articles/publications/ reports/Branchlines_Spring_2014.pdf
Journal	Ecological Variability and Carbon Stock Estimates of Mangrove Ecosystems in Northwestern Madagascar. Trevor G. Jones, Harifidy R.	American	British	Male	Forests, Basel	http://www.mdpi.com/1999-4907/5/1/177

	Ratsimba, Lalao Aigrette, Garth Cripps, Adia Bey. 2014.					
Newsletter	Conducting participatory mapping in southwest Madagascar to contextualize past and present natural resource-use and plan for future needs. Kate Dewar, Trevor G. Jones. 2014	British	British	Female	Darwin DEFRA	http://www.darwininitiative.org.uk/assets/uploads/2014/05/Darwin-Newsletter-Isssue-26-Feb-2014.pdf
Newsletter	The time is now for science and markets to build on social momentum for mangrove restoration in Madagascar. Kate England. October 2013	Canadian	British	Female	Darwin DEFRA	http://darwin.defra.gov.uk/newsletter/July2013newsletter.pdf
Newsletter	Starting up Blue Forests in Northwest Madagascar. Aude Carro. June 2013.	French	British	Female	Darwin DEFRA	http://darwin.defra.gov.uk/newsletter/April2013newsletterFINAL.pdf
PIN	Mamelo Honko Project Idea Note	Canadian	British	Female	Blue Ventures, London	Attached as Annex 13

Annex 6 Darwin Contacts

Ref No	19-016
Project Title	Leveraging markets to conserve mangrove biodiversity and alleviate poverty in Madagascar
Project Leader Details	
Name	Alasdair Harris
Role within Darwin Project	Project Leader, Executive Director of Blue Ventures
Address	
Phone	
Fax/Skype	
Email	
Name	Frances Humber
Organisation	Blue Ventures
Role within Darwin Project	Project Manager
Address	
Fax/Skype	
Email	
Name	Leah Glass
Organisation	Blue Ventures
Role within Darwin Project	Project Coordinator
Address	
Fax/Skype	
Email	