Darwin Initiative Final Report

Darwin project information

Project reference	22-013
Project title	Conserving pine woodland biodiversity in Belize through community fire management
Host country(ies)	Belize, UK
Contract holder institution	University of Edinburgh (UE)
Partner institution(s)	Toledo Institute for Development and Environment (TIDE) University of Belize Environmental Research Institute (ERI), Government of Belize Forest Department (FD) International Institute for Environment & Development (IIED)
Darwin grant value	£298,998
Start/end dates of project	1st April 2015- 31st March 2018
Project leader's name	Dr Neil Stuart (UE) and Mario Muschamp (TIDE)
Project websites	http://tidebelize.org/darwin-community-fire-management-project/ http://www.belizeconservation.site/
Report author(s) and date	Cathy Smith, Neil Stuart and Duncan Moss (UE) Mario Muschamp, Elmar Requena, Nilcia Xi (TIDE) Duncan Macqueen (IIED), Elma Kay (ERI) Rick Anderson, Fanny Tricone (Fire management and ecological consultants to TIDE) 30th April 2018

1 Project Rationale

Belize's lowland pine savannas are characterised by the WWF as a critical and endangered eco-region and a regional priority for biodiversity conservation because this small (2,500km^2) ecosystem contains a singular mix of North and South American species, including endangered/critically endangered species of parrot, tapir, tree and cycad palm. Darwin Initiative project 17022 discovered almost half of Belize's endemic plants occur only in this ecosystem.

Intense fires in these pine savannas are becoming more frequent, degrading the ecosystem from a woodland ecosystem into one of mainly grassland with few pines. Some fires penetrate into the broadleaf forest, causing significant loss of a flora that is not resistant to fire. This increased frequency of fire is attributed mainly to anthropogenic pressures, such as hunters who traditionally set fires to promote the growth of fresh grass to encourage game species into the savanna, and fires escaping from a growing number of agricultural areas that now border the protected areas in Toledo. Few people in these newly established communities have the traditional knowledge about how to control fire and burn agricultural land safely. These fire risks are exacerbated by climate changes such as the earlier onset of the dry season, (fire season), one month earlier now than a decade ago. This combination of anthropogenic factors and climatic changes led the government to identify uncontrolled fire as the single greatest threat to Belize's terrestrial protected areas and to propose that increasing capacity for fire prevention and control would be a key to enabling communities in Belize to adapt to climate change.

Fires are a threat to both biodiversity and to livelihoods in this area. Belize's Poverty Elimination Strategy recognises that the communities living near to these pine woodlands are among the poorest in Belize. Wildfire poses a serious risk to their wooden houses, farms, and to the summer harvest of palmetto seeds which provides valuable additional income to the poorest people. Heavy smoke is also harmful to human health. More careful use of fire on farmland could reduce the number of escaped fires and reduce losses to crops. Stopping intense fires which burn the palmetto flowers in May-June protects the palmetto seeds harvest for the following August.

This project was proposed by the Toledo Institute for Development and Environment (TIDE) and the Government of Belize Forest Department (FD), who together manage over 90% of the pine savanna woodlands of Toledo District, in three protected areas: Payne's Creek National Park (PCNP), Deep River Forest Reserve (DRFR) and Swasey-Bladen Forest Reserve (SBFR). Recognising that low intensity fire every 3-5 years is a natural part of the savanna ecosystem, TIDE has been managing fire timing and intensity using a programme of prescribed burning in PCNP for a decade, and more recently in parts of DRFR. There is anecdotal evidence of fewer intense wildfires in the dry season, less damage to crops and biodiversity and pine regeneration in these areas, so this project sought to introduce systematic monitoring of these effects.

Belize's FD currently lacks capacity to implement its national wildfire management strategy in many protected areas under its jurisdiction. FD recently published a new Forest Policy (2015), recommending devolvement of some authority to communities to become engaged in fire management and to benefit more from sustainably harvesting of resources in protected areas. It also opens to door to allowing PA management organisations to carry out limited sustainable extraction of resources within PAs to raise revenues to support PA management. Before this project however, there had been little consultation by FD with its stakeholders about how sustainable resource use within these PAs in Belize might be negotiated and permitted.

This project sought to conserve biodiversity in the pine woodlands, by increasing the capacity of both the managers of these protected areas and the communities that surround them, to control and reduce the frequency of intense dry-season fires. The project rationale was that by giving the communities incentives to support the fire management activity, such as rights to extract non-timber forest products (NTFPs) or develop small forest enterprises (SFEs) within the areas where they assist with fire control, the communities would become stewards of these woodlands and promote practices to conserve and help restore woodland resources.

The map shows the locations of the five project communities: Bella Vista, Bladen, Medina Bank, Trio and San Isidro (near Bella Vista), together with the extents of PCNP, and SBFR and DRFR.

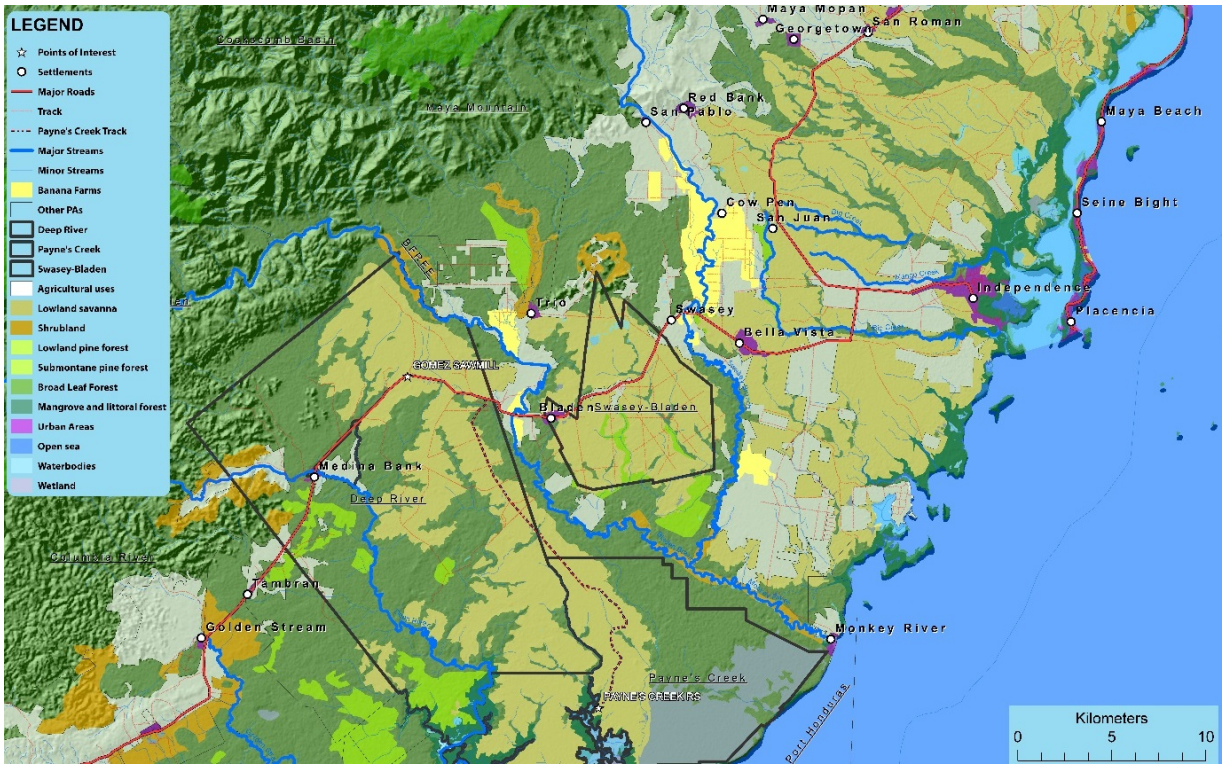


Figure 1: Project communities and other settlements near SBFR, DRFR and Paynes Creek NP

2 Project Partnerships

The project was proposed jointly by TIDE and UoE, responding to needs identified by TIDE and FD. It was strengthened by pre-existing partnerships between some of the organisations. Both FD and the Environmental Research Institute of the University of Belize (ERI) were partners in Darwin Project 17022 led by UE from 2009-2012 which identified the biodiversity importance of the savannas of Belize. TIDE attended stakeholder meetings and training in that project. TIDE and FD have co-managed PCNP for over a decade. Rick Anderson, one of our consultants previously from the US Forest Service, has assisted TIDE to carry out fire management since the 1990s. ERI works with TIDE to assist with biodiversity monitoring, and University of Belize now conducts annual field teaching in protected areas managed by TIDE. IIED was collaborating with UE to research ecosystem services for poverty alleviation, and has specific expertise in developing small community-run forest enterprises that conserve natural resources.

Communication between the partners has been frequent and effective. Email, skype and google drive have enabled communication of progress and sharing of outputs throughout the project. The UK project officer, a PhD student at UE, spent more than 12 months of the project living in Belize, working closely with TIDE on project activities and reporting. All partners have met in person in Belize in January/February and August/September of each year of the project, to review and plan progress. At these meetings, the project made an active effort to engage other organisations and projects working with the same communities, or on similar issues. These stakeholders included the Maya Leaders Alliance (MLA) and Toledo Alcaldes Association (TAA), the Ya'axche Conservation Trust and GOB's Key Biodiversity Areas (KBA) project. Within its business development aspect, the project also made several new partnerships, for example with the FAO, with FEDOCOVERA in Guatemala, the Toledo Ecotourism Association (TEA), GOB's Central Farm, Southern Environmental Association (SEA) Belize, and a women's group at Coxcomb Basin Wildlife Sanctuary, that led to marketing and funding opportunities, training and exchange visits for the community business groups.

As the focal point of most project partnerships was TIDE. This project explicitly supported many of TIDE's long-term goals for community development and savanna management, and it is through their continued work towards those goals that the project will have its greatest legacy. TIDE's partner organisations in this project played three types of supporting role. The links with Darwin as a funder were established via UE, and UE also managed overall coordination, budget, M&E and reporting. Partnerships with UE, IIED, ERI and Rick Anderson provided training and technical support for project activities. Partnerships with GOB's Forestry and Agriculture Departments and the ERI enabled the project to reach national policy making committees.

All partners have been actively involved in project planning and execution. Maps showing the distribution of pine and palmetto were produced by UE and ground-truthed by TIDE. This information was used by TIDE to locate field plots for monitoring the effects of fire on those woodlands, and TIDE now monitor these plots using protocols designed by Rick Anderson and the ERI. The accumulating data is used to monitor the effects of the prescribed burning upon biodiversity and to propose areas for sustainable extraction from PCNP. Duncan Macqueen of IIED developed a close mentoring relationship with Elmar Requena, TIDE's community outreach officer. Duncan's biannual visits to Belize delivered business training to the community groups, who then received guidance and review opportunities from TIDE staff throughout the year.

The most difficult relationship for the project to develop was with FD. Whilst having forward-thinking policies around wildfire management and community access to protected areas, FD has very limited resources to implement them. In year 1, FD did not attend some project activities to which they were invited, and so a more active engagement was sought in subsequent years through more regular meetings and visits by project staff to the FD offices. FD staff then attended the fire management training, biodiversity monitoring training and business incubation workshop, and made verbal commitments to legislative review, at community consultations. In February 2018, FD staff agreed to receive proposals from the Darwin project communities to access World Bank funding which would allow these groups to develop their businesses further beyond EoP.

The partners are staying in touch. Since March, IIED and UoE assisted TIDE to write 3 grant proposals; the partners have also applied for funding under a separate ESRC/GCRF funding call to collaboratively develop innovative new business training courses in Toledo. These initiatives are entirely the result of the partners working well together on this Darwin project.

3 Project Achievements

3.1 Outputs

Output 1: Biodiversity and woodland resource baselines are established for pine savanna woodlands within Toledo District, by developing a set of monitoring protocols that are adopted nationally

Before the project, TIDE was managing PCNP and advising local concessionaires on the prescribed fire management of DRFR and SBFR, but without integration of baseline information about fire frequency, and without the ongoing monitoring of the effects of fire management on biodiversity and sustainably exploitable resources. This output sought to establish baseline data and an ongoing monitoring approach to enable data-driven adaptive fire management in the future. In years 1 of the project, baseline maps showing the distribution of pine and palmetto resources were produced for the 3 reserves, using GIS, as masters dissertations by 2 students at UE, (indicator 1.2, see weblinks to dissertations in annex 3 under code 2). In year 2, another GIS masters student at UE produced maps of inter-annual fire frequency between 2006 and 2016, and the year since the last burn for the 3 protected areas (indicator 1.3, see weblinks to dissertation in annex 3 under code 2). In year 1, a biodiversity baseline report was also drawn together by TIDE using data from monitoring of birds and mammals between 2006 and 2012 on 2 transects in PCNP (indicator 1.2, see annex 7). Although data was not collected using a standard methodology for all six years, it provides an idea of the main species present.

In year 1, 5 new protocols for long-term monitoring of indicator bird, mammal and plant species, as well as pine and palmetto resources (indicator 1.1) were created by Rick Anderson and other specialists identified by the ERI, as can be verified by the documents in annexes 8-10 (annex 10 being an updated vegetation monitoring protocol, revised after field testing during the project). These protocols were all published by the ERI for use in the National Biodiversity Monitoring Program. Other NGOs, especially those in the national Yellow Head Parrot Working Group (such as Belize Audubon, Programme for Belize and the ERI) have begun field testing these protocols for their data collection. In year 2, TIDE started using these protocols to establish baselines for a new monitoring programme that they have committed to continue into the future. A GIS database was established by Fanny Tricone to manage these data. At EOP a report was produced to summarise the first 2 years of monitoring using data collected by TIDE using these new protocols (indicator 1.2, see annex 11).

Figure 2. Vegetation monitoring on one of the permanent plots established in Paynes Creek NP

Output 2: Training to enhance national capacity to a) monitor savanna biodiversity / resources; b) provide training in best practices for agricultural fire use; c) develop small forest enterprises.

Output 2 sought to ensure the sustainability of the approaches newly introduced by the project to Belize, in biodiversity monitoring, community fire management training and community small business development, by training people from the country to carry out this work. This is indicated by numbers of people successfully completing each of these training courses/workshops.

The first of these (indicator 2.1) was training in the methods of fire effects monitoring on biodiversity and natural resources as developed under output 1. It was decided to hold 2 separate biodiversity training courses, one focused on long-term vegetation monitoring and one to on mammal monitoring. The vegetation monitoring course was held over 2 days (04-05/04/2017) at the PCNP ranger station, and was delivered by Rick Anderson, Fanny Tricone, Elma Kay from the ERI with assistance by TIDE staff. There were 13 attendees (6 female, 7 male) representing 6 different protected area managing institutions including the FD. The first day covered establishing, monitoring and managing data from long-term vegetation plots, like those set up by the project in PCNP. The second day introduced vegetation sampling along transects, and the management of such data. The second training course was held from 26-30/06/2016 in Belmopan at the University of Belize. It was led by staff at the ERI and attended by 17 participants (4 female, 13 male) from 10 different organisations. Two classroom-based days introduced camera trapping for mammal monitoring, a practical day at Belize Zoo covered camera trap setting, programming and photo retrieval, with a fourth day on data entry and management. The final day was very important, as the NGOs discussed and agreed how to coordinate the collection and collation of camera trap data nationwide. This is an important change towards establishing a more consistent national monitoring of mammals, co-ordinated through the ERI. See annex 12 for the attendance list on both courses, annex 13 for field sheets used as teaching materials for the first course, and annex 14 for a report of the second course.

The second type of training was a higher level 'burn-boss' training in fire management (indicator 2.2) that equipped attendees to deliver a basic level of fire training (under output 3) to others. This took place between 13th and 18th February of year 2. The course was led by TIDE's protected areas manager and Rick Anderson, with assistance from TIDE rangers already trained to 'burn boss' level. 15 men attended, 6 of which were from the communities, and the others represented 7 organisations managing protected areas across Belize, including FD (see annex 12 for the participant list). The course equipped participants with training in leadership, site surveillance and burn planning, giving them field experience of conducting 4 prescribed burns. This training has created, for the first time, a team of burn bosses in Belize, based in different NGOS, who are now capable of leading prescribed burns and directing attack of fires in the areas they manage.

Figure 3. Classroom session during the 'burn boss' advanced fire training

The third activity, a workshop on community business development and conservation (indicator 2.3) was delivered on 23rd February in year 3 by IIED and TIDE (see annex 12 for participant list). The workshop brought together for the first time 17 participants from 13 organisations, and has started a process of building a national network of business trainers, who are now collaborating to share experiences of working with communities in diverse situations in Belize, about how to foster small business and create alternative livelihood opportunities. This is a significant step, which will reduce the previous duplication of effort, and allow lessons about successful business training to be shared nationally.

Output 3: ≥100 community members are trained in fire management (≥50 NTFP concession-holders trained in fire management for pine savannas and ≥50 farmers trained in best practices in use of agricultural fire)

This output delivered training, customised to the situations and resources available to local communities, in safe fire use for agricultural purposes and prescribed fire use in savanna, to safeguard the palmetto harvest. Originally this was envisaged to be delivered as two separate training events (each with 50 attendees), however in year 1 it was agreed it would be much more effective to combine these into one training activity (indicator 3.1). Some farmers are also palmetto harvesters, and the same basic concepts apply to both uses of fire; it also encouraged 'joined-up' thinking by community members about fire management in their villages. Course materials specifically aimed at Belizean community members were developed by TIDE's protected areas manager and Rick Anderson, in year 1 (see annex 15 and section 3.2 under outcome 2 for detailed course content). In year 1, 62 participants completed the training through 5 repeated 2-day courses (one for each village) consisting of a day in the classroom and a day in the field. The course was repeated in year 3, with 6 participants from 3 communities, with 2 community 'burn bosses' trained under output 2.2 leading the session (dates of all courses under activities 3.3 and 3.4 are in annex 2, spreadsheet of attendees at all courses in annex 12). Participants for the courses were chosen by the community leaders and represented a range of people using fire in the communities: 23 females, 45 males, 38 milpa farmers and 27 palmetto harvesters. Although other NGOs such as Ya'axche had worked with Trio and Medina Bank prior to this project, this is the first time that all these communities in Toledo have been systematically involved in fire training, from a baseline situation described by the FD at the start of the project where none of these communities were able to carry out safe agricultural burning.

Figure 4: Prescribed burning field session during the basic level community fire training course

Output 4: Options to secure the palmetto seed harvest for community members, by formal agreement with FD and more sustainable harvesting practices, are negotiated

Palmetto seeds are a savanna NTFP that is destroyed by poor fire management because early fires burn off the flowers and prevent seed formation. Seeds are also diminished by unsustainable harvesting practices whereby the whole stem is cut down to reach the seeds. This output responded to a baseline situation in which community members were harvesting and selling palmetto seed from Forest Reserves in August, September and October annually, without formal permission, and sometimes without regard to sustainability. Options to legalise NTFP extraction from forest reserves had not been considered previously. FD's new Forest Policy of 2015 opened the possibility for such agreements. Initially the project envisaged community concessions for palmetto extraction being established during project lifetime, however in year 1 it became apparent that the differing situations in each community, the overlapping areas harvested between communities and present contestation of land rights between the Maya Leader's Alliance and the government, required a more careful consideration of how to negotiate palmetto access rights. A change request to output 4 was submitted and approved (See also section 6).

Indicator 4.1 is the gathering of baseline information about present harvesting practices, locations and community organisation for palmetto sale, and research into the value chain dynamics. Before this project, little was known about the harvesting of this NTFP by communities in Toledo. A survey was carried out in year 2, of 77 harvesters across all 5 communities, to obtain this information (see full report attached as annex 16 for verification). The survey was preceded by open community meetings (See annex 2, activity 4.1 for dates) at which the sustainability of palmetto extraction was discussed, and local names for rivers and roads and the general areas of harvesting were obtained. This allowed appropriately labelled and scaled maps to be produced for each community, which were then used to identify and map the areas used by each harvester in the survey.

Figure 5. Conducting the survey of palmetto harvesters in Bladen village

Indicator 4.2 is the use of this information by TIDE to convene meetings between the stakeholders involved: the communities that harvest, any organisations representing them, the buyer, FD, and logging concessionaires for these areas. These meetings considered possible legal vehicles for sustainable palmetto extraction by communities from forest reserves. Whilst all of these stakeholders were engaged individually in year 1 (See annex 2, activity 4.2 for dates and annex 17 for meeting minutes), TIDE could not progress meetings between stakeholders in years 2 and 3 because output assumption 6 failed to hold. Unexpectedly, the single buyer of palmetto did not purchase palmetto from any communities in Belize in years 2 or 3 of the project. Without a market for palmetto, the communities did not harvest, and it was not sensible to devote time to securing access rights or promote sustainable harvest practices. TIDE however made repeated contact with the buyer in year 2 and year 3 to ascertain whether he would be purchasing palmetto (See annex 2, activity 4.2 for dates). In year 2 of the project the buyer blamed his lack of purchase on hurricane damage to the crop, then in year 3 he informed TIDE in July that his buyer in Canada was not purchasing from him, and he was unable to export palmetto. TIDE were unable to verify

this, or obtain any further information, and it remains unclear whether palmetto will be purchased again following EOP. Nevertheless, the change that has resulted is that TIDE and FD now have information about the extent of harvesting that was occurring. At a meeting with FD on 23/02/2018, they remained interested in working with the communities in the future, should the palmetto market become viable again. FD requested and received our report on the palmetto study, and will include it in a consultancy exploring the NTFP options for Belize under a current World Bank funded KBA project.

Output 5: Mapping and analysis to inform a future plan for a sustainable extraction zone in PCNP that includes an evaluation of the ecological and socio-economic impacts.

Output 5 responded to a baseline situation in which TIDE, as manager of PCNP, is not presently legally permitted to extract pine and palmetto resources, which might be possible in future at a sustainable level, with proper management. Revenue from such extraction could be used to fund operational costs of maintaining the park, which currently relies heavily upon donor funding. Indicator 5.1, is the development under the project of detailed maps of the distribution of these resources within the park. These were produced by Masters students as dissertation projects at UE in year 1 (see also output 1, and weblinks to the dissertations in annex 3 under code 2).

As indicator 5.2, the datasets (both socio-economic and ecological) required to identify suitable harvesting locations and to estimate offtake rates were created or collated. Some data were collected under output 1 from the pine and palmetto monitoring plots, and through the yellow-headed parrot monitoring set up under the project, whilst others were gathered from TIDE, online GIS repositories and local logging concessionaires. The GIS datasets (topographical data, pine and palmetto distribution, yellow-headed parrot nesting sites, infrastructural information) were used in year 2 by a further masters student at UE to propose areas to evaluate for sustainable extraction zones (see weblink in annex 3, code 2, for her dissertation). This analysis, with the addition of the socio-economic information, ecological assessment and ground-truthing, enabled Rick Anderson and Fanny Tricone to create a final report and maps to inform recommendations for short and long term sustainable harvesting from PCNP, as indicator 5.3 (See annex 18). This output changes the information base, so decisions about sustainable offtake within PCNP will in future be based on a cost-benefit evaluation, and assessment of the impact on biodiversity.

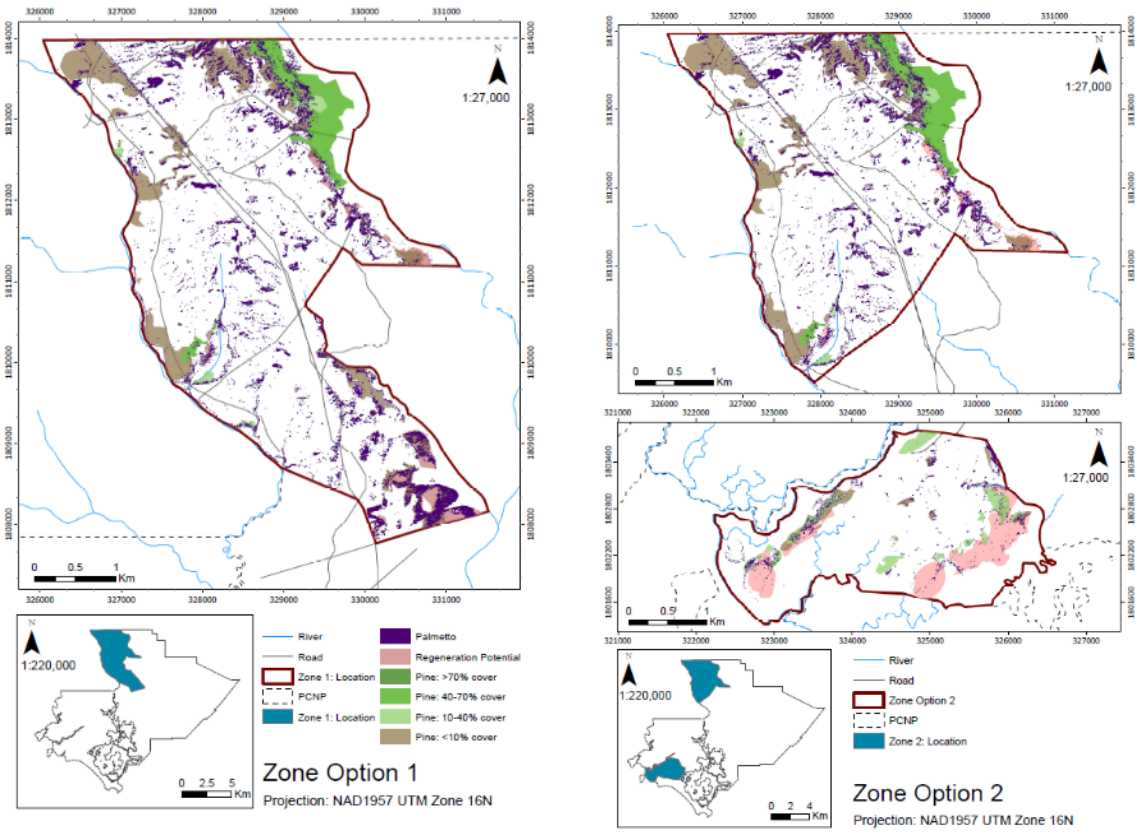


Figure 6. Two possible future sustainable extraction zones (after Freeman, 2017)

Output 6: Business plans created for ≥3 additional SFEs suitable for PCNP buffer communities.

This output responded to a situation in which the 5 target communities had no locally controlled businesses and few business development skills, and hence little incentive to manage local resources sustainably or protect them from wildfire. TIDE, whilst wishing to engage local communities, had a low capacity to deliver business training. The project therefore engaged IIED to mentor TIDE as they worked through a business 'incubation' process with the 5 communities.

The process began with a series of meetings in year 1 and early year 2 in all 5 communities (See annex 2, activity 6.2 for dates and details), at which the concept of group business was discussed, and community members were invited to propose business ideas.

Figure 7 (left) business ideas from Trio village. Figure 8 (right) Exchange Visit to cacao farm

Through links between IIED and the Forest and Farm Facility of the FAO, the project secured additional funding for 5 community members and 2 TIDE staff to take part in a regional exchange for representatives from locally- controlled forest businesses from across Central America, from 11th-15th April 2016. The exchange was hosted by a federation of cooperatives, FEDECOVERA in Coban, Guatemala. The participants visited various successful community-run businesses, and heard their experiences of organisation, marketing, finance and political representation. This exchange sparked the interest of the communities in group business. By August of year 2, six groups had formed across the 5 communities, with different business concepts.

The 6 groups were invited to a 3-day introduction to business skills training with IIED, which took place from 1-3/09/2016. The groups were then tasked to work over the next 4 months, with TIDE's mentorship, on draft business plan documents before a further training course with IIED. 4 of the 6 groups worked successfully on these plans and took the training course on 24/01/2017, covering business risk management. TIDE's work with the groups continued throughout the remainder of year 2 and 3 (see later for details), with a further training course from IIED in business organisation and management on 24/07/2017. IIED also worked with the groups individually in January and July of 2017, and also in February 2018. The lists of attendees at the training courses in annex 12 provide verification for indicator 6.1 (business training of at least 4 community groups).

The business plan documents, which were regularly revised throughout the project, with periodic review by TIDE and IIED, are indicator 6.3 (verified by annex 27, which contains one of the business plans for example – others are available upon request). These plans present the 4 businesses. Xibe is a women's group from San Isidro, with ultimate aims to open a Mayan cuisine restaurant in their village that can also act as a shop for their Mayan crafts (mostly sourced from

adjacent woodland). The group piloted their business during the project lifetime, with initial craft sales to an NGO tour operator, and the construction of a snack shop to pilot arrangements for commercial catering - from which they now sell lunches to the local school. SIFAA is a mixed-gender agroforestry group from San Isidro, with ultimate aims to plant and market cacao. To generate start-up funding, the group began, during project lifetime, with the construction of a jointly managed chicken coop in an area in which they are developing mixed agroforestry planting adjacent to the village. United Hands is a mixed-gender agroforestry group from Trio. During project lifetime, the group were able to construct a pig pen, rear piglets and make their first sale. Adventures in the Last Corridor is an eco-tourism venture in Medina Bank. The group ultimately aims to develop a guesthouse in the village, to host tourists for longer stays, in addition to running day-tours. During the project they developed a day-tour with optional homestay, and now market this tour, including cave, village and farm tours, river tubing, musical demonstrations and traditional Mayan meals, via TIDE Tours, a local tour operator. The group constructed a bathroom, and 2 changing facilities for the tubing element of the tour. Further detail about the achievements of each group is in section 3.2 under outcome 4.

TIDE's mentorship of these 4 groups involved at least monthly meetings with the groups, and the facilitation of a number of additional training courses, opportunities for vocational certification, exchange visits and representation to government. For the women from Xibe and Adventures in the Last Corridor there were visits to successful Mayan women's craft outlets, and craft training opportunities, and market connections were made with SEA Belize, an NGO selling crafts in Placencia village. 16 of these women were also certified as food handlers, permitting them to market food in their villages. For United Hands, SIFAA and Adventures in the Last Corridor, visits to Central Farm, and 2 successful small-holder cacao farms gave opportunities to learn about agroforestry. For Adventures in the Last Corridor there were also exchanges with the TEA, a Mayan guesthouse network, and 2 members of the group were certified, over 4 months, as tour guides, through connections with another project being managed by TIDE. The group were also supported to hold an official launch event for their tour on 26th February 2018, which was an opportunity to market themselves to several tour operators and on local television and national radio. These are just some examples of the work done to mentor the groups, and 'incubate' their developing businesses. As indicator 6.2, full details of the numbers of participants and dates of all courses and visits are listed in annex 2 under activities 6.3, 6.4 and 6.5 to provide verification.

Indicator 6.4 is the preparation of investment proposals with the groups, to secure capital to fund the full ventures planned by each group, and TIDE's continued mentorship of the groups post-project. In year 2, project staff initiated meetings with potential funding bodies, including the World Bank Key Biodiversity Areas Project, managed by the Belizean government, and UNDP's Small Grants Program (see annex 2, activity 6.6 for dates of meetings). TIDE staff worked with the groups to prepare detailed budgets for their investment proposals. On 22/02/2018 the business development team (ER, DMQ,NS,CS) met with consultants to FD and the GEF project leader German Novelo. On 01/03/2018 NS met with GN and agreed the basis for a proposal to be submitted by TIDE to the GEF. The GEF team then visited the business groups in the communities during the first 2 weeks of March and confirmed their suitability to receive funding. The proposal, co-written by TIDE, IIED and UE, was submitted to GEF in mid-March and is attached as annex 19 for verification that indicator 6.4 has been successfully completed.

This output has produced a step-change in the number of community-run businesses in the 5 buffer communities, from a baseline where there were no organised community businesses.

3.2 Outcome

Outcome: The means of monitoring and conserving biodiversity of pine woodlands in southern Belize is enhanced by developing capacity for community-based wildfire management, with local communities incentivised to participate through a more just and sustainable use of woodland resources.

The project has largely achieved its outcome to enhance the capacity to monitor and conserve biodiversity in the pine woodlands of Southern Belize and has also made significant further progress to build this capacity at a national level. TIDE has established a network of permanent

monitoring plots and learnt how to monitor the effects of its prescribed burning upon the pine and palm biodiversity in the area, whilst the monitoring and reporting of these indicators using the protocols established by Output 1 now provide a means for prescribed burning in the future to be managed to maximise plant and animal biodiversity in these protected areas. These consistent protocols for wildlife monitoring have been adopted and are being trialled by other NGOs, with the co-ordination of the ERI's National Biodiversity Monitoring Program (outcome indicator 1). TIDE and other members of the SBFWG now have an enhanced capacity to carry out prescribed burning and to train community members, and this fire training has now been shared with other NGOs throughout Belize. The basic fire training will continue to be available to NGOs nationally through courses organised by the ERI, while private reserves and land owners can arrange to pay TIDE for fire training (indicator 2); the project successfully engaged all the project buffer communities to understand their needs for access and resource use in the protected areas. The collapse of the market for palmetto in Belize, due to factors outside our control, meant that the communities had no incentive to work with us to develop sustainable harvesting arrangements for palmetto (indicator 3), but the engagement we had established through this activity meant that all communities were willing to work with us vigorously to develop other community businesses (indicator 4), which are all based on sustainable resource use and careful management of fire. Access to protected areas also had to be negotiated for these businesses, and so we were able to achieve the original purpose of outcome Indicator 3 in another way.

Each of the 4 outcome indicators (and sub-indicators) are now elaborated below:

3.2.1 Capacity to monitor the effects of fire management on biodiversity

As discussed under output 1, TIDE's fire management of PCNP and advisory role in the fire management of DRFR and SBFR was not previously responsive to data collection. The project seeks as an outcome, to build the capacity to carry out biodiversity monitoring and to actively use results to inform PA management (and specifically fire management) by training TIDE staff and local community members, and nationally, by training other PA managers.

Figure 9: Participants on vegetation monitoring course at PCNP

To achieve this outcome, TIDE staff and 6 community members were trained to use the biodiversity and fire-effects monitoring protocols developed under output 1. Putting the pine and palmetto monitoring protocols into practice required fixed plots and transects to be set up in the protected areas (outcome indicator 1.2). In years 1 and 2, 14 pine and palmetto monitoring plots were set up in PCNP and 8 palmetto monitoring transects were set up in DRFR and SBFR by TIDE's rangers and community members. The locations were chosen using the pine and palmetto maps created by UE under output 1. The plots and transects were marked with permanent tree tags and corner posts. All plots and transects were visited for data collection twice annually in years 2 and 3 by TIDE's rangers and community members who were paid employees for the days of monitoring. Annex 11 provides a summary of the data collected on these plots, using these and the other monitoring protocols developed by the project. As the report demonstrates, the plots are already yielding data that is informing TIDE's fire management

(indicator 1.3). There are recommendations to reduce the intensity of prescribed fires, and a new awareness of the importance of broadleaf shrubs in assisting pine regeneration that will change a previous strategy to attempt to thin shrubs using prescribed fire. Now that the methods have become routine, and the infrastructure, datasheets and data management system are set up, continuing to apply the monitoring strategy post-project should require minimal resources for TIDE, and the results will continue to inform adaptive management. This is a significant change, since at the start of the project the fire management was not informed by biodiversity information.

To build a national capacity to use these monitoring methods developed by the project under output 1, two training courses in long-term vegetation monitoring and mammal monitoring were held in year 3 of the project, co-ordinated by the ERI at the national University of Belize. The wide range of participants from other protected areas across Belize described in section 3.1 under output 2 shows clear evidence that the lessons learnt in the south of Belize about fire effects upon biodiversity are being widely shared to other NGOs and to government, as was recommended in Belize's National Fire Management Strategy and Policy. Annexes 13 and 14 provide example evidence of the content of these national courses (outcome indicator 1.1).

3.2.2 Increased capacity of community members/PA managers to manage wildfire

Under outputs 2 and 3, community members were trained in safe fire use for agriculture and prescribed fire management in savannas, and community members and protected area managers were trained to train others. Outcome indicator 2 is the capacity built in the attendees at these training events, and the resulting changes in fire use.

Indicator 2.1 is the basic level capacity built in the community members trained under output 3. The course they took covered the general principles of fire behaviour and specific principles applied to agricultural fires and savanna fires, and gave the participants practical experience of conducting a prescribed burn in DRFR (course content document in annex 15 gives verification). Verification of the capacity built and a behavioural change towards burning to manage wildfire is also evidenced in interviews conducted with participants on the training courses. Participants returned many of the key lessons that the training had been intended to deliver, for example:

- *'I learnt that it's best to burn when you have a black line first as the fire doesn't come back to that part'*
- *'You can burn when it's dry. Or you can burn like we did today. It's a slow process. That's something I didn't know before'*
- *'I learned how much difference the changing of the breeze can make'*

As well as building skills in fire use and safety, the training was also an opportunity for the community members to take on leadership roles and engage in strategic planning as a team. The following comments suggest these aspects of group training were valued by participants:

- *'It is best to have sufficient crew members to do a burn as there are a lot of things that can go wrong'*
- *'From yesterday, you know from the table, it looks easy, you know, no sweat, no walking. I saw everyone take responsibility and we looked after each other's backs.'*
- *'The point that I see is working together is better'*
- *'I learned that you need to have the appropriate plan. You have to have a purpose and reason for what you want to get out of it'*

Indicator 2.2 is a higher-level, local capacity to give fire training created by training up 'burn bosses'. Training delivered under output 2 equipped 6 community leaders and protected areas managers, selected on evidence of their aptitude in year 1, to lead prescribed burns in the field and to train others how to do so. Evidence that this capacity was built successfully is demonstrated by the ability of 2 of these community 'burn bosses' to lead the next iteration of the basic fire training for community members in year 3 of the project (see annex 12 for spreadsheet of participants as verification).

Figure 10: A community member trained in the advanced 'burn boss' training from year 2, delivers a basic level training course to other community members in year 3

Wider discussions about fire management were held in the communities at open meetings (see annex 2, activity 3.1 for dates of meetings). Meetings in year 1 in all 5 communities suggested that community members saw the management of fire as an important issue in their communities. The risks from savanna wildfire to thatch houses, and the school in one community, from escaped milpa fires to neighbouring crops, and from dry season smoke to health were expressed. In year 3 the project team decided to work with one community, Bladen, and their community 'burn boss', to write the first example of a community fire management plan in Belize (something above and beyond the project activities) They gathered the thoughts of community members at a meeting on 17/2/2018, and then drafted a plan for simple annual prescribed burning activities to protect the village from fires, and for attack on fires when necessary. This is a resource that the community can use both in real fire management and also as a tool to leverage future funding so they might obtain their own fire equipment. This draft was shared with the community at a further meeting on 18/03/2018. The community then used the plan as a basis to borrow equipment and successfully conducted a prescribed burn to protect the village for the dry season of 2018, independently of the project staff.

Figure 11: Community members help to design a fire management plan for Bladen village

Outcome Indicator 2.3 is engagement by the project in discussions at a government level over amendment of the legislation governing agricultural fire use, in order to understand the terms and requirements to provide for community-level regulation of fire permitting. In year 1 initial meetings to discuss rural fire use were convened with various stakeholders, for example: 25/08/2015 with logging concessionaires and the Maya Leaders Alliance, 27/08/2015 TIDE, DAVCO, FD, Ya'axche & the KBA GEF project; 27/08/15 jointly with FD and Agriculture Dept. (AD); 03/02/2016 TIDE and the Maya Leaders Alliance, 30/08/2016 TIDE and FD. Annex 20 provides the minutes of these meetings from year 1. Following provision by TIDE in year 1 of consultancy to the Government Agriculture Department and FD to demonstrate the potential of such legislative change, Mario Muschamp, project lead at TIDE, is now a member of the National Fire Working Group, a committee established on 23/03/2017, which is tasked with revising the Agricultural Fires Act. Unfortunately, movement from the government was slow in year 3 of the project, because the head of the committee began to manage a World Bank grant, and was not able to convene further meetings. Nevertheless towards the end of year 3 progress resumed, and Mario Muschamp was part of a consultative group for the writing of the government's new Forest Fire Communication Strategy for 2018-2020, launched on 24/01/2018. At the launch, TIDEs activities supported by this project with the Southern Belize Fire Working group was particularly highlighted by the Forest Department as an example to be replicated in Central and Northern Belize. Taken together, these discussions signal a significant change occurring during the project period in the attitudes of AD and FD, with both now agreeing in principle that responsibility for agricultural burning should be devolved to responsible persons in local communities. This change will take time to be translated into revision of legislation, but the previous Agricultural Fires Act is widely seen to be unfit for purpose and the project has contributed to discussions and positioned TIDE as an important consultee to continue this process of revision with FD and AD.

Through its training events, the project has built new connections between NGOs across Belize, and with local communities. These are leading to pro-active efforts in fire management despite slower legislative amendment. For example, building on his growing reputation, in year 3 of the project Mario Muschamp from TIDE gave several weeks of fire training courses to organisations across Belize, including the Programme for Belize and Monkey Bay Wildlife Sanctuary. The ~ US$ 5,000 income raised has been reinvested to fund TIDE's fire management in PCNP.

3.2.3 Access for sustainable use or extraction of woodland resources

Under outputs 4 and 5, the project worked to increase awareness in the 5 communities of the role of fire and of damage caused by unsustainable harvesting techniques on the palmetto resource; it also sought to facilitate legally, the sustainable extraction of palmetto and pine resources from the protected areas, both by the communities and by TIDE. An outcome envisaged initially was that the communities would respond by harvesting more sustainably, and with an incentive to participate in fire management. Indicator 3.1 is an increased awareness in community members of the factors influencing the availability of the palmetto resource. In years 1 and 2, community members were engaged on this topic through community meetings and surveys under output 4 and via the fire and business training courses under output 3. As discussed in section 3.1, the market for palmetto ceased to be viable in years 2 and 3 (invalidating outcome assumption 4), so the communities no longer saw a purpose to continue working with us towards output 4. Nevertheless, the request from FD to receive the mapping and results of the survey on the palmetto harvesting, and its assimilation into a consultancy report in preparation to FD on NTFP use by communities within protected areas, provides FD the information they require if the market for palmetto resumes and FD require to revisit the negotiation of access to sustainably harvest this NTFP.

By adopting a wider and more inclusive approach and fostering other community business ideas other than solely palmetto harvesting, the project was able to deliver the same intended outcome of negotiating sustainable use of forest resources and access by local communities to protected areas. For example, the project successfully negotiated access to the Deep River forest reserve for one of the community business groups to use a cave for their ecotourism venture. This involved agreeing conditions for access by the community to the cave within the forest reserve and also to a nearby riparian zone. Following a series of negotiations with the community group,

the consent of the long term forest concessionaire was obtained, leading to resultant approval by the Forest Department. This granting of permission by FD to permit this community use within a forest reserve signals an important change, more consistent with the new Forest Policy.

The other change we sought, also in line with the new Forest Policy, was to allow TIDE to sustainably extract timber from within PCNP, provided this did no harm to biodiversity. Indicator 3.2 is the acceptance by TIDE and FD into the next management plan for PCNP, of the recommendations for sustainable pine and palmetto extraction from the reserve, in a report produced under output 5 (see annex 18). The recommendations of the report are that at present, the economic incomes from pine and palmetto extraction from PCNP by TIDE, are insufficient to justify extraction at this time, as it would have certain minor dis-benefits to ecology and biodiversity that would require mitigation. However, given a further 10-15 years of objective-driven fire management, this situation may change, and it recommends that TIDE should revisit and re-assess sustainable extraction in the future. TIDE's management board have accepted this recommendation. No extraction will take place during the period of the next management plan. Instead, areas with potential for regeneration of pine seedlings have been identified and fire management will be used to encourage regeneration in these areas. Although there will be no change of practice towards extraction of pine in PCNP at present, the decision is now supported by evidence and recommendations for how to mitigate the effects of future logging upon the Yellow Head Parrot communities in the area, if and when the resource base or the economic price of timber increases to a level where sustainable extraction becomes economic.

3.2.4 Local community livelihood benefits

As described under output 6, the project supported TIDE to mentor community groups to develop locally controlled businesses. The outcomes envisaged were human, social, natural, financial and physical capital gains by the communities. The 4 groups were described in section 3.1 under output 6. Here we summarise the main achievements of each group as the outcome of this work.

The Xibe group have built a strong organisational structure around catering and the provision of school lunches in San Isidro beginning in autumn 2017 – in preparation for a more ambitious roadside restaurant venture which would also serve as an outlet for their forest-sourced craft. To allow them to begin preparing and selling food, 9 women from the group were officially certified as food handlers. In year 2 they found an initial market for their crafts with SEA Belize, an organisation in Placencia village. They also shared their craft making skills with the women from Adventures in the Last Corridor. The project made 3 direct investments of £180 to the group, the first of which was used to purchase cooking utensils for the group, the second for material to construct the snack shop from which to sell the school lunches and the third for expansion of that shop and a butane tank to allow cooking on site. The group and family members provided the labour for the construction of the shop. The group was also able to secure a land parcel from the community as a site for a future restaurant. They laboured to maintain this lot, and have planted 12 fruit trees there from seedlings provided by the Department of the Environment.

Figure 12 The leader of Xibe presenting her business group to her community of San Isidro

SIFAA, a livestock-rearing and agroforestry group, managed to secure a 10 acre lot from the community for the group. They laboured together throughout year 3 to clear the parcel, to begin establishing mixed agroforestry plantings and to construct a large chicken coop structure there, which they are planning to bring chickens to in the dry season at end of project. The transport and purchase of some of the necessary materials (timber, sand and gravel) was provided by the project with 3 direct investments of £180. The group also received 47 timber tree seedlings from the Department of the Environment, which they planted in the 10 acre parcel, where they had also begun to plant vegetables together.

Figure 13 SIFAA group members constructing their chicken coop

United Hands also began their agroforestry venture, with a jointly-managed small-scale livestock rearing project in the community. For now this is taking place on a privately owned parcel, while the group negotiate for a group parcel with the community. The group used 3 direct investments of £180, £180 and £110, and group funds collected through membership fees, to purchase materials to construct and later expand a pig pen, for which they laboured together, to purchase a pregnant sow, and to arrange feeding and livestock care rotas. Unfortunately the sow miscarried, and after raising the sow for 3 months, it was killed by a snake in February of year 3. Recognising the strong organisational development achieved by this group, the project invested in another £215 in 4 piglets to allow the group to continue their start-up project and to build upon their existing investment.

Adventures in the Last Corridor (ALC) planned to use resources and sites across the village and farming areas in their ecotourism venture and so required strong support from the community. This was negotiated throughout the project, with regular community meetings to seek support. The group signed a Memorandum of Understanding with the community in January 2018, and the community granted them a house lot on which they plan to build a guesthouse in the future. They laboured together throughout year 3 to clear the river for tubing, to create a trail system, and construct 2 changing areas for the tubing and a public bathroom for tourist use. The group used 3 investments of £180 each from the project to purchase a membership registration with Belize Tourism Industry Association, 15 river tubes, 12 T-shirts and 2 first aid kits. Furthermore, 7 women from the group were certified as food handlers to allow them to sell food for the tours, and 2 men were trained as tour guides. TIDE Tours, a local tour operator, worked with the group throughout year 3 to design and develop their tour packages, information materials, Facebook presence and price lists. The group made commitments to invest 40% of their income back into education and other projects for the wider community. During this development period the group gave practice tours and homestays to TIDE tours staff and the other business groups, for which they received income. TIDE tours began to officially market the tour in February of year 3 with publication on their website and in their brochure. ALC were launched as a service provider at a launch event on 26/02/2018, attended by tour operators. The launch event was broadcast on national radio and television news channels on 27/02/2018 (see annex 21 for an audio-clip of the radio broadcast on LoveFM).

Figure 14: River Tubing Ecotour with Adventures in the Last Corridor

As indicator 4.1, the members of these groups developed human capital in the form of business skills and, for some, vocational certification as food handlers or tour guides (see annex 2, activities 6.3 and 6.5 for more detail on dates and numbers trained). As verification of the skills gained, annex 22 provides the power-point presentation from one of the business training courses (others available on request).

As indicator 4.2, members of the groups gained livelihood benefits in the form of social capital deriving from working together for business. Besides bonds built within the groups, the project brought the groups together frequently at training courses, exchange visit and experience-sharing joint meetings, for example on December 20th 2017. These encounters provided opportunities for the groups to share learning and skills. For example, Xibe, who had more advanced craft-making skills, were able to share these with the women from Medina Bank.

As indicator 4.3, at least 2 of the community groups were expected to obtain direct financial incomes from their businesses, and/or physical or financial capital investment from donors external to the project. As described above, all 4 groups received investments of some kind, either from the project or external donors, and 2 of the groups made initial revenues from their businesses. These investments and revenues are summarised in the spreadsheet in annex 23. All four groups have produced business plans and these have been presented to donor organisations such as the World Bank GEF to secure further investment for these businesses.

The building of capacity in at least 20 local and national NGO staff to understand how to support community business groups is outcome indicator 4. IIEDs mentorship of 3 of TIDE's staff, is evidenced by the frequent provision of learning notes (an example is attached as annex 24) to advise TIDE in supporting the business groups. The workshop report in annex 25 provides verification of a national capacity for business incubation being developed in a workshop on 'community business development and conservation' delivered by IIED in year 3 under output 2, to 17 participants from 14 organisations (See annex 12 for participant list). At the workshop the experiences from the project, and IIED's work globally were shared with organisations working with community businesses elsewhere in Belize, and their experiences were gathered and discussed. Key findings from this workshop were then presented to Belize's biodiversity practitioners through a special session, sponsored by the project, at the Natural Resources Management Symposium of the Mesoamerican Society for Biology and Conservation on 1st March 2018, attended by over 200 biodiversity and conservation practitioners.

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

Impact statement from logframe: Biodiversity of pine woodlands is conserved throughout Belize, enabled by an increased national capacity for community-based wildfire control that is founded upon a just and sustainable use of these woodlands.

Our independent review in November 2016 concluded that "the project is making good progress towards building capacity for community wildfire management and a national capacity for biodiversity monitoring, and has developed a fire management training manual which has been published by the University of Belize Environmental Research Institute (ERI), as part of the National Training Programme on Protected Areas Management (NTPPAM). This contribution to capacity building will likely have a positive impact on biodiversity and livelihoods over the medium to long term."

Our mid-term review concluded that as is typical of many Darwin projects, the positive, measurable impacts on biodiversity and on poverty alleviation are likely to occur mostly after the end of the project. This project has however created the necessary pre-conditions, so that positive impacts on *both* biodiversity conservation *and* livelihood improvements can develop over the next 10 years in these protected areas, surrounding communities, and more widely in Belize.

Since this review, the project has further developed these enabling conditions, many of which were poorly developed or did not exist at all prior to this project, including:

Positive impact on biodiversity conservation: The outcome indicators show that the project has built capacity in both fire management (indicators 2.1, 2.2) and the monitoring of the effects of these fires upon biodiversity (indicator 1). This capacity is now embedded in the local institution, TIDE, which will continue this work beyond EoP using the newly created field plots and monitoring protocols (outcome 1.2), and can now adapt its fire management to maximise biodiversity (outcome 1.3). As a result of interactions with partners during this project, TIDE now has a formal role in advocating for changes to the Agricultural Fires Act to reduce escaped wildfires and can now promote best practices in fire management nationally as practical implementation of the Wildland Fire Management Policy and Strategy for Belize, which was written in 2009 but until this project had not seen practical implementation on the ground (outcome indicator 2.3). This set of project outcomes create the conditions to enable more appropriate fire management practices to be conducted in Belize, and the effect on biodiversity to be monitored, so that over time, as a local example, pine woodlands in PCNP will regenerate, with consequent benefits to biodiversity such as reduced pressure from burning and an expansion of nesting habitat for the Yellow Head Parrot. TIDE also now have the capacity to propose an informed plan for sustainable extraction of pine from PCNP, so that as pine trees mature, they can be carefully extracted to generate income to continue to support their conservation activities, whilst mitigating any negative impacts on biodiversity (indicator 3.2).

A similar capacity for fire training and for biodiversity monitoring has been created at the national level (indicator 1.1), which can continue to be delivered to other NGOS by the ERI, using the training materials for the courses developed by the project (outputs 1 and 2). This will enable other NGOs across Belize with pine savannas to conduct prescribed burning, and to monitor the effect on their biodiversity, such as jaguar, tapir, deer and bird abundance, and yield of NTFPs.

Positive impact on human development/wellbeing: The outcome indicators show that the project has made progress towards more a just and equitable sharing of the benefits from these protected areas, with the 5 communities which border PCNP. Community members who participated in the training courses have learnt how to carry out agricultural burning more safely, with the consequence that fewer escaped agricultural fires are expected to damage valuable crops; each community also has a 'burn boss' with the skills required to lead a group of members with basic training to attack fire which is threatening a village (outcome 3.1). This is a step change in skill and experience to manage fire in each of the villages and the communities report feeling more protected against fire – this represents a significant improvement in reported well-being obtained during the project lifetime, compared to the serious concerns of many communities (especially Bladen village) about wildfire reported at start of project.

The livelihood development component of the project has also led to modest measurable impacts on community livelihoods in the project within project lifetime. Members of these groups developed human capital in the form of business skills and, for some, vocational certification (indicator 4.1), whilst all groups (and especially the majority women groups) reported deriving social capital benefits through working together and networking with groups from other villages. (indicator 4.2). The spreadsheet in annex 23 shows that many of the groups derived some direct economic benefits also (indicator 4.3). These beneficial impacts are likely to continue to grow beyond EoP, and the business plans and investment proposals to donor agencies that have been written during the project are means to achieve a greater impact beyond EoP. In addition to the direct community beneficiaries, the capacity that has been developed in TIDE, and the creation of a network of NGOs working together to develop community businesses throughout Belize, may have the greatest positive impact in the longer term on the livelihoods of communities buffering many protected areas.

4 Contribution to Darwin Initiative Programme Objectives

4.1 Contribution to Global Goals for Sustainable Development (SDGs)

The project worked across a number of the SDGs. With the communities targeted by the project being amongst the poorest in Belize (according to Belize's Country Poverty Assessment of 2010), the development of community enterprises, and reduced risk to property and livelihoods from fire contributed to SDG 1 *'to end poverty in all its forms everywhere'*. The business training, vocational certification, fire training and biodiversity monitoring training provided learning opportunities to a range of people across the communities, some of whom have not completed primary school, and many of whom have not attended high school, and hence supported SDG 4 '*ensure inclusive and equitable quality education and promote life-long learning opportunities for all'.* The equal involvement of men and women in the business development elements of the project, the leadership of women in these enterprises, and the involvement of women in fire training, were strong steps in Belize towards SDG 5, *'achieve gender equality and empower all women and girls'*.

The support of entrepreneurship by community members also aligned with SDG 8, *'promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all',* in a region where opportunities for wage labour are limited. The project's work to reduce the impacts of wildfires on the biodiversity of the lowland savannas of Belize, which are likely to be exacerbated by climate change, strongly supported SDG 13, '*take urgent action to combat climate change and its impacts'*, and SDG 15, '*protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forest, combat desertification, and halt and reverse land degradation and halt biodiversity loss'*. Finally, the national and international partnerships developed through the project, worked towards SDG 17 '*strengthen the means of implementation and revitalize the global partnership for sustainable development'.*

4.2 Project support to the Conventions or Treaties (CBD, CMS, CITES, Nagoya Protocol)

This project addressed several Aichi targets (see Annex 4). The fire management element responded to the need for actions whereby '*degraded ecosystems may be enhanced through in situ conservation and restoration, contributing to climate change mitigation'* (targets 14-16), and enabled local communities to participate in conservation (target 18). The community enterprise and palmetto rights components sought to provide '*economically sound, positive incentives for promoting conservation and sustainable use of biodiversity'* (target 3). Enabling communities to negotiate access to woodland resources and the promotion of sustainable harvesting are examples of short term measures suggested in Annex 1 to UNEP/CBD/COP/12/6 through which *'NGOs and communities may negotiate mutually agreed terms for benefit sharing'.*

The project supported Belize's signatory commitments to various UN-CBD articles, including (6) national strategies for biodiversity monitoring and conservation; (7) identification & monitoring of components requiring urgent conservation; (8) restoring degraded ecosystems by balancing sustainable use/conservation; (10) informing national biodiversity strategy; (11) providing

economically and socially sound incentives to conserve biodiversity and promote sustainable use; (12) establishing research/training programmes; (13) promoting public education and awareness and (15) enabling access to resources and benefit sharing.

FD is the National Focal Point for the CBD in Belize, and as a project partner was regularly updated with project progress, by email and by staff attendance at meetings (e.g. on the 30/08/2016, 31/01/2017 and 03/02/2017 and 22/02/2018). FD staff participated in the 3 capacity- and legacy-building workshops under output 2. Project outputs 2 and 3 enabled FD to implement, for the first time, elements of the National Wildland Fire Management Policy and Strategy of 2009. The meetings held under the project to consider community access to Forest Reserves for palmetto extraction under output 4 were amongst the first attempts by FD to consider implication of elements of its new Forest Policy of 2015, which explicitly calls for community access to Forest Reserves for NTFP extraction.

4.3 Project support to poverty alleviation.

The five communities targeted are amongst the poorest in Belize (as recognised by Belize's Poverty Elimination Strategy), and have few opportunities for paid employment besides labour on surrounding banana plantations. Many adults have not been educated beyond primary school level. This project strengthened links between TIDE and its local communities and improved the capacity of TIDE to contribute to sustainable development in the area.

The fire training will have several indirect, long-term benefits to community members. Participatory exercises at community meetings (activity 2.1) suggest that community members recognise fire as posing a serious risk to their wellbeing, livelihoods, homes and health. There were also direct benefits for the community members taking fire training, who developed new marketable skills (for example useful for obtaining employment with NGOs and local logging concessionaires) and leadership experience, as well as receiving a stipend for attending. The training also built connections for local people with TIDE, giving many an understanding of the functioning of an NGO. Six community members were also employed by the project to carry out monitoring of the pine and palmetto plots established under output 1. Of these, two have now been employed in full-time positions as rangers by TIDE.

The mentored development of 4 new community enterprises under output 6 has built the business skills of over 20 male and female community members through training and exchange visits. It has seen 16 female community members gain official certification as food handlers, and 2 community members trained as tour guides, and by EOP had already delivered incomes to 2 of the groups (see annex 23). The development of business plans, and the submission of proposals for follow-on funding creates the potential for the groups to attract more substantial donor funding that may allow them to secure and further expand their business in coming years.

4.4 Gender equality

The project was committed to promoting gender equity and was encouraged by the progress made. In Belize there are strong gender roles. Men are often the household income earners, and would generally also be regarded responsible for agriculture and fire management. We were therefore encouraged by our success in involving women in the basic level fire training in years 1 and 3. All attendees at the 2nd level "burn boss" fire training were men, reflecting the reality that the overwhelming majority of managers of protected areas, logging concessionaires and community leaders in Belize are male.

The four business groups supported by the project included one with a majority of women and three that were mixed gender. The two groups with agricultural or agroforestry-based business concepts had strong female representation and involvement. All business training events had approximately equal male and female participation-a strong step forward that is prominently demonstrating within the communities that women can lead and develop enterprises.

4.5 Programme indicators

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

The training of community members in fire management and fire effects monitoring under the project has strengthened the involvement of local community members in TIDE's management of PCNP. Two local people have been employed as permanent Rangers and they now engage their villages actively in conservation practices. More than 10 other local community members have gained skills in monitoring the effects of fire on vegetation, and carrying out nest box surveys of endangered birds. This new local expertise will be used by TIDE to enhance its management of the park. At a higher level, TIDE Ranger Mario Muschamp is now a consultee on government proposals for revision of the Agricultural Fires Act; Mario consults widely with local communities to obtain their views on the priority areas for revision from the perspective of local people.

- **Were any management plans for biodiversity developed?**

The PCNP Sustainable Extraction Zone Plan (Annexe 18), the Palmetto Harvesting Survey (Annexe 16), and the new Biodiversity Report for PCNP (Annexe 11) will be included in the next PCNP Management Plan. The biodiversity monitoring protocols developed (Annexes 8, 9, 10) have already been incorporated by ERI into their National Biodiversity Monitoring Programme.

- **Were these formally accepted?**

Yes. TIDE have agreed to incorporate these data and findings into the next revision of the PCNP Management Plan, which will be produced in 2020.

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

Yes, see summary income figures in annex 23. The Xibe group made a total income of $2240 BZD (£787) throughout project lifetime from food sales for community meetings and to the school. ALC group made a total income of $1762 BZD (£619) from trial tours.

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

6 households represented in the Xibe group made an income of $373 BZD (£131) from initial sales. There are 15 members (equivalent to 15 households) in ALC. ALC invest 80% of their income back into the group or into the wider community (donating to the school and to a community fund). So each member made a small income of $23.50 (£8) from these initial trial tours, but households in the wider community (of 90 households) also saw benefit.

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

National averages are not a good proxy for average household income of the group members, as these are among the poorest communities in Belize. Some households are subsistence farmers, but many have some wage income, usually from labour on banana plantations. This work pays the national minimum wage, of approx. $30 BZD (£10.54) p.d. Each group was trained in record keeping and the project regularly visited each community to record income.

4.6 Transfer of knowledge

The project saw the transfer of knowledge and skills in three areas: Fire management, biodiversity data collection/management, and community business mentorship and development. The project presented knowledge developed in each of these areas at national and international conferences in Belize and the UK (UK Belize Association meetings in 2015, 2016 and 2017, a 2017 workshop on fire hazard mapping in Antigua, Guatemala, the 2016 Central America Regional Meeting of the Mesoamerican Society for Conservation Biology, and through special sessions at the 2017 and 2018 Belize Natural Resource Management and Research Symposium.

Technical knowledge and the skills to train others in fire management were transferred under output 2 from TIDE staff and Rick Anderson to protected areas managers from 7 different Belizean organisations including the government FD, who are responsible for implementing

Belize's Wildfire Policy & Strategy. A fire training module (annex 15) was created and is now included in Belize's National Training Programme for Protected Area Managers (NTPPAM).

The creation of new biodiversity monitoring protocols under output 1 (see annexes 8 and 9), transferred expert ecological knowledge to TIDE for an improved monitoring strategy to complement their management of PCNP. These protocols have also been published by the ERI as part of Belize's National Biodiversity Monitoring Programme. They were also used to give two biodiversity monitoring training courses, under output 2, for protected areas managers representing 10 different Belizean organisations, including the government's FD. The protocols were also used to train students of the University of Belize's Natural Resources Management degree in years 2 and 3. Furthermore, the project has enhanced TIDE's capacity for monitoring and planning management of PCNP with the creation of GIS mapping of pine, palmetto and wildfire for the area by UE (see annex 3, code 2, for weblinks to 4 master's dissertations).

The project created a new international partnership for knowledge transfer between IIED and TIDE to develop and mentor community businesses under output 6. Under output 2, the lessons learned by IIED and TIDE from mentoring community businesses in Toledo were transferred to other protected areas managers and NGOs in Belize at a workshop on 23/02/2018 and a special conference session on 01/03/2018. A policy briefing note targeted at Government of Belize FD and AD, and the Ministry of Environment was published by IIED at EOP (see annex 28).

- **Did the project result in any formal qualifications?**

Yes. See Annexe 3, 1-6 for all the formal qualifications and certifications obtained by participants. The KE aspects of the project, including the satellite mapping of forest resources and wildfires provided opportunities for 5 masters students at UE (2 male, 3 female, 4 British, 1 US citizen) to develop masters dissertation projects direct relevant to the conservation of pine woodland biodiversity in Belize. The part-time UK Project Officer also conducted her PhD at UE during the project (for completion by April 2019). This studies the history of fire management in Belize, and her experiences and contacts as the Darwin Project Officer have informed the design of this PhD.

4.7 Capacity building

The project provided internship opportunities with stipends, which gave the opportunity to three recent Belizean graduates from the Natural Resources Management degree at the University of Belize to gain work experience with TIDE and develop skills in GIS, biodiversity monitoring and community development work. Ryan Moore worked as the project's GIS intern for TIDE for 3 months from Jan-March 2016; Allana Barillas worked as our community business development officer for TIDE for 15 months from April 2016 to June 2017, and Nilcia XI carried on the same role working part time from July 2017 to March 2018.

Figure 15 Allana Barillas, Belizean project intern presenting the project's business development work at the 2017 Symposium of the Mesoamerican Society for Conservation Biology, Belmopan

The project built upon TIDE's pre-existing status as an authority in fire management nationally and regionally. It furthered the skills of TIDE's rangers in fire management and biodiversity monitoring, and gave a platform to several of TIDE's rangers to lead their first fire management training courses. TIDE were invited to attend the meetings of the National Fire Management Working Group and consult on the revisions to the Agriculture Fires Act. Mario Muschamp was invited to the Launch of the FD new fire communication strategy in Belize City on 24/1/ 2018. The project also funded the position of TIDE's community development officer Elmar Requena and provided him with opportunities to present his knowledge at two national conferences (the 2017 and 2018 Belize Natural Resource Management and Research Symposia).

5 Sustainability and Legacy

Many of the outcomes of the project are expected to continue and grow after its completion. The biodiversity and resource monitoring that has been established during the project is designed for the long term, and its sustainability has been built into the project via the publishing of the protocols, the training of local community members and rangers to carry out the monitoring and via activity 2.1, which trains protected area managers in the methods. With fixed plots, pre-formatted datasheets and a data management system established, the protocol will be simple for TIDE staff to carry out in successive years. Rick Anderson and Neil Stuart will continue to provide academic direction and to recruit student interns to assist with these studies and reporting of results in subsequent years. The fire training under activity 2.2 has given leaders in the communities the skills to train other community members in fire management in the future, which should ensure that capacity to manage fires remains high following the project.

The business development work aimed to leave community members with the skills, pilot projects and investment for the businesses to survive post-project. The successful completion of business plans, gaining of initial revenues, and production of investment proposals during the project period suggest that at least some of these businesses will be sustained. The business groups have also formed supportive internal and external networks and these will continue to help them to develop skills and social capital and to seek further external funding beyond this project.

For TIDE, ERI and FD, this project provides pilots and establishes methodologies in support their longer-term aims as organisations. For TIDE, the engagement of these local communities will be a core aim in future, as will be the management and monitoring of biodiversity resources, and possible sustainable extraction from PCNP, for which this project lays the groundwork. For ERI, the national standardisation of monitoring and data collation are key aims that this project has assisted. For FD, the project laid the foundations for negotiating community licenses to extract NTFPs from forest reserves, and for creating Sustainable Extraction Zones within National Parks and other PAs, both of which are envisaged in its new Forest Policy. TIDE can use the reports of outputs 4 and 5 as a means for dialogue with FD over community access rights for palmetto (should the market become viable in the future) and for a Sustainable Extraction Zone in PCNP.

The legacy of the project lies partly in the outputs from the project which have been embedded in national organisations – for example the fire management training courses and the biodiversity monitoring protocols which have been adopted by the national university, and which will continue to be delivered beyond the project as part of the National Training Programme For Protected Area Managers (NTPPAM). Legacy also lies in the networks built both between TIDE and other NGOs developing operational fire management operations and working with community business groups in other parts of Belize, since this will enable them to co-operate and to build over time the complete nationwide capacity for fire management envisioned in the project impact. All contracted staff working on this project remain employed beyond EoP, mostly within their institutions, as they were seconded for all or part of their time to work on this project. Student interns have new jobs, e.g. Moore has been hired by TIDE; Xi has become a school teacher.

6 Lessons learned

Using a theory of change that developing community businesses could also help to incentivise fire management, because people will want to protect their resources from fire, this project sought to link biodiversity conservation and poverty alleviation. In year 2 the project had a Darwin mid-

term review, and this noted that although the project was on track to have a positive impact on biodiversity conservation, some of the business ideas from the communities were only indirectly linked to fire management, (e.g. not all the businesses relied directly on harvesting plants from savanna areas – like the palmetto), and argued that this undermined the project's rationale. We continue to believe that this was not the case, and instead feel that we had successes and learned valuable lessons in this project about the process of linking conservation and community development (which are rarely perfectly aligned).

All project partners considered carefully at the community engagement stage of the business development work, the extent to which business ideas should be dictated by the project to the communities. Partners agreed that the communities would have stronger ownership of the businesses, if they themselves proposed the ideas. Hence we agreed to be open to working with a wider set of businesses ideas, including some that did not necessarily rely directly upon savanna resources. Nonetheless, we maintain that any infrastructure in these communities is directly at risk from wildfire, and consequently many of the business plans developed by the communities included fire management as a means to protect their businesses. Many of the fires that affect savanna areas spread from agricultural areas buffering these reserves, and for this reason it is necessary to seek to reduce fires in the buffer areas also, where people live.

By being open and supportive to the business ideas of the community, the project built trust between TIDE and the communities and this allowed TIDE to gradually suggest more compatible elements to the business visions, and to engage the communities with ideas about sustainable resource use and the purposes of protected areas, with which they were previously unfamiliar. Certainly, some of the initial ideas suggested by the communities were not compatible with FDs vision. For example, one of the groups initially wanted to establish Tilapia ponds in a Forest Reserve. By giving the group ownership of their project, taking their ideas seriously and helping them to present them to FD, the group realised over time that the ponds would have to be situated on community land instead. Later they decided that building a chicken coop was more feasible on the land available. Subsequently they were introduced to the idea of agroforestry, and they later decided to plant trees around the chicken coops and on other private land in the village. This mentoring was made possible by not dictating to them only a few options at the outset.

The most important lessons learned were about engaging and working with community groups. In the first year, to recruit participants for the fire training in each community, we relied on their leaders to select candidates. Whilst it is important in Belize to have the support of community leaders, it may have been more inclusive to have presented the opportunity at an open meeting. Feedback at community meetings held after the training suggested that, particularly in Trio village, many community members had not been informed of the opportunity, and some of those trained were not confident to share their experience with other community members. By year 2 we had gained key contacts in each community that could help us in engaging with others, and had built more contextual understanding and developed some trust with each community.

Intra-village political divisions and social structures sometimes came into play and caused unexpected challenges. For example, in Medina Bank, the wider community did not feel that they were being well informed of the project activities by the business group members and the election of new village leaders during year 2 divided the executive of the group. The result was that the members of the community, with the support of one of the new leaders, demanded a change in the executive. The project responded to such challenges by remaining impartial, and continuing to provide support to the new leaders chosen by the community. Nonetheless, some of these new leaders had not participated in earlier training courses, which set back the progress of this business group for some time in years 2-3.

We clearly had a simplistic vision at first of how we might assist communities gain the rights to access forest reserves for the sustainable harvest of palmetto. Though we were not able to secure from government a legal agreement for the communities, we nonetheless deepened the understanding on all sides of the issues involved and clarified the positions of the stakeholders. We revealed the volatility of the market for palmetto, aired wider questions about community land rights being disputed between the government and the Maya Leaders Alliance and evaluated the feasibility of the diversity of harvesters working together collectively to organise the harvest and sale of palmetto. As a consequence of this learning, we believe that TIDE are in a stronger position to press for the realisation of community access to Forest Reserves in coming years,

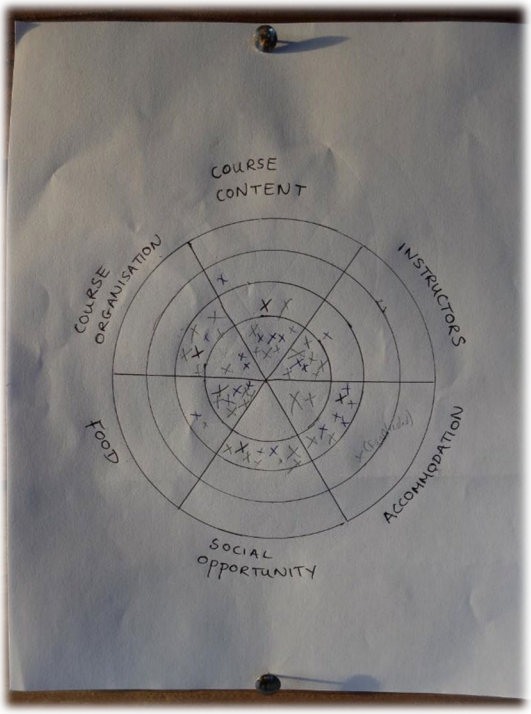
and that FD has been engaged to consider the practical implications of their new Forest Policy and of the Maya Land Rights case.

6.1 Monitoring and evaluation

Regular communication between and biannual meetings of all partners allowed us to respond together to changing circumstances as they arose. This was particularly important for the work with the community business groups. TIDE's frequent meetings with the individual groups (at least monthly) allowed the project to tailor its support with appropriate training opportunities, exchange visits and so on. Indeed the project provided far more opportunities for the groups than originally envisaged because TIDE were so responsive to the group needs. The content of IIED's 3 business training courses for the groups were also not pre-designed, but rather each year responded flexibly to requests from TIDE and from the groups themselves.

Output 4 of the project originally specified that palmetto concessions would be established in DRFR and SBFR for the communities. However in year 1 we quickly realised that more research and consultation was needed to understand the needs of the individual communities and how best to design an agreement securing the palmetto resource in the context of the emerging Maya Land Rights case (See also section 6). In this new context, the traditional model of concessions to be granted by FD would be potentially unacceptable to some communities. We therefore submitted a change request to reword output 4 and remove the commitment to establishing concessions within project lifetime. This was accepted by Darwin at the end of year 1.

In year two the project underwent a Darwin Mid-term review, which provided a valuable chance for reflection and revision of the project. In particular, the review recommended we refine the outcome statement of the project to better capture its likely achievements. The MTR noted that the project's original outcome statement and its outputs 4 and 5, as written, implied further work would be required beyond EoP for them to be fully realised. We reworded these statements and submitted a change request. The MTR also noted that some of the project's indicators were not articulated sufficiently clearly for progress against them to be measured. In response, we reworded certain outcome and output indicators, linking them directly to measurable evidence that the project was capable of providing. Finally the MTR noted that our logical framework did not include all of the work clearly being done to support the community businesses. We expanded the activities and indicators under output 6 to better reflect the scope of the work being done. The request for these changes was accepted by the Darwin Secretariat at end of year 2.



All training courses were evaluated with verbal feedback and opportunities for anonymous feedback. (Annexe 12). To allow us to tailor sessions to the needs of the participants, we usually began sessions by asking participants what they were expecting to learn, and used this as a basis for group review of how far the course had met these expectations by the end.

Figure 16 (left): A 'bulls-eye' diagram is filled in at the end of one of the vegetation monitoring training courses by all participants

It was more difficult for the project to evaluate some of its other activities, because we expect many benefits to accrue after EOP. Whilst the project developed new biodiversity and natural resource monitoring methods, two years of monitoring data is not sufficient to definitively show the effects upon biodiversity of the fire management. Nevertheless, some of the monitoring methods are already providing evidence to inform fire management. For example, data from the pine monitoring plots

we established is providing evidence of the char height at which pine seedlings will survive prescribed fire, and the importance of woody shrubs for protecting seedlings. This is informing plans for the intensity and the timing when prescribed burns will be conducted in future years at PCNP (see Annexe 11).

The socio-economic impacts of the project were initially intended to be evaluated by means of livelihood surveys in years 1 and 3 (activity 6.1). However, we decided in year 1 not to conduct a full socio-economic survey for several reasons. Economic benefits from the development of the community businesses were expected to accrue mainly in the future, beyond EoP, and to a subset of household from much larger villages, who had not yet been determined. A full economic survey of livelihoods in each of the five communities would have been disproportionately time consuming, requiring months of effort to gather a statistically meaningful data set to detect change in each community. We did not feel that the time and resources required to do this were justified, particularly given that we anticipated that many of the more intangible benefits in terms of human and social capital would not be easily captured in a quantitative livelihood survey. Instead, a combination of methods was used to provide a socio-economic impact evaluation for the project. In year 1 the Project Officer spent a month living in the villages, interviewing village leaders and NGO staff, and used this information to write baseline profiles for each village (see annex 26). We are also able to provide figures for of direct economic benefits to the community business groups during project lifetime (See annex 23). We learnt to make the data collection proportionate, and not overly demanding of the time of the community, given that livelihood benefits were only one component of the overall fire management project.

We also provided progress reports to our communities, and ensured they had opportunities to provide feedback and voice concerns. Public update meetings were held in each community biannually, and final project summary meetings were held on 18/03/2018 (San Isidro and Bladen), 25/03/2018 (Trio) and 01/04/2018 (Medina Bank). These were useful opportunities to reflect upon progress and to keep the wider communities informed of achievements. On 21/02/2018 all the business groups had an opportunity to present their experiences and achievements under the project at a public event in Punta Gorda, attended by TIDE, other NGO staff, lecturers and students from the University of Belize, and members of the public.

Figure 17: United Hands business present their experiences at a public talk in Punta Gorda

6.2 Actions taken in response to annual report reviews

Issues raised by the reviewer of our year 1 annual report were addressed with an approved change request to our log-frame at the close of year 2 (already detailed in section 6.1).

The review of our 2nd annual report asked us to address the following in this final report:

1. *Evidence to verify the project's collection of baseline biodiversity data pre-dates the project (a report published in 2014) using data collected up to 2012. Now that the project has revised national biodiversity monitoring protocols and is collecting new data using*

these protocols, does the project plan to publish a new biodiversity baseline, incorporating data collected during years 1-3?

Yes. Annex 11 contains a new baseline report on pine and palmetto using data collected during the project lifetime using the new protocols developed by this project (see section 2.2 for more detail). Whilst new protocols for further biodiversity indicators (birds, mammals etc.) were developed and published nationally under the project by our partner ERI, and are being used by other NGOs in Belize, TIDE does not have the capacity presently to conduct regular monitoring using all these protocols. TIDE is left with the baseline report from 2014, together with the results of two years of further enhanced monitoring by this project, which they have agreed to continue using these protocols in the future. This will enable them to make comparisons with the data collected up to 2014, and the new biodiversity baseline we have produced, incorporating all the data collected during years 1-3. As well as these reports, the project has also left TIDE with increased capacity for data management and a new awareness of using monitoring for their adaptive management of the PCNP ecosystem.

2. *How would you assess the risk to project sustainability of the SFEs not attracting any funding before the end of the project? How will TIDE continue to support the development of SFEs after the project, if funding has not been forthcoming?*

See section 3.1 output 6, and annex 19 for an example of further proposals submitted by TIDE to support the community SFEs beyond EOP. This example was submitted in mid-March 2018 to the World Bank GEF's 'Key Biodiversity Areas Project'. If funded this will support another 2 years of business training and support by a dedicated member of staff at TIDE, as well as direct investment for the full start-up of all the 4 businesses piloted over the last 3 years. While awaiting a decision, TIDE, with the assistance of our project staff also submitted a proposal in May 2018 for $43k to the Power To Grow Foundation, and have the possibility to also submit this proposal to the InterAmerican Fund (IAF). There are therefore good prospects that TIDE will successfully obtain further funds to support these groups. The project also created a new network of NGOs supporting community businesses in Belize, and TIDE are using this network to bid for further resources to expand their community business development activity. 2 of the 4 businesses, (ALC and Xibe), are already making income, and ALC has signed a marketing agreement with TIDE Tours and registered as a tour provider with the Belize Tourism Association. ALC are in contact with further tour operators following their official launch event in February 2018. Both ALC and Xibe are likely to become profitable during this year, at a modest level, even without significant further investment.

3. *Community Palmetto production was negatively impacted by Hurricane Earl in 2016. The project cites this as the reason Belize's Palmetto buyer did not purchase Palmetto from the community (see outcome assumption 4). The reviewer seeks clarification on this statement. If supply in Belize was low (as a result of Hurricane Earl), basic supply and demand economics would suggest the buyer would purchase as much Palmetto as possible, all other factors being equal? How does the project explain this? Did the buyer purchase from other sources? Why did the buyer choose not to purchase from the community?*

See section 3.1, output 4, for the information the project was able to ascertain as to why the buyer did not purchase in years 2 and 3 of the project.

7 Darwin identity

We built upon our previous project (17022) and the awareness this established in Belize about the Darwin Initiative. Darwin was also funding project 17023 in Belize and so we took the initiative to convene a joint meeting of both projects at the British High Commission in Belmopan in November 2016. Darwin Reviewers from LTS attended this meeting and gave guidance on writing stage-2 proposals to 3 applicants who submitted to the 2017/18 round. This further raised the profile of the Darwin Initiative to conservation professionals and diplomats in Belize. As noted in section 4.6, the project, and Darwin as the funder, were also showcased at several conference

presentations in the UK, Belize and Guatemala. We sponsored a special session on 'Community Business and Conservation at the 2018 Belize Natural Resource Management conference, at the University of Belize in the capital Belmopan. The Deputy High Commissioner Clare Bruce and Dr Neil Stuart talked to an audience of over 150 conservation professionals about the legacy of many influential Darwin projects in Belize over the last 20 years, at an evening poster session and reception, co-sponsored by Darwin and the British High Commission. The Darwin logo was prominently displayed on all conference materials, and at all these presentations.

Radio is an effective way to reach a broad audience in Belize, including many rural households that cannot afford a television. The project, and Darwin as the funder, aired three times on Belize's most popular national radio station LoveFM. In year 1, a broadcast on 24/03/2016 covered the fire training of community members from Bella Vista, and was an opportunity to send out some of the project's messages about fire management. In year 3, a broadcast on 04/04/2017 covered the vegetation monitoring course at PCNP, and was an opportunity to showcase the project and TIDE's management of the national park. In year 3 LoveFM covered the launch of the ALC Ecotourism business in Medina Bank on 27/02/2018 (annex 21 has an audio-clip). The launch event was also covered on local television.

Figure 18 Darwin logo featured on (left) main banners and (right) printed materials at the 11th Natural Resource Management Symposium in Belmopan, 1-2 March 2018.

The Darwin logo has been used on all reports produced and published by the project and features prominently on all the certificates awarded to the community members completing the business and fire training courses. IIED published blogs about the project (http://www.iied.org/flaming-parrots-palmetto-palms; https://www.iied.org/community-forest-farm-business-training-under-way-belize; and https://www.iied.org/business-incubation-motivates-fire-management) and a Policy Briefing note (annex 28), which all reference the Darwin initiative and use its logo.

As well as having its own website through which many of the project reports are available for download, this Darwin Project is also promoted on the TIDE website. These websites provide backlinks to the Darwin Initiative website (see weblinks at start of this report).

8 Finance and administration

8.1 Project expenditure

Project spend (indicative) since last annual report	2017/18 Grant (£)	2017/18 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)			8.36%	n/a
Consultancy costs			9.13%	n/a
Overhead Costs			100%	£2786 to TIDE for additional salaries to extend intern from 4-8 months and additional salary to Elmar Requena for project evaluation work. £1,824 additional consultancy to Woodsburner to extend intern Fanny Tricone from 4-10 months; £983 to TIDE for T&S to fund post-project evaln. Additional £1947 to Op Costs (
Travel and subsistence			4.50%	n/a
Operating Costs			37.86%	Extra training & business development support costs (paid to TIDE) and Symposium sponsorship (paid to ERI)
Capital items (see below)			0%	n/a
Others (see below)			59.83	£120 underspend.
Audit costs			0%	n/a
TOTAL				

Staff employed (Name and position)	Cost (£)
Catherine Smith – project officer	
TIDE Sub-contractor, Belize Salaries – sundry person	
TOTAL	

Capital items – description	Capital items – cost (£)
TIDE - Consumable Costs 01/04/2017 to 30/11/2017 Map tubes from printing services	
TOTAL	

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

8.2 Additional funds or in-kind contributions secured

Source of funding within project lifetime	Total (£)
FAO Forest Farm Facility funding for Exchange visit for 7 perso weeks to FEDOVERA cooperative in Guatemala	
US-CARSI project Funding for tour guide training and licensing	
University of Edinburgh contribution for Project Officer travel/ subs	
TIDE consultancy earned from other organisations for fire training	
TOTAL	

Source of funding beyond project lifetime	Total (£)
Continued monitoring of plots by TIDE rangers (fraction of salary)	
TOTAL	

Proposals submitted to fund additional work after project lifetime	Total (£)
Proposal to UNDP KBA project for community business devo	
Proposal to Power To Grow for community agri-business devo	
Proposal to USDA (with University of Florida) for fire monitoring	
TOTAL (proposals submitted for follow-on funding)	

8.3 Value for Money

This project benefited at the outset from £193k in additional in-kind resources, meaning that in the initial budget DEFRA funding covered 60% of total project costs, and 40% was expected to be contributed in-kind. >50% of the total salary budget for this project was contributed in-kind. This included the salaries of Edinburgh University staff (the project leader Neil Stuart and other university staff worked without charge to the project); Edinburgh University also waived its usual overheads on staff salaries (giving a total in-kind contribution from Edinburgh valued at £103k). Additionally, Mr Duncan Moss, who is independent from the University, provided project administration, budgeting, financial management and M&E throughout the project without charge (which in retrospect, looking at actual time contributed was significantly under-valued at only £15k). A notable further in-kind contribution was the £27k in staff time contributed by our Belizean partners. When one considers that pay rates are much lower in Central America than in the UK it is evident that the partners made significant commitments. This project also had negligible expenditure on capital equipment, (1% of total costs) and avoided unnecessary capital costs by borrowing equipment such as video cameras from Edinburgh University.

We highlight two further examples where the project obtained exceptional value for public money. The UK Project Officer Cathy Smith worked part-time, and was registered as a PhD student on a stipend of £XXX per annum. This enabled her to assist the project leader throughout the project duration, which is not normally affordable given usual UK salary costs. In our previous Darwin project, we could only afford to pay a UK project Officer for one year full time. In reality Cathy often voluntarily worked more than 37 hours a week when she was in country, and willingly worked at weekends and in evenings as necessary to carry out various meetings and other activities. A second example is the consultancy for delivering fire training, setting up permanent plots and conducting fire effects monitoring. Such highly specialised expertise from and experienced senior

consultant can cost up to US$1,000/day. The project benefited greatly from employing an experienced senior fire manager, Mr Rick Anderson, who has > 30 years of experience with the US Parks Service, and understands fire ecology in Belize. Rick provided ~50 days of consultancy to this project, on an expenses and refund of outlays basis only; i.e. travel and subsistence, other essential disbursements, salaries for interns, purchase of equipment that was donated to TIDE and to fund repairs to TIDE vehicles used on project. These additional cost savings, valued at £XX/year for 3 years of the project officer, and £XXk for 50 days of Rick Anderson, contribute a further £110,000 in kind over the project lifetime. Combining the in-kind resources secured at start of project with these further costs avoided during the project, we estimate that the actual total cost of conducting this project was ~£600k, and so 50% of total project costs were in fact met in-kind. The project also levered a further £15k in additional resources during project lifetime, and we have written bids for further funds to continue various elements of this project which total £320k -similar to the Darwin funding that enabled the foundational work.

Annex 1 Project's full current log frame with changes agreed with LTS/DEFRA on 13/04/2017

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: Biodiversity of pine woodlands is conserved throughout Belize, enabled by an increased national capacity for community-based wildfire control that is founded upon a just and sustainable use of these woodlands.			
Outcome: The means of monitoring and conserving biodiversity of pine woodlands in southern Belize is enhanced by developing capacity for community-based wildfire management, with local communities incentivised to participate through a more just and sustainable use of woodland resources.	**1. Capacity to monitor the effects of fire management on biodiversity** **1.1** ≥30 Local and national protected areas managers and local community members have an increased capacity to conduct and awareness of the management benefits of long-term biodiversity monitoring of savannas **1.2** 20 long term vegetation monitoring plots are established in PCNP, DRFR and SBFR, from a baseline of 0 **1.3** Baseline biodiversity data is collected during project lifetime and begins to inform adaptive fire management in PCNP and DRFR **2. Increased capacity of community members and protected areas managers to manage wildfire** **2.1** The number of community members with the capacity to conduct safe agricultural burns and an awareness of savanna fire management increases from a baseline of 50 by ≥100 **2.2** The number of protected areas managers and community leaders with the 'burn boss' level capacity to lead training for community members in wildfire management increases by ≥15 **2.3** The project informs discussions at the national level to consider change to the legislation governing agricultural fire use to allow for community-level permitting	**1. Capacity to monitor the effects of fire management on biodiversity** The following will provide verification: **1.1** The lesson plan content of training courses in biodiversity monitoring, and numbers of community members trained and employed for monitoring work. **1.2** The locations and data from the plots in a GIS database will provide verification **1.3** A report summarising initial findings from the monitoring plots, and their implications for management of the area by TIDE and logging concessionaires **2. Increased capacity of community members and protected areas managers to manage wildfire** The following will provide verification: **2.1** Lesson plan course content for basic level fire training and interview evidence of changed understanding and changed fire-use practices of trainees **2.2** Lesson plan course content for 'burn boss' level training and spreadsheet attendance records for basic level fire training courses delivered by the community 'burn bosses' **2.3** Meeting minutes	1. The Government of Belize remains a committed signatory of the CBD and the Forest Department continues to engage with this project as means of obtaining evidence to support moves towards promoting access and benefit sharing within its forest reserves and national parks, moving the government towards ratifying the Nagoya protocol. This will be monitored through the level of input by FD to project activities, engagement with stakeholder meetings and attendance and contribution to partner meetings. Many FD staff are already aware and supportive of the project ideas, having been involved in shaping them. We will encourage their continued support by actively engaging with a wide range of FD personnel from the Chief Forest Officer down to forest officers, by co-working with them on the resource inventory fieldwork, by involving them in meetings and training events, and by covering their travel costs. 2. Project partners and stakeholders continue to co-operate effectively. TIDE already has good working relationships with the five communities to be involved and their community leaders were consulted and agreed to the idea of participating in fire management and small forest business development as part of scoping this project. We will monitor the level of engagement by the 5 communities in the project; if we find reduced engagement by particular villages, groups or gender, we will pro-actively seek further engagement, e.g. by modifying the nature / timing of outreach or training. Stakeholders, including logging concessionaires, local communities and

	3. Access for sustainable extraction of woodland resources: **3.1** Community members have an increased awareness of the role of fire and of unsustainable harvesting techniques on the palmetto resource **3.2** Recommendations for locations of sustainable extraction of pine and palmetto from PCNP are incorporated by TIDE into its next management plan **4. Local community livelihood benefits:** **4.1** Human capital development through iterative business training and exchange visits to successful businesses with ≥4 community groups **4.2** Social capital development through the organisation ≥4 community business groups. **4.3** Initial gains in financial and physical capital to at least 2 community business groups, from trial sales of products and services in line with community business plans.	**3 Access for sustainable extraction of woodland resources:** The following will provide verification: **3.1** Interview evidence of awareness of community members of the need to harvest sustainably; **3.2** Materials produced and accepted for incorporation into TIDE's next management plan for PCNP **4.Local community livelihood benefits:** The following will provide verification: **4.1** The lesson plan content, dates of exchange visits, and interview evidence of increased understanding of business concepts by group members will provide verification **4.2** Interview evidence of social benefits arising from group organisation **4.3** Spreadsheet summarising physical or financial capital investment received and any revenue earned by the business groups	NGOs will be engaged through regular meetings. All partners will review and comment on project progress and propose adjustment to activities. 3. Natural disasters, such as hurricanes or wildfires do not seriously damage the woodland areas in Payne's Creek National Park, Swasey-Bladen Forest Reserve and Deep River Forest Reserve, which are the focus areas for this project. Southern Belize is in a relatively low risk hurricane risk belt compared with most of the Caribbean. The risk over the 3 years of the project is low. The project itself responds to the risk of intense wildfires by establishing community fire management. As the project progresses, it will reduce the risk of wildfire and build community resilience. 4. There continues to be sufficient demand for palmetto palm seed. There has been a reliable market for 16 years. Mr. Paul Bradley from Burrell Boom, Belize District has been exporting to Canada since 1998. In 2014, he exported 350,000 lb dry seed (583,000 lb wet) and says his buyer would have taken another 50% had it been available. He has expressed that his main problem is harvesters cutting down the trees to obtain the seed. He is very supportive of the plans proposed in this project to train and equip community members to harvest sustainably.
Output 1 Biodiversity and woodland resource baselines are established for pine savanna woodlands within Toledo District, by developing a set of monitoring protocols that are adopted nationally	**1.1** 5 new protocols for monitoring bird indicator species and plants (P. caribaea, Z. prasina, V. gaumeri, A. wrightii) in PCNP, DRFR and SBFR. **1.2** Availability of baseline data for PCNP will have increased from one of these monitoring targets (birds) at present to six by end of project (EoP). Baseline data for DRFR and SBFR will have increased from one of these monitoring targets (Caribbean pine) to two (pine and palmetto).	The following will provide verification: **1.1** The monitoring protocol documents, as published by ERI for the national ranger training program **1.2** A biodiversity baseline report and the raw datasets **1.3** The map and accompanying report	1. Personnel with required expertise for biodiversity / resource monitoring, and design / provision of training courses remain committed to the project. The assumption is likely to be valid since individuals with the required expertise have already been identified and consulted 2. NTPPAM and the National Ranger Training Academy continue as long-lasting initiatives. This is realistic as the intention is for them to become self- sustaining in the

	1.3 A baseline map of fire frequency for PCNP, DRFR and SBFR will be produced		long term, financed by trainee fees. A business plan has found this to be viable. Belize' Protected Areas Conservation Trust has indicated an intention to fund additional capital costs for these programs on an on-going basis. 3. Community members remain interested in training in fire management. A pilot training session on agricultural fire best practices in 2014 was very well received – farmers were glad to learn they can achieve their burn objectives (to mineralize the maximum proportion of biomass in the plot) safely without significant extra effort. 4. Agriculture Dept. and other partners remain open to discussing possible changes to governance of rural fire use. Engagement with the Agriculture Department is planned throughout the project, and their level of engagement will be monitored and reported 5. Palmetto palm resources are not destroyed by hurricane or major wildfire. Wildfire monitoring is built into the project. 6. The market for palmetto palm seed remains viable. This will be monitored through the project. 7. Community members remain interested in harvesting NTFPs and SFEs. This assumption will be monitored through the project using feedback from stakeholder meetings and the results of the reflective learning M&E by the communities.
Output 2 Training to enhance national capacity to a) monitor savanna biodiversity / resources; b) provide training in best practices for agricultural fire use; c) develop small forest enterprises.	**2.1** The number of people in Belize capable of monitoring components of savanna biodiversity will have increased by ~30 from <10 at present. **2.2** The number of people in Belize capable of providing training in safe use of agricultural fire will have increased by approximately 15 from <5 currently. **2.3** The number of NGO personnel with an awareness of the process of developing community SFEs will have increased by ~20 from an estimated <10 at present.	The following will provide verification: **2.1** A spreadsheet of attendees and certificates of attainment/competency awarded to successful students. **2.2** A spreadsheet of attendees and certificates of attainment/competency awarded to successful students in year 2 and a spreadsheet of attendees and further certificates of attainment awarded to new students, trained by the year 2 cohort in year 3. **2.3** A spreadsheet of workshop attendees.	
Output 3 ≥100 community members are trained in fire management (≥50 NTFP concession-holders trained in fire management for pine savannas and ≥50 farmers trained in best practices in use of agricultural fire)	**3.1** The number of community members trained in fire management for pine savannas as well as best practices in use of agricultural fire, will have increased by ≥100 from a baseline of ~50.	**3.1** A spreadsheet of attendees and certificates of attainment/competency awarded to successful students will provide verification.	
Output 4 Options to secure the palmetto seed harvest for community members into the future, through a formal agreement with the forest department and more sustainable harvesting practices, are negotiated	**4.1** A report outlining the current palmetto harvesting situation will be produced and used as the basis of discussing areas where communities seek access. **4.2** At least 5 meetings will be convened between TIDE, FD, logging concessionaires and community members, regarding the areas to secure in a possible legal agreement for palmetto extraction.	The following will provide verification: **4.1** The report **4.2** The meeting minutes	
Output 5 Mapping and analysis of site data to inform a future plan for a sustainable extraction zone in PCNP that includes an evaluation of the ecological and socio-economic impacts.	**5.1** 2 maps will be produced showing the extent and distribution of pine and palmetto resources within PCNP, DRFR and SBFR. **5.2** Datasets will be collated or created to assess present and future growth and yield of pine and palmetto under a range of scenarios, and to enable the assessment of the socio-economic and ecological implications of those scenarios. **5.3** A report will be produced to identify a number of possible extraction sites and	The following will provide verification: **5.1** The maps and accompanying reports **5.2** The raw datasets **5.3** The report and accompanying mapping	

	recommend site-specific management to mitigate any ecological, socio-economic or biodiversity impacts.		
Output 6 Business plans created for ≥3 additional SFEs suitable for PCNP buffer communities.	**6.1** The number of community groups trained in business management will increase from 0 to ≥4 **6.2** The number of exchange visits attended by the group members with other successful businesses or market partners will be ≥6 **6.3** Community business organisations with completed business plans will have increased from none to ≥3. **6.4** Investment proposals based on those business plans will have increased from none to ≥2.	The following will provide verification: **6.1** Spreadsheets of attendees and their group affiliations at 3 business training courses and certificates of attainment **6.2** Lists of attendees of exchange visits **6.3** The business plan documents **6.4** The investment proposal documents and minutes of meetings with potential investors	

Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1)

1.1 Surveys of pine stocks in PCNP (TIDE, FD)

1.2 Establish ~28 0.2 ha permanent plots in PCNP (TIDE, FD)

1.3 Assess distribution, abundance and productivity of palmetto palm in PCNP, DRFR and SBFR (TIDE, FD)

1.4 Develop protocols for monitoring Caribbean pine and palmetto palm (TIDE)

1.5 Establish/refine protocols for monitoring key conservation targets (yellow headed parrot, Zamia prasina, and fiddlewood) and biodiversity indicator species (birds) in line with the National Biodiversity Monitoring Program (TIDE, ERI)

1.6 Establish biodiversity and wildfire baselines against which effects of fire control and sustainable harvesting will be monitored (TIDE)

1.7 Publish materials for monitoring pine woodland biodiversity and resources as part of the NTPPAM (ERI, TIDE)

2.1 Conduct national training workshops in biodiversity monitoring for ~30 PA staff (ERI)

2.2 Train ≥15 PA personnel and community leaders so they are able to deliver further training as provided in 2.3 beyond EoP (TIDE, Everglades)

2.3 Convene a workshop for ~20 staff from TIDE and other NGO co-managers to share best practices in SFE development (IIED)

3.1 Community consultation on wildfire management (TIDE, FD)

3.2 Produce materials for training community members in fire management and disseminate via NTPPAM (TIDE, Everglades)

3.3 Train ≥50 farmers and community leaders in fire management (TIDE, Everglades)

3.4 Train and equip ≥50 community members to harvest palmetto seed sustainably, and manage wildfire (TIDE, Everglades)

3.5 Convene meetings between TIDE, FD, Agriculture Dept., NAVCO and DAVCO to agree improvements to governance of rural fire use (TIDE, FD)

4.1 Consult with palmetto harvesters to establish the areas that are currently harvested by each community, the numbers of harvesters and to how the harvest could be best secured from the community perspective. (TIDE)

4.2 Convene at least 5 meetings between TIDE, logging concessionaires, FD and the communities, regarding the most suitable legal agreement for securing the palmetto harvest for community members into the future, and leading to drafting of such an agreement if desired (TIDE, FD)

5.1 Assess potential income from sustainable extraction of pine and palmetto resources in PCNP

5.2 Assemble information required to enable TIDE to propose a sustainable extraction zone in PCNP, including evaluation of any ecological, socio-economic or biodiversity impacts.

6.1 Undertake baseline surveys of livelihoods in five communities (IIED, TIDE)

6.2 Meetings with community groups to assess interest in developing SFEs (IIED, TIDE)

6.3 Iterative training courses on business development, start-up planning, book-keeping (IIED)

6.4 Peer-to-peer exchange with other successful community businesses and market linking visits for community business groups (TIDE, IIED)

6.5 Vocational certification for community business members in relevant areas (TIDE, IIED)

6.6 Agree with FD terms for community-run SFE to sustainably use woodland resources (TIDE, FD)

6.7 Develop business plans for at least 3 community enterprises, and investment proposals for at least 2 community enterprises (IIED)

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

Project summary	Measurable Indicators	Progress and Achievements
Impact: Biodiversity of pine woodlands is conserved throughout Belize, enabled by an increased national capacity for community-based wildfire control that is founded upon a just and sustainable use of these woodlands.		By enhancing both local and national capacity for conducting safe fire management, by establishing field plots to monitor the effect of fire on biodiversity, and by training NGO staff to use consistent protocols, conditions have been created so that fire management will in future be conducted to conserve and enhance biodiversity, while any future pine extraction will be limited to mitigate any negative impacts on biodiversity. The project has improved community wellbeing, with the 5 communities which border PCNP all now having members who can carry out agricultural burning more safely, and protect crops and houses from wildfire. There has also been progress towards a more just and equitable sharing of the benefits from these protected areas, with 4 community businesses developed, based on sustainable use of resources, and with access negotiated to the resources within some of the protected areas.
Outcome The means of monitoring and conserving biodiversity of pine woodlands in southern Belize is enhanced by developing capacity for community-based wildfire management, with local communities incentivised to participate through a more just and sustainable use of woodland resources.	**1. Capacity to monitor the effects of fire management on biodiversity** **1.1** ≥30 Local and national protected areas managers and local community members have an increased capacity to conduct and awareness of the management benefits of long-term biodiversity monitoring of savannas **1.2** 20 long term vegetation monitoring plots are established in PCNP, DRFR and SBFR, from a baseline of 0 **1.3** Baseline biodiversity data is collected during project lifetime and begins to inform adaptive fire management in PCNP and DRFR **2. Increased capacity of community members and protected areas managers to manage wildfire** **2.1**The number of community members with the capacity to conduct safe agricultural burns and an awareness of savanna fire management increases from a baseline of 50 by ≥100 **2.2**The number of protected areas managers and community leaders with the 'burn boss' level capacity to lead training for community members in wildfire management increases by ≥15	The project has achieved its outcome of creating the means to monitor and to conserve biodiversity in Southern Belize, and has additionally made significant further progress to build this capacity at a national level. TIDE has established permanent monitoring plots and can now monitor the effects of its prescribed burning upon biodiversity in the area, enabling prescribed burning in the future to be managed to maximise plant and animal biodiversity in PCNP. All communities have participated in fire training and 4 community businesses have been created which are producing livelihood benefits, based on enhanced access to and more sustainable use of local natural resources, with the communities having an incentive to protect these resources from fire. Please refer to section 3.2 for greater detail. Evidence is: For indicator 1.1 the course materials from 2 biodiversity monitoring workshops for protected areas managers, one covering long-term vegetation monitoring, and one mammal monitoring are found in annexes 13 and 14 as verification of course content. For indicators 1.2 and 1.3, annex 11 is a report summarising the biodiversity and natural resource data collected during the project, the locations of the long-term monitoring plots established to collect the data, and initial implications interpreted for future fire management. For indicator 2.1 the basic fire training course content document is attached as annex 15, and section 3.2 gives interview evidence of participant learning. For indicator 2.2, the participant list at the basic fire training in year 3 of the project in annex 12, which was led by the community members trained to advanced level, evidences the capacity they had gained by becoming 'burn bosses'. For indicator 2.3, refer to the minutes of meetings with stakeholders about rural fire governance in annex 20. For indicator 3.1 raised awareness of role of fire is shown in the quotes given by community members after receiving their training. (section 3.2.2)

	2.3 The project informs discussions at the national level to consider change to the legislation governing agricultural fire use to allow for community-level permitting **3. Access for sustainable extraction of woodland resources:** **3.1** Community members have an increased awareness of the role of fire and of unsustainable harvesting techniques on the palmetto resource **3.2** Recommendations for locations of sustainable extraction of pine and palmetto from PCNP are incorporated by TIDE into its management plan **4. Local community livelihood benefits:** **4.1** Human capital development through iterative business training and exchange visits to successful businesses with ≥4 community groups **4.2** Social capital development through the organisation ≥4 community business groups. **4.3** Initial gains in financial and physical capital to at least 2 community business groups, from trial sales of products and services in line with community business plans.	The recommendation for sustainable extraction from PCNP, were that it is not presently economically viable, and therefore there was no extraction zone to be accepted at the present time against indicator 3.2. Against indicator 4.1, the power-point from one of the business training courses attached as annex 22 provides an example of skills learned by the groups. See also section 3.2 for interview evidence of human capital development by the groups. Against indicator 4.2, see section 3.2 for interview evidence of social capital development by the groups. Against indicator 4.3, see the investments made in and revenues made by the 4 business groups during project lifetime, attached as a spreadsheet in annex 23.
Output 1 Biodiversity and woodland resource baselines are established for pine savanna woodlands within Toledo District, by developing a set of monitoring protocols that are adopted nationally	**1.1** 5 new protocols for monitoring bird indicator species and plants (P. caribaea, Z. prasina, V. gaumeri, A. wrightii) in PCNP, DRFR and SBFR. **1.2** Availability of baseline data for PCNP will have increased from one of these monitoring targets (birds) at present to six by end of project (EoP). Baseline data for DRFR and SBFR will have increased from one of these monitoring targets (Caribbean pine) to two (pine and palmetto). **1.3** A baseline map of fire frequency for PCNP, DRFR and SBFR will be produced	See section 3.1 and the activity reports below for more detail. Against indicator 1.1, the 5 new protocols for long-term monitoring of indicator bird, mammal and plant species, as well as pine and palmetto resources are attached as annexes 8 and 9. Against indicator 1.2, baseline maps showing pine and palmetto distribution produced in year 1 are in masters dissertations at weblinks in annex 3 under code 2, a biodiversity baseline report using data from 2006 to 2012 for PCNP is attached as annex 7 and a new baseline biodiversity, pine and palmetto resource report integrating data collected during project lifetime is attached as annex 11. Against indicator 1.3, baseline maps of inter-annual fire frequency between 2006 and 2016, and the year since the last burn for the 3 protected areas are in a master's dissertation available at a weblink in annex 3 under code 2

Activity 1.1 Surveys of pine stocks in PCNP (TIDE, FD)	This activity was completed in year 1. A GIS analysis of the pine distribution in PCNP, with mapping, was produced and the work written up as a master's thesis at UE. See weblink to this dissertation in annex 3 under code 2
Activity 1.2 Establish 28 0.2 ha permanent plots in PCNP (TIDE, FD)	In April of year 2, 12 pine (and palmetto) monitoring plots were set up in PCNP, with the assistance of 6 community members. The locations of the plots were chosen based on the mapping produced in activities 1.1 and 1.3. These plots were revisited in August, to check that tree locations were correctly recorded, and for monitoring, with 4 community members to assist. All were revisited in February of year 2, with 2 community members assisting. In year 3, two new plots were set up in April, as part of the vegetation-monitoring course (see activity 2.1). All plots were revisited in April/May, with 2 community members assisting, and again in February/March, with 1 community member assisting. The data from all of the plots is being managed in a GIS database system. See annex 11 for report summarising data from the plots across the 3 years.
Activity 1.3 Assess distribution, abundance and productivity of palmetto palm in PCNP, DRFR and SBFR (TIDE, FD)	In year 1 a GIS analysis with mapping of the palmetto distribution in PCNP, SBFR and DRFR was completed, and the work written up as a masters dissertation at UE, (see weblink to dissertation in annex 3 under code 2). The plots established in PCNP under Activity 1.2 in April of year 2, are also palmetto monitoring plots, and were re-visited for data collection in August and February of year 2 and April/May, and February/March of year 3. 9 additional palmetto monitoring transects were set up in DRFR and SBFR in May of year 2 and were re-visited in August of year 3. The data collected on these plots and transects includes the status of each palmetto patch (burnt, unburnt), number of dead trees, fruiting stalks and average number of seeds per patch. The data is being managed in a GIS database system. See annex 11 for a report summarising the palmetto data collected during project lifetime.
Activity 1.4 Develop protocols for monitoring Caribbean pine and palmetto palm (TIDE)	The protocols were finalised in year 1, and used throughout years 2 and 3 to collect data under activities 1.2 and 1.3. In year 3, the datasheets to accompany data collection were refined, based on experience so far. See annexes 8 for the protocols.
Activity 1.5 Establish/refine protocols for monitoring key conservation targets (yellow headed parrot, the cycad palm Zamia prasina, and the fiddlewood tree) and biodiversity indicator species (birds) in line with the National Biodiversity Monitoring Program (TIDE, ERI)	Following consultation with relevant specialists co-ordinated by the ERI throughout year 1 specific biodiversity monitoring protocols were completed for Yellow Headed Parrot and Fiddlewood, and generic protocols completed for birds and mammals. See annexes 8 and 9 for the protocols.
Activity 1.6 Establish biodiversity and wildfire baselines against which effects of fire control and sustainable harvesting will be monitored (TIDE)	In year 1, biodiversity data collected over the past decade within 2 transects in PCNP was analysed by TIDE and report was finalised at the start of year 2 (see annex 7). In year 3 a new report was written to summarise the data collected during the project lifetime (See annex 11). These two reports will provide a biodiversity baseline for TIDE's work in PCNP going forward. A GIS analysis of wildfire frequency for the area was completed for a masters student at UoE in summer 2016. The resulting maps showing inter-annual fire frequency between 2006 and 2016, and the year since the last burn, can be used as a baseline for TIDE to assess wildfire frequency over coming decades. See weblink in annex 3 under code 2 for this dissertation.
Activity 1.7 Publish materials for monitoring pine woodland biodiversity and resources as part of the NTPPAM (ERI, TIDE)	The protocols written under activities 1.4 and 1.5 (see annexes 8 and 9) were published by the ERI as part of the NTPPAM in year 1 of the project.

Output 2. Training to enhance national capacity to a) monitor savanna biodiversity / resources; b) provide training in best practices for agricultural fire use; c) develop small forest enterprises.	**2.1** The number of people in Belize capable of monitoring components of savanna biodiversity will have increased by ~30 from <10 at present. **2.2** The number of people in Belize capable of providing training in safe use of agricultural fire will have increased by approximately 15 from <5 currently. **2.3** The number of NGO personnel with an awareness of the process of developing community SFEs will have increased by ~20 from an estimated <10 at present.	See section 3.1 and the activity reports below for more detail. Against indicator 2.1, the participant lists for 2 biodiversity monitoring workshops for protected areas managers, one covering long-term vegetation monitoring, and one mammal monitoring are found in annex 12. Against indicator 2.2, the participant list for an advanced 'burn boss' level fire training, equipping attendees to train others in fire management, is attached in annex 12. Against indicator 2.3, the participant lists for a workshop in community business development for NGO staff, and a sponsored conference session at the 2018 Natural Resource Management Symposium are attached in annex 12.
Activity 2.1 Conduct national training workshops in biodiversity monitoring for ~30 PA staff (ERI)		It was decided to divide the budget for this activity across two separate training workshops with different aims. A 2-day vegetation monitoring course, was held in year 3 from 04-05/04/2017 at the ranger station at PCNP, delivered by Rick Anderson, (who designed the pine and palmetto monitoring protocols and fire management training for the project), assisted by Elma Kay of the Environmental Research Institute (ERI), and Fanny Tricone, the terrestrial research intern at TIDE. See annex 13 for the field sheets used as course teaching materials. The 13 attendees (6 female, 7 male) represented 6 different protected area managing institutions including the FD (see annex 12 for the names and affiliations of participants). The second course covered mammal monitoring and data management and was held over 5 days from 26-30/06/2016 in Belmopan at the University of Belize, and at the Belize zoo. It was led by Bart Harmsen, Yahaira Urbina, Michael Brakeman, Lisa Jones and Anwah Young of the ERI, and attended by 17 participants (4 female, 13 male) from 10 different organisations (see annex 12 for attendance list). Annex 14 provides a full report of this training course.
Activity 2.2 Train ≥15 PA personnel and community leaders to deliver further training as provided in 3.3 beyond EoP (TIDE, Everglades)		The 'burn boss' training was held in year 2 between 13-18/02/2017, with 1 ½ days in the classroom and 4 ½ days in the field. 15 men attended, both local community leaders, and land managers from across Belize (See annex 12 for attendance list). Under supervision from TIDE, 2 of the community members trained as 'burn bosses' led a 2nd round of the basic level fire training in their villages under activities 3.3 and 3.4 in year 3 of the project.
Activity 2.3 Train ~20 staff from TIDE and other NGO co-managers in SFE development (IIED)		The workshop on 'community business development and conservation' took place on 23/02/2018 in year 3, led by IIED. There were 17 participants from 13 different organisations (See annex 12 for attendance list and annex 25 for a report from the workshop). This was followed up with a special conference session on community business development, led by IIED and TIDE and sponsored by the project at the 2018 Belize Natural Resource Management Symposium.
Output 3 ≥100 community members are trained in fire management (≥50 NTFP concession-holders trained in fire management for pine savannas and ≥50 farmers trained in best practices in use of agricultural fire)	**3.1** The number of community members trained in fire management for pine savannas as well as best practices in use of agricultural fire, will have increased by ≥100 from a baseline of ~50.	See section 3.1 and the activity reports below for more detail. Against indicator 3.1, the participant list is attached in annex 12

Activity 3.1 Community consultation on wildfire management (TIDE, FD)	Wildfire management was discussed in initial open consultations in Bladen and Trio villages in August of year 1. In February of year 1 meetings with held in each community with the village leaders, who were asked to put forward names of community members to participate in the training under activities 3.3 and 3.4. Following the training, open meetings with between 11 and 60 attendees were held in all five communities to discuss the training and how the villages might organise for fire management (dates: 13/02/2016 Bella Vista, 20/03/2016 San Isidro, 22/03/2016 Trio, 29/03/2016 Bladen, 03/04/2016 Medina Bank). See section 2.2 of this report for a fuller discussion of these meetings. In year 3, following the final round of fire training, a meeting was held in Bladen village on 17/02/2018, to discuss elements of a fire management plan for that village (the first such plan for a village in Belize). This was then drafted by project staff and the 'burn boss' from that community and shared with the community at a meeting on 18/03/2018. The community used the plan as a basis to borrow equipment and successfully conducted a prescribed burn to protect the village for the dry season of 2018, independently of any of the project staff.
Activity 3.2 Produce materials to train community members in fire management and disseminate via NTPPAM (TIDE, Everglades)	In year 1, the fire training materials were developed, used to train community members under activities 3.3 and 3.4, and were reviewed and published as a training module within the NTPPAM by the ERI. See annex 15 for the fire training manual.
Activity 3.3 Train ≥50 farmers and community leaders in fire management (TIDE, Everglades)	The fire training for farmers and palmetto harvesters was combined in one course (as the general concepts of prescribed fire are applicable to both savanna or milpa burns), involving a classroom day followed by a practical day conducting a prescribed burn in the savanna. During the classroom day, methods specific to milpa burns were discussed. In year 1, the course was run five times, once for each community, with 15 people from Bella Vista trained 22-23/02/2016, 15 from Bladen 24-25/02/2016, 8 from Trio 26-27/02/2015, 11 from Medina Bank 29/02/2016-01/03/2016 and 13 from San Isidro 2-3/03/2016. Of the total of 62 community members trained, 23 were female, 39 were male, 32 were milpa farmers, 27 were palmetto harvesters, and 45 were unemployed for wage labour. In year 3 the course was run again, from 15-16/02/2018 with 6 male farmers from Bladen, San Isidro and Trio villages. In year 3 the course were led, under TIDE's supervision, by 2 of the community members trained as 'burn bosses' in year 2 under activity 2.2. See annex 12 for the participant lists from the training in years 1 and 3.
Activity 3.4 Train and equip ≥50 community members to harvest palmetto seed sustainably, and manage wildfire (TIDE)	The fire training for farmers and palmetto harvesters was combined in one course (as the general concepts of prescribed fire are applicable to both savanna or milpa burns), involving a classroom day followed by a practical day conducting a prescribed burn in the savanna. During the classroom day, sustainable palmetto harvesting practices were discussed. In year 1, the course was run five times, once for each community, with 15 people from Bella Vista trained 22-23/02/2016, 15 from Bladen 24-25/02/2016, 8 from Trio 26-27/02/2016, 11 from Medina Bank 29/02/2016-01/03/2016 and 13 from San Isidro 2-3/03/2016. Of the total of 62 community members trained, 23 were female, 39 were male, 32 were milpa farmers, 27 were palmetto harvesters, and 45 were unemployed for wage labour. In year 3 the course was run again, on 15-16/02/2018 dates with 6 participants. See annex 12 for the participant lists from the training in years 1 and 3.
Activity 3.5 Convene meetings between TIDE, FD, Agriculture Dept., NAVCO and DAVCO to agree improvements to governance of rural fire use (TIDE, FD)	In year 1 initial meetings to discuss rural fire use were convened with various stakeholders: 27/08/2015 TIDE, DAVCO, the Maya Leaders Alliance and local logging concessionaires, 03/02/2016 TIDE and the Maya Leaders Alliance, 28/08/2016 TIDE and FD. Annex 20 provides the minutes of these meetings from year 1.

		In year 2 of the project the Agriculture Department began the process of revising the Agricultural Fires Act, and as a member of the National Fire Working Group, established on 23rd March 2016, the project lead from TIDE was on the committee tasked with revising the act. This committee met on 22/04/2017, however following this, the head of the committee began to manage a GEF project and progress towards legislative change was halted. In year 3 M. Muschamp is seconded to a consultative group for the writing of the government's new Forest Fire Communication Strategy for 2018-2020. This was launched on 24/01/2018.
Output 4 Options to secure the palmetto seed harvest for community members into the future, through a formal agreement with the forest department and more sustainable harvesting practices, are negotiated	**4.1** A report outlining the current palmetto harvesting situation will be produced **4.2** At least 5 meetings will be convened informs between TIDE, FD, logging concessionaires and community members, regarding the areas to secure in a possible legal agreement for palmetto extraction.	See sections 3.1, 6 and the activity reports below for more detail. Against indicator 4.1 report of a survey of 77 palmetto harvested is attached as annex 16. Against indicator 4.2 the minutes of meetings with stakeholders are attached as annex 17. This output was not fully achieved for reasons outside our control described in sections 3.1 and 6
Activity 4.1 Consult with palmetto harvesters to establish the areas that are currently harvested by each community, the numbers of harvesters in each community and to discuss how the harvest could be best secured from the community perspective. (TIDE)		Open consultation meetings were held in year 2 with palmetto harvesters in Bladen (31/07/2016 and 14/08/2016), San Isidro (13/08/2016) and Trio (20/08/2016), Medina Bank (21/08/2016), to discuss sustainability of palmetto extraction and possibility of access rights. Following this, in August/ September of year 2, a survey of 77 palmetto harvesters across the 5 communities was undertaken in August and September 2016, and used to produce a report detailing the present harvesting situation. The aims of the survey were to better understand the logistics and locations of harvesting and sale, and community perceptions of the resource, in order to determine how best to support the palmetto harvesters through the project. The report is attached as annex 16.
Activity 4.2 Convene at least 5 meetings between TIDE, logging concessionaires, FD and the communities, regarding the most suitable legal agreement for securing the palmetto harvest for community members into the future, and leading to drafting of such an agreement if desired (TIDE, FD)		In year 2, the report created under activity 4.1, was used as a basis for initial discussions about access rights to palmetto were held between TIDE and the Government's Maya Land Rights Commission on 08/09/2016, with FD on 31/01/2017 and 03/02/2017 and with the Maya Leader's Alliance on 01/03/ 2017. In addition, 2 face-to face meetings and several phone calls were held with the Belizean palmetto buyer/ exporter. See annex 16 for minutes of stakeholder meetings about palmetto. In year 3 it was difficult to progress with this activity because of the uncertain market for palmetto in Belize. The buyer unexpectedly ceased to purchase palmetto in year 2 of the project. TIDE made regular, bi-weekly phone calls to the buyer/exporter in May, June and July of year 3, were not initially able to ascertain clearly whether there would be a market, and finally discovered that the buyer's export market (to Canada) was no currently viable.
Output 5 Mapping and analysis of site data to inform a future plan for a sustainable extraction zone in PCNP that includes an evaluation of the ecological and socio-economic impacts.	**5.1** 2 maps will be produced showing the extent and distribution of pine and palmetto resources within PCNP, DRFR and SBFR. **5.2** Datasets will be collated or created to assess present and future growth and yield of pine and palmetto under a range of scenarios, and to enable the assessment of	See section 3.1 and the activity reports below for more detail. Against indicator 5.1, the maps are available as part of 2 masters dissertations produced at UE, available at weblinks in annex 3 under code 2. Against indicators 5.2 and 5.3, a masters dissertation at UE, available at weblink in annex 3 under code 2, and the final sustainable extraction plan report is attached as annex 18.

	the socio-economic and ecological implications of those scenarios. **5.3** A report will be produced to identify a number of possible sites and recommend site-specific management to mitigate any ecological, socio-economic or biodiversity impacts.	
Activity 5.1 Assess potential income from sustainable extraction of pine and palmetto resources in PCNP		In years 2 and 3, Rick Anderson and Fanny Tricone obtained information from local logging concessionaires about actual costs and revenues for locally produced pine lumber in order to complete this economic analysis together with an assessment of any remediation costs that may be incurred to ensure the extraction does not conflict with the conservation of biodiversity, such as the roosting sites of the protected Yellow Headed Parrots in this area. The sustainable extraction zone plan, annex 18, summarises this information.
Activity 5.2 Assemble information required to enable TIDE to propose a sustainable extraction zone in PCNP, including evaluation of any ecological, socio-economic or biodiversity impacts.		In years 2 and 3, layers of digital information (incl topographical maps, pine and palmetto distribution, yellow-headed parrot nesting sites, infrastructural information), required to delineate a sustainable extraction zone plan were assembled in a GIS and used to propose and map two potential zoning options. This work was written up as a Masters dissertation at UE (See annex 3 under code 2 for weblink), and all data was delivered to TIDE. The student visited Belize in May of year 3 and ground-truthed the proposals with TIDE's rangers and Rick Anderson. Rick Anderson and Fanny Tricone used this mapping work to produce the sustainable extraction recommendations in annex 18.
Output 6 Business plans created for ≥3 additional SFEs suitable for PCNP buffer communities.	**6.1** The number of community groups trained in business management will increase from 0 to ≥4 **6.2** The number of exchange visits attended by the group members with other successful businesses or market partners will be ≥6 **6.3** Community business organisations with completed business plans will have increased from none to ≥3. **6.4** Investment proposals based on those business plans will have increased from none to ≥2.	See section 3.1 and the activity reports below for more detail. Against indicator 6.1, the names and group affiliations of participants at 3 businesses training courses provided by IIED are found in annex 12. Against indicator 6.2, the dates and numbers of participants on all exchange visits are detailed in this table under activity 6.4. Against indicator 6.3, an example of one of the business plan documents is attached as annex 27 (others available on request). Against indicator 6.4, a joint investment proposal submitted by TIDE and the 4 business groups to the World Bank GEF's 'Key Biodiversity Areas project is attached as annex 19.
Activity 6.1 Undertake baseline and EoP surveys of livelihoods in five communities (IIED, TIDE)		In year 1 of the project, the UK Project Officer conducted interviews with village leaders and members, and local NGO staff, and stayed for a week in each of the 5 project communities. This information was used to write a community profiles (See annex 26). After a detailed assessment of a number of frameworks and methods for assessing livelihoods, and discussion with all project partners, it was decided that detailed livelihood surveys were not an appropriate monitoring and evaluation methodology for capturing the social and economic impacts of this project, many of which are expected to accrue after the project lifetime (see section 6.1)

Activity 6.2 Meetings with community groups to assess interest in developing SFEs (IIED, TIDE)	In year 1, idea of small community enterprises was presented and feedback gathered at open meetings on the following dates: 20/03/2016 San Isidro, 22/03/2016 Trio, 29/03/2016 Bladen, 03/04/2016 Medina Bank. In year 2, further open meetings were held following an exchange visit by community leaders to Guatemala (see activity 6.4) in Bladen (24/04/2016), Medina Bank (24/04/2016), San Isidro (03/05/2016) and Trio (15/05/2016), to further assess interest by the communities. Following this, meetings to determine business ideas were held in Bladen (31/07/2016 and 14/08/2016), San Isidro (13/08/2017), Trio (20/08/2016) Medina Bank (21/08/2016). See section 3.1 for more detail about these initial consultations. The 6 business groups formed as a result of these meetings took a first business training, and following this all groups were met with on 07/09/2016 to discuss next steps. TIDE met at least monthly with each group in the remainder of year 2 to mentor the development of the groups, and their business plans. See section 3.1 for more detail about this mentorship process. TIDE's mentorship of the final 4 business groups from Trio, Medina Bank and San Isidro continued with monthly meetings in year 3. On 20/12/2017, the 4 groups came together at a meeting hosted by the group in in Medina Bank to discuss and compare progress.
Activity 6.3 Iterative training courses on business development, start-up planning, book-keeping (IIED)	In year 2, the first, 3 day training course, an introduction to business, was led by IIED between 01-03/09/2016, with 14 female and 14 male attendees from 5 villages, and 6 business groups (see annex 12 for participant list). An additional accounting and book-keeping training course was delivered by a local trainer to 1 woman and 7 men from the group from Medina Bank on 26/11/2016 and 4/12/2016. A second single day training course was then led by IIED with 10 women and 12 men, from 4 villages, and representing 4 of the business groups on 24/01/2017, on business risk management (See annex 12 for participant list and annex 22 for slides). In year 3 the, final day in this series of classroom-based business training courses was delivered by IIED on 24/07/2017, covering business organisation management. Annex 12 gives the participant list, of 11 women and 12 men from the 4 business groups. In November of year 3, the group from Medina Bank also received a number of informal training sessions in customer service and pricing from a TIDE tours volunteer.
Activity 6.4 Peer-to-peer exchange with other successful community businesses and market linking visits for community business groups (TIDE, IIED)	Several exchange visits were facilitated in year 2 (See sections 3.1 and 3.2 for more detail): 2 women and 3 men, one from each village, accompanied TIDE on an exchange funded by the FAO's Forest Farm facility to the FEDECOVERA federation of cooperatives in Alta Verapaz, Guatemala, from 11-15/04/2016. 14 women from three of the business groups were taken on an exchange visit and craft training with a women's group in San Antonio village on 23/11/2016 1 woman and 4 men from 2 of the business groups were taken to the Tilapia hatchery at Central Farm on 29/11/2016. 9 women and 1 man from 2 business groups were taken to Maya Centre to see the tour and craft shop of a women's group there on 15/12/2016. 3 women and 1 man from 2 business groups were taken to Placencia to meet with the organisation SEA to discuss a regular sale of crafts at their gift shop on Laughing Bird Caye, on 09/02/2017. Following this, a meeting of 19 women and 2 men from the 2 business groups was held on 15/02/2017, at which the first sale of crafts was arranged.

	Further exchanges in year 3 included (See section 3.1 and 3.2 for more detail): 7 men and 4 women from 2 of the business groups were accompanied by TIDE on 06/05/2017, to visit a cacao, cardamom and coffee farm in San Vicente and a cacao farm in Pueblo Viejo and learn about agroforestry in the Belizean climate. 2 women and 6 men from one of the groups were taken to Laguna and San Miguel villages on 27/05/2017, to visit the Toledo Ecotourism Association (TEA) guesthouses there, and learn about accommodating and marketing to tourists. On 26/06/2017, A man and woman from the TEA groups in Laguna and San Miguel, along with a representative from TIDE tours, visited Medina Bank to trial the tour that the group were developing, and consider how TIDE tours might support the group with marketing the tour. This was followed up on 27/07, when the Director of TIDE tours visited Medina Bank with a test group of 5 European tourists for a second practice tour. TIDE tours agreed to market the tour, and provided the group with advice about health and safety issues, required equipment, and the need for customer service training. The project sought technical advice for the groups with livestock rearing and agroforestry as part of their business plans, from the District Agriculture Coordinator, with whom TIDE met on 11/08/2017. The officer then visited Trio and provided the group with assistance in protection from Vampire bats. TIDE met a representative of the government cooperatives department on 05/09/2017 to discuss how the groups may register as cooperatives, and to inform the groups. TIDE also met a representative from the Department of the Environment, who agreed to provide groups with a total of 59 fruit and timber tree seedlings to plant. On 26/02/2018 the ecotourism group in Medina Bank were supported to hold an official launch event, attended by tour operators. The event was broadcast on national radio and television news channels on 27/02/2018 (annex 21 has an audio-clip of the radio broadcast on LoveFM).
Activity 6.5 Vocational certification for community business members in relevant areas (TIDE, IIED)	In year 2, on 23/11/2017, 14 women from 3 of the business groups attended a training course in craft production in San Antonio on 23/11/2016 (this did not come with any kind of official certification) In years 2 and 3, the project supported women from 2 of the groups to obtain their government training and certification as food handlers. This took place for 9 women on 09/03/2017 and 7 women on 16/09/2017. See annex 12 for the participant names. In year 3, the project made links with another project being managed by TIDE (the CARSI project), and secured funding under that project for 2 community members from Medina Bank to be trained over 4 months from Oct 2017-Jan 2018, and be officially certified as tour guides.
Activity 6.6 Formalise license agreement(s) with FD terms for community-run SFE to sustainably use woodland resources (TIDE, FD)	In year 2, meetings were held with FD on 31/01/2017 and 03/02/2017 to obtain information as to the process of gaining community access to Forest Reserves for the planned businesses. It was determined that only the group from Medina Bank required official permission, because of plans to take tourists to a cave within a Forest Reserve. The group requested permission from the logging concessionaire for the reserve in year 2. In year 3 the logging concessionaire wrote a letter of support for the group to the Forest Department. At EOP the community was preparing to make a trip to Belmopan to meet with the Forest Department and National Institute for Culture and Heritage (NICH) to formalise these access rights.

	Additionally, the four groups required permissions and land from their communities to progress with their business ventures. These permissions were successfully negotiated in years 2 and 3. In Medina Bank, where the proposed ecotourism venture would impact the community at large, this took the form of a Memorandum Of Understanding signed between the community and the group.
Activity 6.7 Develop business plans for at least 3 community enterprises, and investment proposals for at least 2 community enterprises (IIED)	In year 2, following the business training from IIED in September 2016 under activity 6.3, the groups were asked to work on draft business plans, with a deadline of January 2017. With TIDE's support, 4 of the 6 groups initially trained produced these drafts. Following the business training in January 2017, a day was spent by IIED with each group (between 25-27/01/2017 and 30/01/2017) in their communities, to work on the plans further. These plans continued to be refined by the groups, with TIDE and IIED assisting, in year 3. An example business plan document from one of the groups is attached as annex 27 (others available one request). At the end of year 2 the project was able to give each of these 4 groups an initial investment of $500 BZD (£180) to cover a part of the cost of a pilot of their business ideas. Two further investments of $500 BZD were made in each group in year 3 to expand these pilot projects further (see annex 23 for summary of how these investments were spent). In year 2, meetings were held on 08/09/2016 and 31/01/2017 with the leader of the current World Bank GEF funded 'Key Biodiversity Areas' project, to discuss the potential for business proposals to be put to that project by the 4 groups. Whilst this would have been in its remit, that project was not yet at a stage to receive business proposals. A meeting was then held with the UNDP Small Grants Programme representative in Belmopan on 02/02/2017, to discuss the format of proposals to that granting body. In year 3, following further work by TIDE's Community Outreach Officer in June and July with the individual groups to finalise their budgets, a half-day spent by IIED with each group on 25-26/07/2017, further meetings with the staff of the GEF project on 22/02/2018 and 01/03/2018 and visits by the GEF staff to the communities, a full proposal was finalised and submitted to the World Bank GEF project in mid-March 2018 (annex 19). Since EOP, 2 further proposals co-written with TIDE have been submitted to Power to Grow and to USDA, bringing bids for follow up work to £319k. (see 8.2)

Annex 3 Standard Measures

Code	Description	Total	Nationality	Gender	Title or Focus	Language	Comments
Training Measures							
1a	Number of people to submit PhD thesis	1	UK	Female	History of fire management in Belize	English	Research conducted by part-time UK Project Officer Catherine Smith. Due For submission in Spring 2019.
1b	Number of PhD qualifications to be obtained	1	UK	Female	History of fire management in Belize	English	Research conducted by part-time UK Project Officer Catherine Smith. Due For submission in Spring 2019.
2	Number of Masters qualifications obtained	5	4 UK, 1 US	3 female, 2 male	MSci dissertations completed under MSci in GIS at the University of Edinburgh: 1 Mapping the Extent and Distribution of Caribbean Pine in the Lowland Savannas of Southern Belize 2 Mapping the Extent and Distribution of Palmetto Palm in Three Protected Areas of Southern Belize Using Remote Sensing 3 Analysing the Environmental Niches for Caribbean Pine and Palmetto Palm in the Lowland Savannas of Southern Belize 4 Mapping Fires in the Lowland Pine Savannas of Southern Belize using Non-Sequential Landsat dNBRs 5 The Role of Geographic Information in Designating a Sustainable Extraction Zone in Payne's Creek National Park, Belize	English	Available in Edinburgh Research Archive https://www.era.lib.ed.ac.uk/handle/1842/11797 https://www.era.lib.ed.ac.uk/handle/1842/11802 https://www.era.lib.ed.ac.uk/handle/1842/19493 https://www.era.lib.ed.ac.uk/handle/1842/23377 3 of these students were supported to visit Belize to ground-truth their GIS datasets, spending a cumulative 24 weeks in Belize.
3	Number of other qualifications obtained						
4a	Number of undergraduate students receiving training						
4b	Number of training weeks provided to undergraduate students						

4c	Number of postgraduate students receiving training (not 1-3 above)						
4d	Number of training weeks for postgraduate students	4					
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification (e.g., not categories 1-4 above)	3	Belizean	2 female 1 Male	3 local graduates from the Natural Resources Management degree at the University of Belize were paid as interns to TIDE and develop skills in GIS, biodiversity monitoring and community development work. Ryan Moore worked as the project's GIS intern for TIDE for 3 months from Jan-March 2016; Allana Barillas worked as our community business development officer for 15 months (April 2016 to June 2017), and Nilcia XI carried on the same role from July 2017 to March 2018. Total of 24 months training.		
6a	Number of people receiving other forms of short-term education/training (e.g., not categories 1-5 above)	68	Belizean	23 female, 45 male	Basic level community fire training, involving one day in the classroom and one day conducting a prescribed burn in the field.	English, Spanish, Q'eqchi (as required)	
		15	Belizean	Male	Advanced level 'burn boss' fire training, with community leaders and protected areas managers, involving 1 ½ classroom and 4 ½ field days.	English	
		6	Belizean	1 female, 5 male	Training to community members to carry out monitoring work in Payne's Creek National Park	English, Spanish, Q'eqchi (as required)	
		1: 28 2: 8 3: 22 4: 23	Belizean	1: 14 female, 14 male 2: 1 female 7 male 3: 10 female 12 male	Business skills and accountancy training for community members (4 sessions spread over 2 years)	English, Spanish, Q'eqchi (as required)	

				4: 11 female, 12 male			
		1: 13 2: 17	Belizean	1: 6 female, 7 male 2: 4 female, 13 male	Biodiversity monitoring training for protected areas managers. First 2-day course covering long-term vegetation monitoring, second 5-day course covering mammal monitoring.	English	
		16	Belizean	female	Food handlers certification (1 day course and examination from the Belizean government required in order to vend food)	English	
6b	Number of training days/weeks not leading to formal qualification	2 days			Basic level community fire training, involving one day in the classroom and one day conducting a prescribed burn in the field.	English, Spanish, Q'eqchi (as required)	
		6 days			Advanced level 'burn boss' fire training, with community leaders and protected areas managers, involving 1 ½ classroom and 4 ½ field days.	English	
		1 day			Training to community members to carry out monitoring work in Payne's Creek National Park	English, Spanish, Q'eqchi (as req'd)	
		1: 2 day 2: 2 days 3: 1 day			Business skills and accountancy training for community members (4 sessions spread over 2 years)	English, Spanish, Q'eqchi (as req'd)	

		4: 1 day					
		1: 2 days 2: 5 days			Biodiversity monitoring training for protected areas managers.	English	First 2-day course covering long-term vegetation monitoring, second 5-day course covering mammal monitoring.
7	Number of types of training materials produced for use by host country(s) (describe training materials)	2			Fire Training Manual for ERI National Ranger Training Program Fire awareness leaflet for communities Business Primer for TIDE Business training workshop materials	English	Annex 15 Basic fire training course for communities Annex 24 Second learning note for TIDE from IIED Annex 22 course powerpoint slides
Research Measures		**Total**	**Nationality**	**Gender**	**Title**	**Language**	**Comments/ Weblink if available**
9	Number of species/habitat management plans produced for Governments, public authorities or other implementing agencies in the host country	1			Sustainable extraction zone plan for Payne's Creek National Park	English	Annex 18 Sustainable extraction zone plan for Paynes Creek
10	Number of formal documents produced to assist work related to species identification, classification and recording.	6			Field protocols for monitoring biodiversity (protocols for each of Caribbean pine, palmetto palm, fiddlewood, mammals, yellow-headed parrot and birds)	English	Annex 8 Vegetation monitoring protocols Annex 9 Bird and mammal monitoring protocols Annex 10 Revised protocols
11a	Number of papers published or accepted for publication in peer reviewed journals						
11b	Number of papers published or accepted for publication elsewhere	1			IIED Policy Briefing at EOP		Annex 28 IIED Policy Briefing note to Government of Belize
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	1			Pine and palmetto survey data and plot information in GIS system	English	Annex 16 Palmetto survey report Data from MSc dissertations from links at item (2) above.

12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	1			Spreadsheet of data from biodiversity monitoring report given to TIDE	English	Annex 14 Wildlife monitoring training report
13a	Number of species reference collections established and handed over to host country(s)						
13b	Number of species reference collections enhanced and handed over to host country(s)						

Dissemination Measures		**Total**	**Nationality**	**Gender**	**Theme**	**Language**	**Comments**
14a	Number of conferences/seminars/workshops **organised** to present/disseminate findings from Darwin project work	3			Special session on "Conservation and community business" organised and hosted by project at the 11th Natural Resource Management Symposium, University of Belize. 1-2 March 2018 Workshop on Community Business Development. 23/2/2018 Belmopan Annual Meeting of the UK-Belize Association organised at Edinburgh University, 1st October 2016	English	View details of events at: https://www.facebook.com/events/344131729419051/ Annex 25 Conservation and livelihoods workshop led by IIED http://www.ukbelizeassociation.org/wp-content/uploads/2014/01/UKBA19-Programme.pdf
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work were presented/ disseminated.	7			Presentations at UK Belize Association meetings in 2015, 2016 and 2017, at a workshop on fire hazard mapping in Central America in Antigua, Guatemala in 2017, at the Central America Regional Meeting of the Mesoamerican Society for Conservation Biology in 2016, at the Belize Natural Resource Management & Research Symposium in 2017 and at the 2018.	English	see http://www.ukbelizeassociation.org/events/ for 2015 and 2017 events. http://www.hazmap.org/workshops/guatemala-2017/

Physical Measures		Total	Comments
20	Estimated value (£s) of physical assets handed over to host country(s)	540	Cooking utensils, butane tank and materials to construct and expand snack shack for Xibe business
		540	15 river Tubes, 2 first aid kits and 12 t-shirts for Adventures in the last Corridor business
		695	Sow and materials to construct and expand pig pen for United Hands business. Purchase of 4 piglets upon death of sow
		540	Timber, sand and gravel and transport of materials to construct chicken coop for SIFAA business
		40	Paint and materials to make road signs to advertise Adventures in the last Corridor business and Xibe business
		1000	Vehicle Parts for repair of TIDE Polaris ATV to enable continued access to PCNP
21	Number of permanent educational, training, research facilities or organisation established		
22	Number of permanent field plots established	22	14 permanent pine and palmetto monitoring plots in PCNP, 8 permanent palmetto monitoring transects in DRFR and SBFR

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	5000	6 Belizean 1 British	3 female 4 male	FAO Forest Farm Facility exchange visit for 7 person weeks to Guatemala		
		700	2 Belizean	2 male	Funding for tour guide training and licensing under CARSI project being managed by TIDE		
		5000	British	Female	University of Edinburgh contribution for Project Officer travel/ subs		
		5000	3 Belizean 1 USA	4 male	Fire training offered by TIDE to other organisations in Belize in 2018		Income intended to support TIDE management of PCNP

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.	√
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.	√
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.	√
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.	√
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.	√
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.	
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.	
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.	√
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.	√
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.	√
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.	√
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. web link, contact address etc)
Masters theses	1 Mapping the Extent and Distribution of Caribbean Pine in the Lowland Savannas of Southern Belize. East A 2015	UK	UK	F	University of Edinburgh	
	2 Mapping the Extent and Distribution of Palmetto Palm in Three Protected Areas of Southern Belize Using Remote Sensing. Chambers, J. 2015	UK	UK	F	University of Edinburgh	https://www.era.lib.ed.ac.uk/handle/1842/11797
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Monitoring protocols	Field vegetation Monitoring Manual 2018	FR	FR	F	Woodsburner/ Edinburgh University TIDE/ERI/FD for Darwin Project 22-013.	Annex 8 Vegetation monitoring protocols.docx Annex 9 Bird and mammal monitoring protocols.pdf Annex 10 Revised vegetation monitoring protocol...
Fire training manual	Community Fire Training Course				Woodsburner Ltd for TIDE/ERI	Annex 15 Basic fire training course for communi...
Biodiversity Reports	Results of 2009-2012 Biodiversity Monitoring Surveys Bevan R, Requena E, Ah E, Muschamp M, Alvarez M, Foley J 2014	Belizean	Belizean	M	Darwin project 22-013 to TIDE and GOB FD	Annex 7 Biodiversity baseline report.pdf
	Tricone F and Anderson TR (2018) Biodiversity and fire monitoring effects monitoring report: Baseline study for vegetation and fire monitoring plots in Payne's Creek National Park, Belize. 20pp	FR	FR	F	Darwin project 22-013 to TIDE and GOB FD	Annex 11 EOP Biodiversity and fire effects moni...

Annex 6 Darwin Contacts

Ref No	22-013
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