

Darwin Initiative Annual Report

Darwin Project Information

<i>Project Ref Number</i>	R15176 (UEA); Darwin Ref. 16-001
<i>Project Title</i>	Community-based sustainable management of forest resources in Amazonian extractive reserves
<i>Country(ies)</i>	UK, Brazil
<i>UK Contract Holder Institution</i>	University of East Anglia, UK
<i>UK Partner Institution(s)</i>	n/a
<i>Host country Partner Institution(s)</i>	(1) Secretaria do Estado do Meio Ambiente e Desenvolvimento Sustentável (SDS), State of Amazonas, Brazil; (2) Brazilian Institute of the Environment and Natural Renewable Resources (IBAMA), Brazil
<i>Darwin Grant Value</i>	£64,018
<i>Start/End dates of Project</i>	1 Sept 2007 – 30 April 2011
<i>Reporting period (1 Apr 200x to 31 Mar 200y) and annual report number (1,2,3..)</i>	1 Sept 2007 – 30 April 2008 Annual report no. 1
<i>Project Leader Name</i>	Carlos Peres
<i>Project website</i>	Not yet available
<i>Author(s), date</i>	Carlos Peres, Whaldener Endo, and Joseph Hawes 5 June 2008

1. Project Background

This project seeks to understand a number of increasingly pressing issues related to natural resource management in a growing number (and aggregate area) of Amazonian extractive reserves or extractive reserve analogues. These semi-subsistence non-timber extractive resources are sourced from both forest environments (e.g. game vertebrates, medicinal oleo-resins, other therapeutic and cosmetic plant products) and freshwater bodies (e.g. fish and turtles from oxbow lakes, rivers and streams), and sustain the basic livelihoods of a growing population of nontribal Amazonians. The project is taking place at two adjacent sustainable development forest reserves, which were created by the Brazilian Government in the last decade and are located along the Rio Juruá of western Brazilian Amazonia (see Figure 1): the 632,949 hectare Uacari Sustainable Development Reserve (RDS), and the 253,227 hectare Médio Juruá Extractive Reserve (ResEx). According to our preliminary survey, these two reserves are legally occupied by approximately 3,080 people, who are willing participants in this research and management programme, and currently experience a population growth rate of ~2.5 % per year. All of these reserve occupants are second to fourth generation descendents of local indigenous groups and Brazilian rubber tappers (*seringueiros*) of northeastern Brazil, who initially colonised this region of southwestern Amazonia in 1892 during the first rubber boom. However, the rural population of the Rio Juruá and other major white-water tributaries of the Amazon have experienced a period of pronounced economic transition marked by the collapse of the rubber boom and significant rural exodus to major urban centers (e.g. Caruarí, Tefé, Manaus). The Uacari and the Médio Juruá reserves are under the jurisdiction and are formally managed by two state-level and federal Brazilian government agencies (SDS and IBAMA, respectively), which comprise our formal execution partners in deploying and implementing this project, and disseminating the project results both within and outside these target reserves. However, the geographic extent of the areas managed on paper by these agencies within Brazilian Amazonia is vast, and they are unable to allocate a sufficient number of qualified personnel to all of the reserves they oversee, including our target reserves. The project aims to develop an ambitious work program by identifying and examining a number of population ecology and population management issues that are relevant to real-world harvesting systems in spatially structured landscape mosaics that are often highly heterogeneous in resource productivity and yields. We aim to develop feasible yet effective management strategies at the landscape scale that can be adopted by other Amazonian extractive and sustainable development reserves to help maximise the sustainable use of key resource populations and the long term persistence of forest biodiversity conservation.

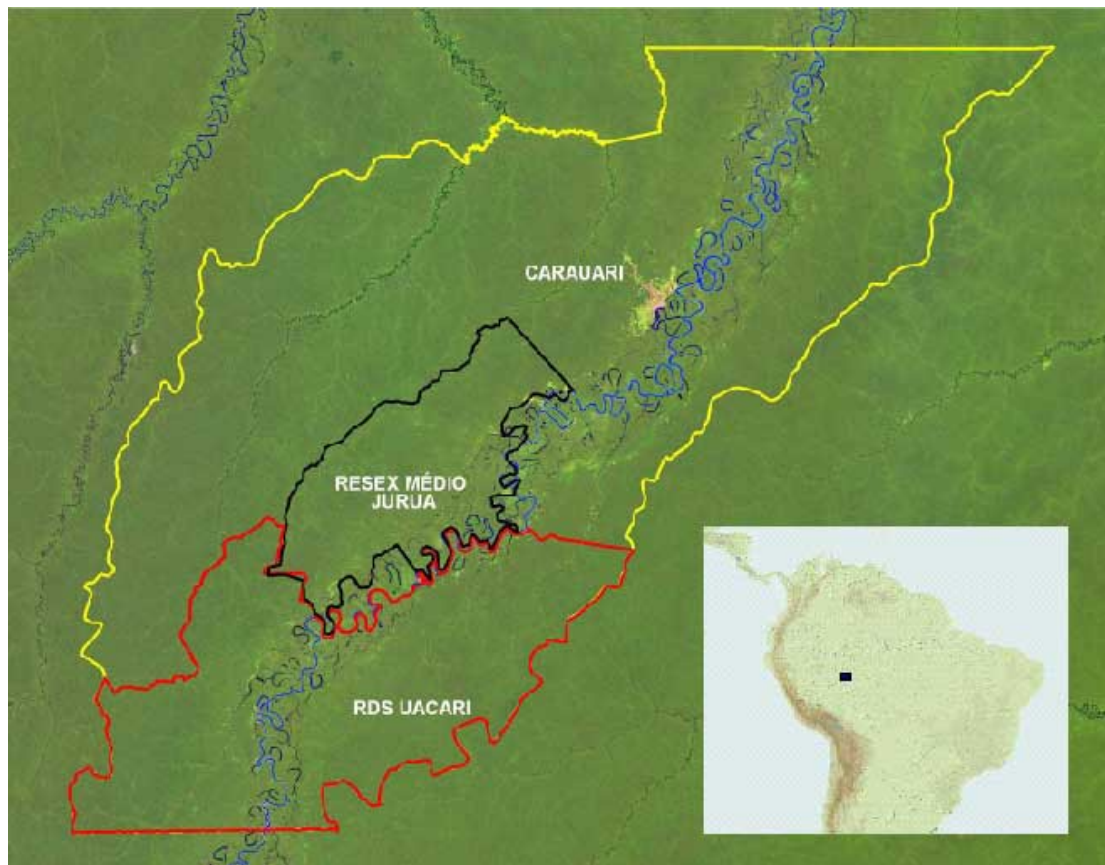


Figure 1. Map of the 253,227 hectare Médio Juruá Extractive Reserve (black polygon) and the 632,949 hectare Uacari Sustainable Development Reserve (red polygon) along the meandering Juruá River of western Brazilian Amazonia, showing the wider region of project influence (yellow boundaries). Area of satellite image corresponds to the small rectangle in the inset map of South America.

2. Project Partnerships

Project partnerships:

The project is a formal partnership between the University of East Anglia and the Environmental Secretariat (Secretaria do Estado do Meio Ambiente e Desenvolvimento Sustentável; hereafter, SDS) of the largest Brazilian state (Amazonas); and the Brazilian Institute of the Environment and Natural Renewable Resources (IBAMA). Both of these administrative agencies have offices in Carauari, a town located 37 km from the nearest boundaries of the target reserves, and we have been in continuous contact and consultation with these administrative offices by means of monthly visits to Carauari. Our relationship is best described as mutually collegiate and very cooperative in terms of how project activities interact with, or can be facilitated by these agencies. Given the high prices of fuel in remote parts of Amazonia, government funding available for fluvial transport is in scarce supply, and this is one of the areas in which we have been able to cooperate with our local partners. The project intends to maintain almost continuous scientific presence to closely monitor project activities at the study areas over the 3 years of study, and we are currently in the process of training a significant number of local assistants (“monitores”) to help us monitor project activities, maintain data acquisition through a number of sampling protocols and guard the all important data-quality control associated with the sampling protocols.

Other Collaboration:

On a regional scale, the project collaborates with an attempt by SDS – Amazonas to monitor resource use within the so-called ProBUC programme. Project activities and associated sampling protocols are, however, more detailed, and the data acquisition and verification processes are more frequent. So far we have been able to strike a good partnership with the ProBUC which will ensure a larger sampling effort, an economy of scale in deploying this sampling, and good prospects for future data sharing.

So far there have been no external collaborations. However, the spatial modelling hunting sustainability component of this project in Year 3 expects to be able to collaborate with a project funded by the Leverhulme Trust (of which CAP is a participant) conducted with Matsigenka native communities of Manu National Park, Peru, which has attempted to model the spatial dynamics of game population depletion and renewal using source-sink dynamics. This will be of enormous assistance in the analytical approaches used to model game availability and harvest data – as well as establish parallels with other neotropical forest landscapes.

3. Project progress

Despite the official start date of our project (1 September 2007), this work programme did not effectively commence until 1 November 2007 because of bureaucratic delays in the state capital that were beyond our control. However, we are pleased to be able to report that we have been able to achieve all of the initial activities that had been predicted for the first six months of this project. These activities include many meetings with government officials and technical staff in Manaus and Carauari (with both SDS and IBAMA); meetings with all local communities and local representatives at both reserves; a presentation in Manaus and a seminar given in Carauari in November 2007 to explain the main objectives of the project; a remotely sensed reconnaissance of satellite images of the study areas within both forest reserves to select project study sites; physical demarcation and georeferencing of forest plots that will be used to sample forest resource density and phenology; preparation of 52 forest transects of 4-5 km in length in unflooded (*terra firme*) and seasonally flooded (*várzea*) forest; a training workshop held with 39 local project participants representing local leaders; continued training assistance to these participants following this workshop; community-based geographic mapping of harvest areas within extractive areas of both reserves on the basis of collective interviews held at 30 different villages; and the early stages of large-scale data collection, including all major components of the study (see below). The project is ground-breaking in spatial scale and covers a 340-km meandering section of the Rio Juruá, which presents huge challenges in terms of fluvial transportation, logistics, and safety. Direct data collection protocols include the extractive activities of a total of 24 (46%) of the 52 communities occurring at the Uacari and Médio Juruá Reserves, amounting to a total of 240 (51%) of an approximate total of 469 active households available. The project also involves the largest ever meso-scale effort to census wildlife populations ever deployed within a single region of tropical forest anywhere. This sampling effort is expected to be sustained on a monthly basis for 3 years, both within and outside hunting catchments areas associated with any given settlement. We now turn to the different components of this project addressed in the first six months of project implementation.

3.1 Progress in carrying out project activities

Meetings in Manaus and Carauari:

Following a presentation of the project in Manaus and a seminar in Carauari during November 2007 the project has maintained regular contact and collaboration with government officials and technical staff from both IBAMA and SDS in Carauari. In addition, SDS staff from Manaus have visited the RDS Uacari on two occasions, most recently for a meeting on the 17th-18th May 2008.

Meetings with local communities:

Between November 2007 and March 2008, 30 communities within both the RDS Uacari and RESEX Médio-Juruá were consulted regarding their interest in participating in the project. These meetings resulted in the selection of direct project participants from 24 communities (and 2 additional communities just outside the reserve boundaries) to work directly with the project, collecting data from forest transect surveys and community-based household interviews. In total, 26 transect monitors (recording data on the diversity and density of forest vertebrates and fruit resources) and 22 household interviewers were selected. This is amplified further by two transect monitors and four household interviewers working solely for the ProBUC monitoring programme of SDS, yielding a grand total of 54 monitors and/or interviewers. The meetings also served to confirm sites for line transects following initial site selection based on analysis of satellite images with the aim of achieving an even spatial distribution of transects throughout the vast area covered by the two reserves.

PROPOSED OUTPUT 1: Assessment of forest resources extracted, and levels of offtake

1a. Household level interviews: Local monitors have been trained to conduct weekly household level interviews at 26 local communities (10 households per community or all households in communities where the total number of households is ≤ 10). These interviews assess the levels of extraction for timber, all non-timber forest products (NTFPs), hunting, and fishing, in addition to an assessment of agricultural activities. Details are recorded for all extractive activities and production of the proportions consumed locally or sold, including information on income generation. The assessment of game harvest also records the weight, sex, and reproductive condition of all animals and fish.

1b. Following fieldwork conducted in December 2007 and January 2008, GIS analysis has been carried out by mapping the main game-harvest and extractive areas in the two reserves by Romulo Batista of SDS (Manaus). So far this has been based on collective interviews only. However, the feasibility of commencing the spatially-explicit mapping of hunting trips and resources harvested will be assessed in August 2008.

PROPOSED OUTPUT 2: Quantitative assessment of the demographic sustainability of forest resource extraction.

2a. Data collection by transect monitors (monthly) and household interviewers (weekly) began in April 2008. Seasonally repeated census data collection is therefore underway from 52 forest transects, with the remaining transects (mainly in várzea forest that has been flooded until now) due to be opened in July and August 2008. This considerable number of transects will be spatially distributed throughout the reserves in locations of variable hunting pressure and capturing the spatial variation in a range of environmental gradients.

2b. Mapping the spatial distribution of key NTFP populations has already commenced. Surveys recording the density of three key nontimber resources that are harvested for sales (the seeds of *Astrocaryum murumuru*, *Carapa guianensis*, and *Copaifera* spp.) have already been conducted between January and May 2008 along 35 *terra firme* forest transects of 4-5 km. The presence of all trees within 10 m either side of the transect was recorded and their DBH (diameter at breast height) measured. All arborescent palm species have been surveyed in a similar fashion along a 1 km section of each of the 35 *terra firme* transects. All várzea transects will be surveyed for the same species using the same protocol in June and July 2009.

2c. The impact of extractive practises upon key NTFP resources will be assessed using an experimental initiative to harvest the medicinal oil from a natural *Copaifera multijuga* population. The DBH of 50 unharvested adult trees with unique tree tags has been measured and local field assistants have been trained to collect seeds during the seedfall period of this year (June – August 2008), and record data on seed production, seed size, and seed germination rate. This will be repeated in the following years after an experimental harvest of half the tree population.

Population ecology model:

In addition, a population ecology model will be developed for three *Copaifera* species. All adult *Copaifera* trees and saplings within three 9-ha plots have been marked and measured, and their flowering/fruitlet phenology will be monitored monthly. Contained within these plots, twenty-seven 20m x 20m plots have been established to survey the fate of *Copaifera* seedlings. All seedlings and saplings have been marked and measured once already, and will be recensused for the duration of the project at 4-monthly intervals. To assess whether findings within these plots are representative of the wider area, these surveys have also been conducted once already along the 35 *terra firme* transects (five 20m x 20m plots per 5km transect) distributed throughout the two reserves.

PROPOSED OUTPUT 3. Local monitors, field technicians and students able to assess and monitor forest biodiversity using quantitative methods.

Training workshop:

A two-day workshop was conducted at the SDS Base at Bauana (26th-27th March 2008), attended by 22 transect monitors and 17 household interviewers who have been working with the project. Presentations were conducted to train monitors and interviewers with respect to data collection methods. These were supported by audio-visual aids, discussion groups, and practical exercises focusing on transect census or interview techniques, and filling in simulated data sheets clearly and correctly. The workshop also provided further opportunity to explain the project objectives and to discuss issues surrounding conservation, the management of natural resources, and information about other forest reserves with similar management objectives throughout Amazonia. All monitors and interviewers participated fully in the meeting, which was very successful in forming a strong feeling of close involvement with inhabitants of communities who are otherwise dispersed widely throughout the two reserves.

Continued post-workshop training:

The initial training workshop has been followed by regular information exchange visits to the monitors and interviewers in their communities to reinforce particular points, eliminate any doubts or errors occurring, and to encourage the continuation of data collection. A system of regular contact and support will be maintained throughout the duration of the project, as well as occasional central meetings designed to bring all project participants together again.

Line transect surveys:

Between February and April 2008, 37 line transects of 3-5 km have been opened, measured, marked every 50 m, and georeferenced. These were complemented by 15 previously existing transects from the ProBUC programme, thereby yielding a total of 52 transects (with a combined distance of approximately 180 km of transects) already available to be surveyed by local monitors. Currently, 35 of the 37 opened transects are located in *terra firme* (unflooded) forest. This is due to the severe annual flooding of *várzea* (flooded) forest throughout the western Amazonian basin from January to June. The location of a further 28 *várzea* transects have been selected and approved by local communities. These *várzea* transects will be a priority as soon it becomes possible to open them, once the water-level recedes (July-August 2008).

100 ha plot surveys:

In addition to the line transects, three 100-ha (1km x 1km) plots were established in December 2007 and January 2008 within the two reserves. Two of the plots are located in *terra firme* forest and one in *várzea* (flooded) forest. These plots each contain a grid system of 1 km line transects, running 200 m apart, thus yielding a total of 12 km of trails per plot. Each of these permanent plots already have trained local field assistants conducting detailed monthly censuses for fauna and residual fruit fall, and recording all interactions between fruiting plants and vertebrate frugivores, since March 2008. In addition, two of the 100 ha plots (one in *terra firme*; one in *várzea*) contain an arrangement of 1m² leaf-litter/fruit traps (96 traps in each plot; with a floating design in the flooded *várzea* forest). Material is collected from the traps every 2 weeks, dried, separated, and accurately weighed by trained local field assistants to assess primary productivity in the different forest habitats. Fruit specimens are also already being collected and preserved, with the aim of compiling a fruit and seed library (reference collection) accessible to inhabitants of the reserve, and researchers working both in the reserve and throughout Amazonia. The *várzea* plot is accessible at the maximum water level by canoe, and

leaf-litter/fruit traps have been designed to float on the water surface using an innovative prototype.

1 km phenology surveys:

Four 1 km phenology transects (two *terra firme*; two *várzea*) have been established along sections of existing line transects. All trees with DBH \geq 30 cm and lianas (DBH \geq 10 cm) within 5 m of the transect were identified and marked with a uniquely numbered tree-tag (265 tagged trees or lianas in *terra firme*; 219 in *várzea*). The canopies of all tagged trees and lianas have been examined once a month (from March 2008 onwards) by local field assistants trained to record details on the appropriate phenophase that becomes available (i.e. old leaves, new leaves, flowers, young fruits, mature fruits), and this will continue for the duration of the project. The *várzea* phenology transects are accessible by canoe during high water levels, thereby allowing sampling continuity all year-round.

Dung beetle surveys:

During December 2007 preliminary surveys of dung-beetle populations were conducted using pitfall traps, in both *terra firme* and *várzea* forest. Even in this limited time period about 80% of the coprophagous beetles, and probably about 50% of the overall dung beetle fauna, were successfully sampled. This included 5 guaranteed new species, and it is likely that this could increase to 15 during the course of the project. Extensive sampling of dung beetle populations throughout the two reserves will be conducted during 2008/2009, using the system of transects and 100 ha plots already established. Findings will be related to hunting pressure and results from faunal surveys to assess the dependence of dung beetle species on large mammals. Experiments will be conducted to determine the underlying relationship between dung beetle community structure and ecological functions such as secondary seed dispersal. A local field assistant will be trained in the quantitative methods for assessing dung beetle community structure and diversity.

PROPOSED OUTPUT 4. Local communities in RDS Uacari and RESEX Medio-Jurua, and other reserves are able to effectively apply large-scale management recommendations.

4a. A community-based wildlife management handbook has not yet been compiled. This will be developed following assessments of the various components of the project, and begin to be distributed in September 2010.

4b. Publications and presentations will begin to emerge as individual components of the project reach completion. A final technical workshop in collaboration with SDS in Manaus will be run in September 2010.

3.2 Progress towards Project Outputs

1. Assessment of forest resources extracted, and levels of offtake.

Despite our recent efforts to establish such a large-scale sampling, good progress has begun on assessing extraction of different types of forest and aquatic resources. Weekly interviews have begun in 26 communities to record the types and amounts of resources extracted, the frequency of extraction, and the relative contributions that these forest resources make to the income of households and communities. Regular contact has been maintained with interviewers to provide support and ensure data quality. The output is very likely to be achieved by the project close, after the long-term accumulation of data from these interviews over various seasons, but still relies on the assumptions that data acquisition can be maintained and that the protocols established will allow standardised quantification of offtakes.

Harvest zoning agreements, with respect to forest wildlife refugia, have not yet been established. However, the same approach has been extended to fish and other aquatic resources harvested from the main river channel and a large number of oxbow lakes. Access to these lakes and fish resources therein have recently been negotiated between the local communities of the two reserves and commercial fishermen in Carauari. We are now sampling catches per unit effort (CPUE) data from both lakes restricted to only subsistence fishing (using traditional fishing gear) and those that are also open to commercial fishing boats (using long gillnets). The project therefore aims to take advantage of this unique experiment to quantify the local benefits of oxbow lake protection (in terms of restricted access) to local communities.

The explicit mapping of hunting-trips (using more sensitive GPS units that can capture GPS satellites through dense forest canopy) has not been attempted yet, but this will be incorporated at a latter stage of the project.

2. Quantitative assessment of the demographic sustainability of forest resource extraction.

General progress towards this output has been very good, particularly on the establishment of line-transect surveys, and mapping the distribution of NTFPs. However, due to the flooding of várzea forest during this period, both activities been mainly restricted to terra firme forest. Line transects surveys will be expanded to várzea forest during the next period and the spatial distribution of NTFPs will be mapped in várzea forest in June-July 2009. As with Output 1, this relies on the assumption of sustained data collection. By maintaining close contact and providing regular support to the monitors, this output is very likely to be achieved by the project close.

Progress has begun on assessing the impact of extractive practices, at least on *Copaifera* seeds for the pharmaceutical and cosmetic industry. Following seed-fall during the next period, details will need to be confirmed regarding the harvest of oil from *Copaifera* trees in the focal study sites.

Sustainable harvest models will require the accumulation of long term data from line-transect surveys, household interviews, and experimental extraction experiments. It also still requires the recruitment of a trained spatial modeller and adequate students from partner institutions. These issues will be discussed in meetings in Manaus and Carauari in August 2008.

3. Local monitors, field technicians and students able to assess and monitor forest biodiversity using quantitative methods.

Excellent progress has been made training local monitors to survey a total 37 line-transects so far, three 100-ha plots, and 4 phenology transects. Monitors are already trained for the 28 várzea transects due to be opened during the next period, and all monitors will continue to receive support and training where necessary. Further local monitors will be trained for dung-beetle surveys, and a robust, arge scale series of floristic inventories (including trees >10cm DBH and woody lianas) that we expect to conduct within 300 forest plots of 0.1 ha (10m x 100m), which will be widely distributed in terra firme, paleo-várzea and várzea forests of varying inundation regimes.

This output still relies on attracting adequate students from partner institutions but discussions are underway and the basic infrastructure, including the transects and 100-ha plots already established, will be available to conduct biodiversity surveys and harvest assessments once those students are recruited. This output is very likely to be achieved by the project close.

4. Local communities in RDS Uacari and RESEX Medio-Jurua, and other reserves are able to effectively apply large-scale management recommendations.

Progress will only commence following assessment of the various long-term project components, which are currently all just at the beginning of the data collection stage. Regular contact and good relationships are maintained with the local communities and the government agencies formally managing the reserves (SDS and IBAMA). The original assumptions hold true and the output is likely to be achieved by the project close.

3.3 Standard Measures

Table 1 Project Standard Output Measures [relevant to this early stage of the project]

Code No.	Description	Yr 1 Total	Yr 2 Total	Yr 3 Total	Yr 4 Total	Total to date	Total planned from application
Established codes							
6A	Local community 'monitors' trained in resource monitoring field techniques	30				30	60
6B	Field-course delivered to local-community 'monitors'	1				1	3
4A	Brazilian undergraduate students from the State of Amazonas trained in resource monitoring field techniques	2				2	12
6A	Full-time MSc-level project staff members, who will help to manage the project, receive the above training plus extensive training in project management	1				1	2
6A	Brazilian wildlife biologists trained in line-transect census and camera trapping techniques, and correspondent data analysis	1				1	5
6A	Reserve personnel in Carauari trained in reserve spatial mapping, including the use of a GIS	1				1	2
8	A minimum of 32 weeks to be spent by UK project staff (C Peres and Spatial Modeller) at the two focal reserves. This excludes advisory, administrative and political meetings to be held in Manaus and Brasília.	5				5	32
12A	Datasets and dynamic databases to be established and handed over to SDS and IBAMA.	2				2	15
20	Bauana Field Station at RDS Uacari refurbished and equipped (costing ~£3,000)	33%				33%	100%
20	One laptop and a desktop, equipped with the appropriate software, handed over to reserve office in Carauari.	1				1	2
20	Two 8-m aluminium boats powered by 30HP outboard engines to be handed over to reserve office in Carauari.	1				1	2
21	Bauana Field Station adequately developed and equipped to serve as a permanent research station and logistical base for future Amazonian forest ecology field courses	33%				33%	100%
22	Thirty 1-hectare permanent tree plots (established according to RAINFOR guidelines) to be recensused over many years after the project is discontinued.	10				10	30
22	Approximately 4,000 number-tagged trees included in phonological	1,500				1,500	4,000

Code No.	Description	Yr 1 Total	Yr 2 Total	Yr 3 Total	Yr 4 Total	Total to date	Total planned from application
	monitoring available for future studies						
22	'No-take areas' in sub-catchment basins >5,000 ha, established within 20 community territories, to be monitored post-project.	3				3	10
23	A substantial support in kind in terms of office and laboratory facilities at SDS-Manaus, IBAMA-Manaus, INPA-Manaus, the SDS and IBAMA offices in Carauari, and the field station of Bauana (value cannot be estimated at present).	20%				20%	100%
New -Project specific measures	Preparation (cutting, measuring, marking, georeferencing, and mapping) of 60 forest transects of 4 to 5 km in length in várzea and terra firme forest	52				52	60
New -Project specific measures	Allocation of harvest categories to 30 oxbow lakes which will be monitored in terms of CPUE (catch per unit effort) of freshwater resources (mostly fish)	10				10	30

Table 2 Publications

Publications are unavailable at this early stage of the project in relation to current activities that have been specifically deployed in relation to this project. However, few papers that are directly relevant to project objectives have been recently published.

Type * (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Journal	<i>Peres C.A. & E. Palacios (2007) Basin-Wide Effects of Game Harvest on Vertebrate Population Densities in Amazonian Forests: Implications for Animal-Mediated Seed Dispersal.</i>	Biotropica 39: 304-315.	Blackwell	0
Journal	Stoner, K.E.; Vulinec, K.; Wright, S. Joseph; Peres, C.A. 2007. Hunting and Plant Community Dynamics in Tropical Forests: A Synthesis and Future Directions	Biotropica, 39: 385-392	Blackwell	0
Journal	<i>Ohl, J., G.H. Shepard Jr., H. Kaplan, C.A. Peres, T. Levi & D.W. Yu. (2007) The sustainability of hunting by Matsigenka native communities in Manu National Park, Peru.</i>	Conservation Biology 21:1174–1185	Blackwell	0
Journal	<i>Nichols, E., Gardner, T., Spector, S. and C.A. Peres. Declining large mammals and dung beetles: a case study of an impending ecological cascade.</i>	Oikos, in review		0

3.4 Progress towards the project purpose and outcomes

At this early stage in the project, none of the project outcomes have yet been achieved, and therefore progress towards the defined project purpose is limited. The purpose level assumptions still hold true and the indicators still appear adequate for measuring outcomes at this stage. The active participation of focal communities to date has been very encouraging and the project will continue to provide regular support and discussion to ensure this continued participation.

3.5 Progress towards impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits

It is not possible at this early stage in the project to comment upon progress at the goal level, but we are pleased to report that we have been able to successfully conduct the various stages of local to regional scale project negotiation and to establish the field programme in practice. This has not been without its physical challenges; for example, we have cut, marked and measured more than 250 km of new forest transects that will be used over the next 3 years. In addition, all project participants are very confident that this project will be successful in achieving its most important targets, and there are a number of unanticipated positive spin-offs that are likely to result from this study and cooperation agreement. Most importantly, the local communities are very pleased to be able to work with us, and we have a fantastic working understanding with the people in the villages and communities that we are working with.

4. Monitoring, evaluation and lessons

Project members in the field, with responsibilities for different project activities, have been in constant discussion with each other to ensure optimal coordination and to monitor the combined progress of these complementary aspects of the project. Regular contact has also been maintained with the project leader in the field (Nov – Dec 2007) and by email and telephone, reporting on the progress of all project activities.

Important indicators of achievements at this early stage of the project include quantitative measures such as the numbers of transects successfully opened, the number of communities which have agreed to actively participate in the project, and the general willingness of these communities to accept the project and work with us. For example, we are unable to work with all households across both of these large reserves, but this has generated a certain amount of resentment from the communities and households with whom we are unable to work for purely logistical reasons. Progress on the training of monitors and interviewers is another important measure of progress at this stage by cannot just be assessed by the numbers of local people attending a training workshop. In addition, it is critical to judge the effectiveness of the training, especially in terms of building a team spirit, and a willingness and enthusiasm to carry out the long-term systematic surveying protocols required for the success of this project. This indicator of achievement must be measured qualitatively, and requires careful assessment of individual characters. One particular lesson learnt here is the importance of strong personal relationships with all participating communities and local monitors, throughout the vast area of the two reserves. Regular contact and support will maintain those good relationships already established, to ensure the continued involvement of local communities in work progressing towards the project outputs.

At the moment, most monitoring is focused on the progress of individual project activities but as the project develops, more work will be required to monitor and evaluate the combined contribution of disparate project activities toward project outputs and the project purpose.

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

Report No. 1: Not applicable

6. Other comments on progress not covered elsewhere

We are happy with the design of the project and this has not been enhanced over the last year.

The major difficulty during the year was being unable to open transects in várzea forest, which is at least partly flooded from January to June. These transects will be opened, marked and measured now during the period of low water levels and surveys by trained monitors can commence thereafter. Transects are more difficult to open during high water levels than they are to subsequently survey, and surveying should be possible by trained monitors throughout the year conducting censuses either by foot or by dugout canoe.

The project does not face any particular risk.

7. Sustainability

The project is arguably the largest ever ongoing natural resource management effort of this kind in Amazonian sustainable development and extractive reserves. The work programme that we are conducting in the Central Juruá valley had to be cleared by both state-level and federal agencies, and permission to physically work in the target reserves was granted by IBAMA, IPAAM and SDS. It is still early in the project for any concerted dissemination activity but we have been communicating with biologists and anthropologists who have been involved in similar projects elsewhere in Amazonia. Undoubtedly the project will attract attention from a new crop of MSc students in ecology entering the graduate program at the National Institute of Amazonian Research (INPA, Manaus). The first 7 months of fieldwork have been almost entirely satisfactory with only one minor accident with no serious casualties (during a thunderstorm, we lost a dugout canoe containing a small outboard motor and some equipment in the choppy waters of the Juruá). It is still far too early to report on outputs, outcomes and impacts.

8. Dissemination

In its early stages of preparation in 2007, the project was advertised at three Brazilian academic conferences, each of which including >1500 delegates (the Brazilian Ecology Congress, the Brazilian Parks Conference, and the Brazilian Zoology Congress). At this stage we were mainly attempting to attract high-calibre Brazilian MSc level students to work with us on some priority areas of the project. The project is beginning to become well known within the State of Amazonas, but more dissemination work has been earmarked for other events in 2008 including the Brazilian Mammalogy Congress and the Tropical Biology and Conservation meeting to be held in Suriname (7-13 June 2008), both of which to be attended by CAP. It is still too premature to be thinking of exit strategies, or post-project dissemination activities when the project comes to a close in 3 yrs time.

9. Project Expenditure

Table 3 Please expand and complete Table 3. *Project expenditure during the reporting period (Defra Financial Year 01 April to 31 March)*

Item	Budget (please indicate which document you refer to if other than your project application)	Expenditure	Balance
Rent, rates, heating, overheads etc			
Office costs (eg postage, telephone, stationery)			
Travel and subsistence			
Printing			
Conferences, seminars, etc			
Capital items/equipment			
Others			
Salaries (specify)			
TOTAL			

JUSTIFICATION ON DISCREPANCIES BETWEEN THE ORIGINAL BUDGET ALLOCATION AND EXPENDITURE IN THE REPORTING PERIOD: For bureaucratic reasons beyond our control and related to the state/federal agencies that we work with, the field project effectively commenced in mid November 2007, over two months after the official start date of 1 Sept 2007. We therefore have an outstanding positive balance of £9,867 based on expenditure during the reporting period. However, the project accounts currently held at University of East Anglia (UEA) do not reflect all field expenditure because project advances from UEA the cannot be cleared until all project expenditure can be demonstrated with receipts, which have to be posted via air mail from Carauari, in the western Brazilian Amazon and it takes time to finally log these onto the accounting system. In addition, several expenditure items, such as the purchase of outboard motors and other equipment in Manaus have been severely delayed because Manaus is a 2-hour flight from Carauari and we need to control project costs related to rather expensive local airfares (monopolized by a single small airline company), but we are now redressing this time lag. This left a considerable sum of underspent funds in this initial part of the project, but we ask for permission to make up for this time lag and spend these funds in the second reporting period. Finally, almost all of the day-to-day running and operational costs of the project (e.g. food, fuel, boat repairs, local wages, airfares) have been allocated to Travel & Subsistence, and we are currently running a deficit on this budget component of the project, which admittedly had been under-budgeted because we did not know the exactly costs of deploying this ambitious field programme. However, this deficit has been more than compensated by a surplus balance on other parts of the project, so that there are no additional costs to the funding agency.

10. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum). This section may be used for publicity purposes

It is too early in the life cycle of this project for us to be able to report any *outstanding achievement*.

I agree for ECTF and the Darwin Secretariat to publish the content of this section

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2007/08

Project summary	Measurable Indicators	Progress and Achievements April 2007 - May 2008	Actions required/planned for next period
<p>Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve</p> <p>The conservation of biological diversity,</p> <p>The sustainable use of its components, and</p> <p>The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources</p>		<p>(report on any contribution towards positive impact on biodiversity or positive changes in the conditions of human communities associated with biodiversity eg steps towards sustainable use or equitable sharing of costs or benefits)</p>	<p>(do not fill not applicable)</p>
<p><i>Purpose</i> To design appropriate guidelines to manage game vertebrates and other key NTFP resource populations in large multiple-use tropical forest reserve, helping the Brazilian federal and state governments in developing, stimulating and implementing effective community-based forest resource management programmes that are grounded in the socioeconomic reality of Amazonian Sustainable Development and Extractive Reserves, and Indigenous Territories.</p>	<p><i>New and unique knowledge on the spatial structure of extractive activities in tropical forest reserves, and how these relate to natural mosaics of habitat productivity.</i></p> <p><i>Quantitative estimates of sustainable harvest quotas of target species, assuming both a closed and an open population scenario where depletion can be balanced by immigrants from source areas.</i></p> <p><i>An experimental study of the source-sink dynamics of game populations using multiple large no-take areas mapped with the assistance of and enforced with the help of local communities.</i></p> <p><i>Results that provide the State of Amazonas and the Brazilian federal government with practical management information helping them fulfill commitments to the Convention on Biological Diversity.</i></p>	<p><i>Very good progress starting field surveys (to census line-transects, to measure primary and secondary forest productivity in permanent plots, to conduct household interviews, and to prepare for experimental harvests). This is a result of high levels of active participation by focal communities. Continued progress is still reliant on the assumption of their continued active participation. Current participation and interest levels are highly encouraging for the further participation required for the experimental manipulation of hunting pressure and NTFP extraction throughout the duration of the project.</i></p>	<p><i>At least 28 further transects (locations already selected and approved by local communities) will be opened in várzea forest, which has been flooded during the previous period. These will start to be surveyed monthly by already trained monitors.</i></p> <p><i>Detailed measurement of environmental parameters and vegetation characteristics will be conducted along all transects.</i></p> <p><i>All existing transects and permanent plots will continue to be surveyed monthly.</i></p> <p><i>Household interviews will continue in all participating communities.</i></p> <p><i>All monitors and interviewers will continue receiving regular support to ensure the continuation of high quality data collection.</i></p> <p><i>Discussions will continue to organise the implementation of experimental harvest.</i></p>
<p>Output 1. Assessment of forest resources extracted, and levels of offtake.</p>	<p><i>1a. Daily records of the identity, weight, sex and reproductive condition of animals consumed, including game vertebrates and</i></p>	<p><i>Good progress has begun on assessing extraction of forest resources. Weekly interviews have begun in 26 communities. The output will only be achieved after the long-term accumulation of data from these interviews, over various seasons.</i></p> <p><i>The explicit mapping of hunting-trips has not been attempted yet.</i></p>	

	<p>fish.</p> <p>1b. Spatially-explicit mapping of hunting trips and resources harvested.</p>	
Activity 1.1 Household interviews		Local inhabitants have been trained to conduct weekly household interviews in 26 communities assessing resource extraction. They will continue to receive regular support and further training where necessary during the next period.
Activity 1.2 GIS mapping of the reserves and habitat types		This has been successfully completed and is available to be used by all other components of the project.
Activity 1.3, GIS analysis of game harvest areas		A preliminary analysis of the main harvest areas has been performed. During the next period the feasibility of tracking hunters using GPS will be assessed.
<p>Output 2. Quantitative assessment of the demographic sustainability of forest resource extraction.</p>	<p>2a. Seasonally repeated census data from at least 100 line-transects of 5 km in length in both hunted and nonhunted várzea, paleo-várzea, and terra firme forests, on both banks of the Rio Juruá.</p> <p>2b. <u>Mapping of the spatial distribution of key NTFP populations, including Copaifera and Carapa trees.</u></p> <p>2c. A study of the demographic impact of extractive practices on key NTFP resource populations.</p> <p>2d. Sustainable harvest models under different source-sink scenarios.</p>	<p>General progress has been very good on line-transect surveys, and mapping the distribution of NTFPs. However, due to the flooding of várzea forest during this period, they have both been mainly restricted to terra firme forest. Line transects surveys will be expanded to várzea forest during the next period and the distribution of NTFPs will be mapped in várzea forest in June-July 2009.</p> <p>Progress has begun on assessing the impact of extractive practices, at least on Copaifera. Following seedfall during the next period, details will need to be confirmed regarding the harvest of oil from the prepared site.</p> <p>Sustainable harvest models will require the accumulation of long term data from line-transect surveys, household interviews, and experimental extraction experiments. It also still requires the recruitment of a trained spatial modeller.</p>
Activity 2.1. Census faunal transect		Local inhabitants have been trained to conduct monthly censuses of 52 line transects, mainly in terra firme forest. The number of transects will be increased in the next period, mainly as a result of opening new transects in várzea forest. All monitors will continue to receive regular support and further training where necessary during the next period.
Activity 2.2. Map NTFP population density		The population densities of key NTFP resources have been mapped along 35 terra firme transects. No further mapping will occur in the next period but surveys will be conducted in várzea forest during June-July 2009.
Activity 2.3. Assess impact of experimental harvest of Copaifera		50 adult Copaifera trees have been tagged and measured in preparation for an experimental harvest experiment. Seeds will be collected from these trees during the next period and data recorded on seed production, seed size, and seed germination rate. This procedure will be repeated in following years after the experimental harvest of oil from half

		the adult population
Activity 2.4. Develop population ecology model for <i>Copaifera</i>		Adult trees, saplings and seedlings from three <i>Copaifera</i> species have been marked and measured for the first time in preparation for repeat surveys throughout the duration of the project.
Output 3. Local monitors, field technicians and students able to assess and monitor forest biodiversity using quantitative methods.	3. Minimum of 49 local monitors and 10 Brazilian students trained in quantitative biodiversity surveys, and harvest assessments.	Excellent progress has been made training local monitors to survey 37 line-transects, three 100ha plots, and 4 phenology transects. Monitors are already trained for 28 várzea transects due to opened during the next period. Further local monitors will be trained for dung-beetle surveys. These transects and 100ha plots already established will be available for Brazilian students to conduct biodiversity surveys and harvest assessments once they are recruited.
Activity 3.1. Conduct training workshop		The initial training workshop was successfully completed in March, and the trained monitors and interviewers are already conducting their censuses and interviews.
Activity 3.2. Continue post-workshop training		Two additional monitors have been trained since the training workshop, and all monitors and interviews have been revisited to check any problems, answer any questions or doubts, and to provide extra training if necessary. This regular support aims to assure the continued long-term collection of quality data.
Activity 3.3 Conduct line transect surveys		37 line-transects (35 terra firme; 2 várzea) have been opened and are now being censused monthly. Complemented by 15 previously existing transects this yields a total of 52. The location of 28 várzea transects have been selected and approved by local communities, and will be opened in the next period (July-August 2008).
Activity 3.4 Conduct 100 ha plot surveys		Three 100ha plots have been opened, and trained monitors have been conducting monthly censuses for fauna and residual fruit-fall since March 2008. In addition, two of these plots (1 terra firme; 1 várzea) have 96 traps (1m ²) from which, every 2 weeks, leaf litter is being collected, dried, separated and weighed by trained assistants to assess primary productivity levels.
Activity 3.5. Conduct phenology surveys		Four 1km phenology transects (2 terra firme; 2 várzea) have been established, with 484 uniquely tagged trees and lianas. Monthly surveys have been conducted since March 2008, and will be continued by trained monitors throughout the duration of the project.
Activity 3.6. Conduct dung beetle surveys		Preliminary surveys were conducted in December 2007 in advance of extensive surveys during 2008/2009.
Output 4. Local communities in RDS Uacari and RESEX Medio-Jurua, and other reserves are able to effectively apply large-scale management recommendations.	4a. A user-friendly, illustrated community-based wildlife management (CBWM) handbook that can be distributed to rural communities of lowland Amazonia. 4b. Publications, presentations and SDS workshop, Manaus.	Progress on Output 4. will only start following assessment of various long-term components of the project, which are currently just at the beginning of the data collection stage.
Activity 4.1. Analyse long-term data collected from all project components		
Activity 4.2. Conduct meetings with all local stakeholders		
Activity 4.3. Write publications and presentations		
Activity 4.4. Interpret findings to develop recommendations		

<i>Activity 4.5. Publish, print and distribute CBWM</i>	
<i>Activity 4.6. Organise workshop in Manaus to present findings and recommendations</i>	

Annex 2 *Project's full current logframe*

<i>Project summary</i>	<i>Measurable Indicators</i>	<i>Means of verification</i>	<i>Important Assumptions</i>
<p>Goal: To work with local partners in countries rich in biodiversity but poor in resources to achieve the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.</p>			
<p>Purpose</p> <p>To design appropriate guidelines to manage game vertebrates and other key NTFP resource populations in large multiple-use tropical forest reserve, helping the Brazilian federal and state governments in developing, stimulating and implementing effective community-based <u>forest resource</u> management programmes that are grounded in the socioeconomic reality of Amazonian Sustainable Development and Extractive Reserves, and Indigenous Territories.</p>	<p>New and unique knowledge on the spatial structure of extractive activities in tropical forest reserves, and how these relate to natural mosaics of habitat productivity.</p> <p>Quantitative estimates of sustainable harvest quotas of target species, assuming both a closed and an open population scenario where depletion can be balanced by immigrants from source areas.</p> <p>An experimental study of the source-sink dynamics of game populations using <u>multiple</u> large no-take areas <u>mapped with the assistance of</u> and enforced with the help of local communities.</p> <p>Results that provide the State of Amazonas and the Brazilian federal government with <u>practical management</u> information helping them fulfill commitments to the Convention on Biological Diversity.</p>	<p>Field surveys and spatial modelling data.</p> <p>Successful implementation of a viable <u>spatially-structured</u> experimental harvest programme that can be co-managed by local communities.</p> <p>Publication and wide distribution of an illustrated user-friendly management handbook that can be understood by the semi-literate rural population of Amazonian <u>extractive and sustainable development</u> reserves.</p> <p>Publications in high-impact international scientific journals.</p> <p>Reports in Brazilian high-circulation popular science magazines (e.g. Ciência Hoje; Natureza & Sociedade).</p> <p>Reports to state-level and federal environmental agencies in Brazil including SDS-State of Amazonas, IBAMA, and Ministério do Meio Ambiente (MMA).</p>	<p><u>That focal communities will maintain their active participation in the project and uphold the experimental manipulation of hunting throughout the length of the project.</u></p> <p>That new knowledge will actually be used by state-level and federal government agencies to instigate, facilitate, design and implement community-based wildlife management (CBWM) programmes in a growing number of Amazonian multiple-use forest reserves.</p> <p>That any resulting policy changes will be implemented effectively via SDS-Amazonas, IPAAM, and IBAMA (state and federal branches).</p> <p><u>That IBAMA's National Centre of Sustainable Development of Traditional Populations (CNPT) can help promote participatory CBWM protocols in all Amazonian extractive reserves under its management jurisdiction.</u></p> <p>That several of the lessons and insights from this project will be generalised to other multiple-use Amazonian forest reserves, including Extractive Reserves, Sustainable Development Reserves, National Forests, and Indian Reserves.</p> <p>Project results can be fed through to the revision process of the now obsolete federal Faunal Protection legislation act of January 1967.</p>
Outputs	1a. Daily records of the identity,	1. Survey reports, biodiversity	1. Proposed methods will allow standardised

<p>1. Assessment of forest resources extracted, and levels of offtake.</p> <p>2. Quantitative assessment of the demographic sustainability of forest resource extraction.</p> <p>3. Local monitors, field technicians and students able to assess and monitor forest biodiversity using quantitative methods.</p> <p>4. Local communities in RDS Uacari and RESEX Medio-Jurua, and other reserves are able to effectively apply large-scale management recommendations.</p>	<p>weight, sex and reproductive condition of animals consumed, including game vertebrates and fish.</p> <p>1b. Spatially-explicit mapping of hunting trips and resources harvested.</p> <p>2a. Seasonally repeated census data from at least 100 line-transects of 5 km in length in both hunted and nonhunted várzea, paleo-várzea, and terra firme forests, on both banks of the Rio Juruá.</p> <p>2b. <u>Mapping of the spatial distribution of key NTFP populations, including <i>Copaifera</i> and <i>Carapa</i> trees.</u></p> <p>2c. A study of the demographic impact of extractive practices on key NTFP resource populations.</p> <p>2d. Sustainable harvest models under different source-sink scenarios.</p> <p>3. Minimum of 49 local monitors and 10 Brazilian students trained in quantitative biodiversity surveys, and harvest assessments.</p> <p>4a. A user-friendly, illustrated <u>community-based wildlife management (CBWM)</u> handbook that can be distributed to rural communities of lowland Amazonia.</p> <p>4b. Publications, presentations</p>	<p>and resource databases and correspondent files from collaborators.</p> <p>2a. Survey reports, data and correspondent files from internal collaborators.</p> <p>2b. Survey reports, data and correspondent files from internal collaborators.</p> <p><u>2c. Survey reports, data and correspondent files from internal collaborators.</u></p> <p><u>2d. Development of spatially-explicit sustainable harvest models.</u></p> <p>3. Field survey reports, correspondent files from collaborators detailing student involvement and skills gained. Skills certification schemes for those involved.</p> <p>4a. Wildlife management handbook successfully developed and widely disseminated.</p> <p>4b. Twelve papers in peer-reviewed scientific journals, and high-circulation Brazilian science magazines.</p> <p>4a & 4b. Copies of all publications, conference abstracts and workshop proceedings sent to DEFRA (Darwin Initiative).</p>	<p>quantification of offtakes and resource densities.</p> <p>1&2. Level of acceptability of simplified protocols is sufficiently high, and data acquisition can be sustained.</p> <p>1&2. Harvest zoning agreements can be established and maintained.</p> <p>2. A competent spatial modeller can be recruited to apply empirical results to a series of harvest mosaic scenarios based on spatio-temporal simulations.</p> <p>2&3. Adequate students can be attracted from within partner institutions.</p> <p>3. Assimilation by local community ‘monitors’ and MSc students of field course information is satisfactory.</p> <p>4. Impact of the SDS/INPA Technical Workshop and publications are sufficiently significant to influence wildlife management policy through IBAMA, IPAAM, and MMA (Ministry of Environment).</p> <p>4. Level of receptivity and uptake of resource management guidelines at RDS Uacari and RESEX Medio-Jurua are satisfactory.</p> <p>4. Results are adequate to provide novel publications with national and international impact.</p> <p>4. Level of receptivity and uptake of resource management guidelines are satisfactory in other State of Amazonas reserves where the project ‘toolbox’ approach is applied.</p>
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	and SDS workshop, Manaus.		
<p>Activities</p> <p>GIS mapping of the reserves and forest types, establishment of harvest and population census protocols, experimental design and considerations of spatial scale;</p> <p>Training of local community monitors, Brazilian <u>MSc</u> students and reserve staff;</p> <p>Field research programme involving the delimitation and implementation of experimental no-take areas following wide consultation with <u>at least 20 of the 49</u> local communities.</p> <p>Data analysis and spatial modelling;</p> <p>Dissemination of results;</p> <p>SDS/INPA Workshop.</p>	<p>Activity Milestones</p> <p>Yr1: Formal assessment of RDS Uacari and ResEx Médio Juruá, including spatial mapping of forest types, local communities, and stream subcatchment basins, and establishment of harvest protocols (4 months; Sept-Dec 2007).</p> <p>Yr1: Leaders of all <u>49</u> local communities attend the initial planning meetings and training sessions; Selection of Brazilian students from collaborating institutions; Initiation of short field courses and supervised training programme; Experimental no-take areas are delimited and begin operating (6 months; Sept – Feb 2007/08).</p> <p>Yr1 - Yr3: Sampling protocols agreed by July 2007. Household-level surveys targeting specific resource types and fieldwork begin, including 24 month quantification of seasonal changes and phenological patterns of resource populations and their food supply (Sept 2007 - Aug 2009).</p> <p>Yr 3: Ongoing analysis and spatial modelling conducted throughout the period of data collection will be enhanced and finalised within a 6 month period following termination of field data collection (Sept 2009 – Feb 2010).</p> <p>Yr 3 – Yr4: SDS/INPA Workshop; First high-impact publication and management handbook (March 2010) followed by others both in Portuguese and English. Information summarised and presented to the State of Amazonas and Brazilian Federal Government.</p>		<p>Assumptions</p> <p>GIS mapping can be completed both at UEA and SDS on the basis of high-resolution satellite images and initial field surveys.</p> <p>INPA and SDS contacts are in place; Fieldwork logistics can be implemented at Carauari, Amazonas; <u>boats and other equipment</u> are purchased and field station is refurbished.</p> <p>Local communities become willing collaborators, as indicated by partner institutions.</p> <p>Deployment of experimental no-take areas can be agreed upon following mapping of catchment areas, as indicated by collaborating institutions.</p> <p>Theoretical and applied results are written-up. Illustrator completes hand-drawings. Workshop is well attended by IPAAM, SDS, IBAMA and INPA staff.</p>

Annex 3 *onwards – supplementary material (optional)*

Checklist for submission

	<i>Check</i>
Is the report less than 5MB? If so, please email to Darwin-Projects@ectf-ed.org.uk putting the project number in the Subject line.	x
Is your report more than 5MB? If so, please advise Darwin-Projects@ectf-ed.org.uk that the report will be send by post on CD, putting the project number in the Subject line.	
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number.	N/A
Have you completed the Project Expenditure table?	x
Do not include claim forms or communications for Defra with this report.	x