

Xaté Palms (*Chamaedorea* spp.) in Belize: conservation and sustainable management

DI Project 162/12/012

First Annual Report



Table of Contents

DI Belize Xate Project

<u>Description (File on CD)</u>	<u>Page</u>
Cover Letter (<i>Xate DI AR1 162.12.012.doc</i>)	1
Annual Report Form (<i>Xate DI AR1 162.12.012.doc</i>)	2-23
Appendix 1: First Year Report, Belize Botanic Gardens (<i>Xate DI AR1 162.12.012 Appendix 1 BBG AR1.doc</i>)	A1: 1-19
Appendices 2-8 (<i>Xate DI AR1 162.12.012 Appendices 2-8.doc</i>)	
Appendix 2: Xaté Project Planning Workshop	A2-8: 2
Appendix 3: Memorandum from CEO, Ministry of Home Affairs	A2-8: 3
Appendix 4: Workshop with Belize Xaté Technical Committee	A2-8: 4
Appendix 5: Molecular phylogeny of <i>Chamaedorea</i>	A2-8: 5
Appendix 6: Report: Sustainable harvesting of xaté in Belize	A2-8: 6-12
Appendix 7: Preliminary Report: Abundance of xaté in Chiquibul Forest	A2-8: 13-16
Appendix 8: <i>Las Cuevas Newsletter</i> article	A2-8: 17
Appendix 9: Article in <i>NHM (The Magazine for NHM Supporters)</i> (<i>Xate DI AR1 162.12.012 Appendices 9 palm_article.pdf</i>)	A9: 3 pp.

Darwin Initiative for the Survival of Species

Annual Report

1. Darwin Project Information

Project Ref. Number	162/12/012
Project Title	<i>Xaté palms (Chamaedorea spp.) in Belize: conservation and sustainable management</i>
Country(ies)	<i>Belize</i>
UK Contractor	<i>The Natural History Museum</i>
Partner Organisation(s)	<i>Belize Forest Department (BFD) Belize Botanic Gardens (BBG)</i>
Darwin Grant Value	<i>£173,723.00</i>
Start/End dates	<i>1/4/03–31/3/07</i>
Reporting period (1 Apr 200x to 31 Mar 200y) and report number (1,2,3..)	<i>1 Apr 2003 to 31 March 2004 Annual Report 1</i>
Project website	<i>n/a</i>
Author(s), date	<i>Nancy C. Garwood, Sam Bridgewater, Richard Bateman, Natalie Bell 14 July 2004</i>

2. Project Background

Chamaedorea is the largest palm genus (80-100 spp.) in the Neotropics, and the most heavily exploited. About 75% of species are threatened by habitat destruction and over-harvesting of leaves (xaté), seeds or whole plants (Conservation Action Plan for Palms 1996). Of the 11 *Chamaedorea* species believed to occur in Belize, four are threatened (IUCN 1997). The Belize Biodiversity Action Plan (BAP) identified the need to monitor and to quantify the value of non-timber forest products (NTFP), including xaté, for sustainable use and to involve NGOs in monitoring and educating both collectors and the public (BAP: 6.6.14, 1998). Although xaté collecting activity was negligible in Belize when the BAP was published, trade in leaves and seeds generates more than US\$ 30 million per year in Guatemala and Mexico. By 2002, Belizean organisations (e.g. Belize Forest Department, Belize Botanic Gardens, Belize Biodiversity Information Service) and the British High Commission in Belize had noted that illegal xaté collectors were penetrating deeper into the Chiquibul Forest, a protected area critical to Belize's Protected Area System Plan and the Mesoamerican Biological Corridor (BAP 6.1). A sustainable management plan is urgently needed to counter increasing threats to xaté species in Belize and to reduce side-effects of unregulated exploitation (e.g. associated hunting of CITES-listed animals such as tapir and jaguar).

Sustainable harvesting of xaté could provide long-term livelihoods for Belizeans collecting palm leaf in the forest as well as for those processing leaves for export. In addition, cultivation of xaté leaf for export in local small-holdings could potentially generate sustainable livelihoods for many others. Sustainable harvesting of xaté might replace, in part, local income lost from the recent down-turn in the regional timber industry, resulting from a recent out-break of bark beetles in local pine forests and earlier over-harvesting of mahogany and cedar. A controlled and more equitable xaté harvesting industry in Belize could redress the current economic imbalance between illegal collectors (earning less than five pence per 40 leaves harvested) and foreign middle-men

(receiving more than 50 pence per 40 leaves sold) now occurring across the border with Guatemala.

The project has been developed in close consultation with Belize Forest Department (BFD) to insure that the sustainable management plan, improved xaté information base, and staff training activities meet the specific needs of the BFD and achieve a lasting impact. Local xaté cultivation and eco-labelling offer potential for further developing the economic contribution of xaté to the local economy while simultaneously ameliorating the current pressure on native populations. Belize Botanic Gardens (BBG) is committed to continuing this work if, as we expect, sufficient potential is demonstrated during the project. Both steps will assist Belize and local NGOs to implement the CBD in terms of conserving biological diversity, sustainably using its components, and equitably sharing the benefits arising from this use within Belize. Training will promote in-country opportunities for students (e.g. GIS [in use at Belize's Land Information Centre], resource assessment and horticulture), BFD & BBG staff (e.g. monitoring, palm identification or cultivation), and local growers and harvesters. It will also facilitate job uptake. The Management Plan and palm guide will be developed in collaboration with the BFD and implemented by them. The palm guide, educational materials, and xaté cultivation manual will be distributed to teachers, schools, farmers and other NGOs through networks developed during the project.

Belize, a country rich in biodiversity but poor in resources, lacks the necessary funding and expertise to develop an urgently needed Management Plan for sustainable harvesting of xaté palms for the floral trade and to develop supplementary methods to reduce over-exploitation. This project will use UK skills, in collaboration with Belizean institutions, industry and communities, to assist Belize in meeting its obligations under the CBD. Promoting sustainable xaté harvesting, cultivation and marketing will help eliminate poverty and promote sustainable livelihoods among local people. The combined systematic, ecological, forestry and horticultural experience of partners will yield practical outputs of high quality and scientific excellence, provide a lasting legacy to enable sustainable management of this important resource and contribute to the holistic management of Belizean forests. Project development has acted as a catalyst to secure in-kind contributions from partner and supporting organisations.

3. Project Purpose and Outputs (from Logical Framework, Annex 2)

Purpose

To develop the capacity in Belize for conserving and sustainably managing the xaté palms (*Chamaedorea* spp.) of Belize and for improving the economic benefits to Belizeans from xaté collection.

Outputs

- (1) Management plan for sustainable xaté harvest
- (2) Field Guide to Belizean Palms published
- (3) Xaté information base increased (permanent, experimental and demonstration plots; databases)
- (4) Publications/reports/manuals: Xaté abundance, diversity, distribution in Belize determined; feasibility of xaté eco-labelling explored; nursery protocols developed
- (5) Training and education: BFB, BBG, students and local people trained; groups educated about xaté

Changes in 2003/2004:

There has been no change to the purpose or key outputs of the xaté project as summarised above and in the Logical Framework. The specific timetable of key milestones and outputs has twice been modified. First, the onset of major project activities was delayed six months after a general request from the DI to postpone as much expenditure as possible until the next FY. Second, following (a) policy decisions by NHM concerning the future management of the Las Cuevas Research Station and (b) key staff changes within the Department of Botany at NHM, we

requested further modifications to the timetable and minor changes to Key Milestones and Outputs for FY 2003/2004 (see Annex 3 and Annex 4). These were readily accepted.

4. Progress

Pre 2003/04 Activity:

FY 2003/04 was the first year of the project. There was no significant activity between the submission of the 2nd tier proposal in January 2003 and announcements of awards in March 2003.

Progress in 2003/04:

The revised Project Outputs and Implementation Timetables, submitted to DI on 17 February 2004, are included in Annex 3 and Annex 4, respectively. These follow the required "Report of progress and achievement against Logical Framework for Financial Year 2003/04" (Annex 1) and the Logical Framework (Annex 2), which differs from the original only in changes to Activity Milestones (reflecting changes in Annex 3 and Annex 4).

Summary tables of progress on Key Milestones and Outputs:

Progress on all 2003/04 milestones and outputs are included in the summary tables below, as well as those brought forward from 2004/05 and completed in 2003/04. We are making good progress with respect to the revised schedules. Much of the activity in 2003/04 will lead to completion of Outputs and Key Milestones in 2004/05.

Project implementation timetable 2003/04 (revised 17/2/04)		
FY Month	Key Milestones <i>(Activity areas: F – Field research and training in Belize; B – Belize Botanic Gardens research and training; L – Laboratory research and training at NHM, London; R – Reports, plans and guides; W – workshops)</i>	
	Description	Progress in 2003/04
2003/04		
May	Planning workshop in Belize completed (W)	Held 20 May 2003 at Las Cuevas Research Station
May	Defoliation plots in Chiquibul Forest established (F)	Plots established in June 2003
Sept.	Tropical botanic garden growing <i>Chamaedorea</i> (xaté) species visited (B)	BBG staff visited botanic garden in Honduras in June 2003; other visits postponed until FY 04/05
March	Seeds collected in Belize and germination trials established (B)	First seeds collected and germination trials initiated August-September 2003; additional seeds sown January 2004
March	Xaté harvesting areas in Guatemala visited (F)	BBG & NHM staff visited Justo Mundo's xaté plantation project in May 2003, January 2004 and early April 2004; visits to forests being harvested delayed until FY 04/05 (because new Research Station Manager did not take up post until Feb. 2004)
2004/05		
Dec.	Background report on sustainable xaté harvesting in Selva Maya prepared and disseminated (R)	Brought forward and refocused on Belize; completed March 2004 and passed to BFD
Oct.	Survey plots in Chiquibul Forest	Brought forward (in part): 50 permanent plots established and measured in June 2003; methods

	established (F)	for survey plots (non-permanent) established and first 14 survey plots measured (March-April 2004)

Project Outputs: 2003/2004 (revised 17/2/04)			
FY			
Month	No.	Description	Progress in 2003/04
2003/04			
May	14A	Planning workshop	Completed in May 2003
June	14A	Presentation to government officials	Completed in June
Sept.	14B	Conferences attended and talks given: 2 (formerly TBA)	Project goals presented at two meetings (April 2003, September 2003)
Oct.	14A	Local xaté workshop at BBG	Completed in October 2003
March	21	Education Centre established and equipped at BBG	Site selected, equipment purchased, refurbishment nearly completed
March	8	NHM staff in Belize on project (2 [NG, MP], total 6 weeks; 1 [SB] – supervision February-April)	NG (3 weeks), MP (2 weeks); LCRS staff, SB (3 weeks), CB (1week)
2004/05	-		None brought forward

Achievements in 2003/04:

Planning workshop: This was held at Las Cuevas Research Station on 20 May 2003. The following organisations were represented: Belize Forest Department (Marcello Windsor), Belize Botanic Gardens (Judy duPlooy, Heather duPlooy, Brett Adams), San Antonio village and Eljijo Panti National Park (James Mesh), British High Commission (Simon Mustard and Howard Lattin-Rawstrone), New York Botanic Gardens (Holly Porter-Morgan), Natural History Museum (Nancy Garwood, Malcolm Penn, Natalie Bell, Nick Wicks), and Las Cuevas Research Station/NHM (Chapal Bol, Chris Minty). Short talks on the background of the project were presented, followed by a lengthy discussion on project planning. The workshop ended with a visit to a nearby xatéro camp in the Chiquibul Forest. (See Appendix 2 for photos of the workshop.)

Horticultural Activities at Belize Botanic Gardens: A full report on the year's activities at BBG is attached (Appendix 1, 19 pp.). Highlights from the report are summarised here.

Xaté cultivation manual: Preparations for a manual of xaté cultivation for Belizean farmers began with the translation of an existing Mexican manual into English. Methods used by the few existing growers in Belize, including our DI commercial partner Teakettle Enterprises, and the Mundo Justo xaté plantation project in Guatemala, were compiled and preliminary germination tests were conducted.

Horticultural methods: Work concentrated on building the demonstration seed beds and seedling nursery. Excellent germination results have been obtained with *C. ernestii-augustii* and *C. oblongata*, although results from *C. elegans* were poor because only old seeds were available at the start of the project. Seedlings will soon be transferred into the nursery (due for completion in April 2004). New signage on the seed beds explains treatments used.

Demonstration plots: The first demonstration plot (¼ acre) has been established in young second-growth forest (8 year-old). Seedlings of *C. elegans* and *C. oblongata* have been planted and have established well. The demonstration plots will provide an example for farmers wishing to grow to xaté on their small-holdings and practical experience in cutting xaté leaf for market.

Visits to Botanic Gardens and Nurseries: BBG staff made several visits to the Mundo Justo (MJ) project in Guatemala to examine horticultural techniques used and to discuss MJ with local people. In addition, Teakettle Enterprises, our DI commercial partner in Belize, was visited to discuss horticultural techniques, examine the small-scale seed plantations developed over the past 15 years, and collect seed for germination.

Education: Tours of the BBG now include the story of xaté in Belize, taking guests to visit the seedbeds and various *Chamaedorea* species being grown throughout the Gardens. An education centre has been established. Furniture and a Powerpoint projector were purchased this year, and refurbishment of the rooms will be completed early in 2004/05, ready for farmer training and student visitors later in the year.

Interviews for a full-time Education Officer were conducted, but an appropriate candidate was not identified. A second round of interviews will be held in 2004/05. Once hired, the Education Officer will expand the educational outreach to include more farmers and students.

Resource Assessment Activities by Las Cuevas Research Station/NHM:

Permanent plots: Fifty 20 x 20 m permanent plots were established in the Chiquibul Forest in May-June 2003, 25 each in two forest types, by MSc student Nick Wicks (Imperial College/NHM course) with funding from the Las Cuevas Research Fund. The areas sampled were chosen because they were largely uncut by xateros (protected by their closeness to Las Cuevas Research Station); such areas are now difficult to find elsewhere in the Chiquibul Forest. All palm species were counted and all *Chamaedorea* species were marked and measured. Of 2965 *Chamaedorea* plants, 78% were *C. oblongata*, 14% *C. ernesti-augustii* ('fishtail'), 6% *C. tepejilote*, 5% *C. pinnatifrons*, and <1% *C. elegans* and *C. graminifolia*. Mean densities (\pm SD) of *C. oblongata* and *C. ernesti-augustii*, the two most abundant species in the 50 plots, were 1109 ± 916 /ha and 216 ± 171 /ha; these species occurred in 100% and 94% of the plots, respectively. Plots will be re-measured in June 2004 and 2005 to determine growth rates and mortality of palms not being cut for xaté leaf.

Defoliation plots: Five 20 x 20 m plots were established in three locations near Las Cuevas Research Station in June 2003 by PhD student Holly Porter-Morgan (New York Botanic Gardens) with funding from the Las Cuevas Research Fund. Plots included 111 plants of *C. ernesti-augustii* and 229 plants of *C. oblongata*. The experimental design is summarised in the table below, and spans the cutting intensity observed currently in the Chiquibul Forest. The first and second cuttings (6 and 12 month intervals) have been completed; plant growth, reproduction and survival will be measured after one and two years. Preliminary observations during the second cutting indicate that the higher defoliation levels are already causing reduced leaf production and mortality, especially of smaller plants. Plots will be remeasured in August 2004 and 2005 to quantify effects of defoliation.

Experimental Design for Defoliation Plots			
Treatment group	Number of leaves cut	Cutting interval (months)	Total number of leaves cut per year
1	0	0	0
2	1	12	1
3	1	6	2
4	2	12	2
5	2	6	4
6	4	12	4

Survey Plots: In March-April 2003, Nancy Garwood, Sam Bridgewater, Malcolm Penn, and Chapal Bol established protocols for the survey plots and inventoried 12 plots with other LCRS staff. Survey plots will be 20 x 20 m (to compare with the permanent growth plots). They will be distributed along the major tracks (mostly old logging roads) within the Chiquibul Forest at intervals of ca. 1.5 km, with each plot located 50 m from the track (on alternating sides of track). A random

placement of survey plots throughout the area of the Chiquibul Forest (1744 km², M. Penn, pers. com.), while preferable on statistical grounds, was discarded as impractical, given the resources and time available to the project. In each survey plot, the following data is measured for all *Chamaedorea* species: number of leaves per plant, number of leaves cut, stem height, stem length (note: in many plants, much of the stem is horizontal and total stem length better reflects age of plant than height from ground to apex), and length of youngest mature leaf. The results from the first 12 plots were summarised in a report given to the Xaté Technical Committee and BFD (Appendix 6). Of 579 *Chamaedorea* plants, 59% were *C. oblongata*, 26% *C. ernesti-augustii* ('fishtail'), 6% *C. tepejilote*, and 9% *C. pinnatifrons*. Mean densities of *C. oblongata* and *C. ernesti-augustii* were 715/ha and 310/ha. These data are similar to those obtained from the 50 permanent plots. Data from these preliminary survey plots confirmed that, at present, only *C. ernesti-augustii* ('fishtail') is being cut by the illegal Guatemalan xateros: 85% of all fishtail plant had at least one leaf cut, while no leaves were cut from the other three species. In addition, mean number of fishtail leaves cut was 2.9/plant. In some plots nearer the Guatemalan border, which have been harvested for a longer period, mean number cut was greater than 4 leaves/plant. Some plants in these plots had 8 leaves cut and no leaves remaining, and dead leafless stems were frequent. These are the first data to establish the extent of damage to xaté in the Chiquibul and in Belize as a whole. Our priority in 2004/05 is to increase the number of survey plots in the Chiquibul to understand better the distribution of species and the damage already inflicted on the fishtail populations.

Genetic Analyses: A molecular phylogeny of *Chamaedorea*, which forms the necessary background to the population study, was completed in March 2004 by a team led by Meredith Thomas. As can be seen from the phylogenetic tree (Appendix 5), the three most important xaté species in Belize (*C. ernesti-augustii*, *C. elegans*, and *C. oblongata*) are not closely related to each other genetically, as well as being morphologically distinct. Therefore, there should be few problems with identification in collecting samples for genetic analyses from these species in Belize. The situation with species of secondary importance is more complex. For example, although *C. pinnatifrons* is very difficult to distinguish from *C. neurochlamys* (and some authors include the latter within *C. pinnatifrons*), our genetic analysis (Appendix 5) indicates that they are not closely related. Plants analysed to date from the Chiquibul Forest group with *C. neurochlamys*, rather than *C. pinnatifrons*; future work will compare samples from throughout Belize and adjacent regions.

The molecular phylogeny will also assist us in identifying unknown *Chamaedorea* species encountered in Belize during our surveys. In addition, accessions of *Chamaedorea* in botanic gardens throughout the world are very poorly named (Hodel 1992): these accessions can be sampled and tested against the molecular phylogeny to verify identifications. As *ex situ* collections are extremely important for conservation of the many threatened species in the genus, this is an important step forward.

In March-April 2004 we collected over 400 leaf samples from the Chiquibul Forest, sampling two to three populations each of six species. Samples from elsewhere in Belize will be collected in 2004/05. Population genetic analysis of these samples will be completed in 2004/05.

Our original goal for undertaking these analyses was to determine whether there was sufficient variation among populations of the major xaté species to provide an independent (genetic) means for verifying claims of sustainability which underlie many eco-labeling schemes. As interest in xaté has been building rapidly in Belize, it has become clear that our population genetic analyses can be used to address other important aspects of the proposed xaté industry in Belize.

First, there are many proposals afoot to import xaté seeds and seedlings into Belize from outside the country with the intention of kick-starting the local industry. However, if the populations of xaté species in Belize are distinct from those elsewhere in the region, transport of material from other locations into Belize might jeopardise the genetic integrity of the Belize populations. Conservation of local genetic diversity is an important part of the CBD. Second, it is difficult at present to establish the source of material (seeds and seedling) now in trade. For example, it is generally thought that most leaves of fishtail palm (*C. ernesti-augustii*) on the market are being cut from forest populations, not plantations. Plantations of fishtail are reportedly being developed now in Mexico to supply seed for other growers as well as cut leaves. Large amounts of seed are being

obtained to start fishtail plantations in Guatemala, supposedly sourced from Mexico. Yet, illegal Guatemalan xateros working in the Chiquibul Forest are collecting large amount of seed as well cutting leaves (N. Garwood, personal observation). Who is buying this seed and where is it being grown? A genetic analysis of fishtail palm seeds now in trade could usefully address this under-appreciated problem.

Presentations and Meetings:

Following the planning meetings, we received an invitation from Mr. Alan Usher, CEO Ministry of Home Affairs, to give a short presentation in Belmopan on 12 June 2003 to a selected group of government officials on the Darwin xaté project and current xaté harvesting activity in the Chiquibul forest. (See invitation Memorandum, Appendix 3.) Nancy Garwood co-ordinated presentations from the following project participants: Judy duPlooy (BBG), Chapal Bol (Las Cuevas), Maria Garcia (ITZAMA Society, which manages Elijo Panti National Park, near San Antonia village), Holly Porter-Morgan (New York Botanic Gardens), and Nick Wicks (Imperial College/NHM). Other project participants were present and participated in the discussion following the presentation.

Contacts made at the June presentation led to a further half-day meeting hosted by the Belize Botanic Gardens on 16 October 2003 to promote further dialogue between Belizean farmers, government departments, and NGOs on possibilities of xaté cultivation in Belize and inform these groups of the DI xaté project. Judy duPloy (BBG), Martin Meadows (BBG), James Mesh (BBG) and Maria Garcia (ITZAMA) gave short presentations. This successful meeting was subsequently discussed in a newspaper article in the *Belize Times*. (See Appendix 1 for the agenda, list of participants, and copy of the article).

DI xaté project partners met with the Belize Xaté Technical Committee on 1 April 2004 at Las Cuevas Research Station (see Appendix 4 for photos of the meeting). Committee members attending included Alfonso Gahona (Ministry of Foreign Affairs), Eugene Waight (Ministry of Agriculture), Marcelo Windsor (BFD) and Osmany Salas (BFD). We presented the Committee with a preliminary report (Appendix 6) on abundance of xaté species in the Chiquibul Forest and damage to the population of fishtail (*C. ernesti-augustii*). The implications of our findings for possible levels of sustainable harvesting of xaté in the Chiquibul were discussed

Nancy Garwood (NHM) gave talks on the objectives of the Darwin xaté project to the third meeting of the European Network of Palm Specialists (EUNOPS3) held at the Royal Botanic Gardens, Kew on 26 and 27 April 2003, and to the 7th Annual Meeting of the Britain-Belize Research Association held at the Institute of Geography, University of Edinburgh, on 26th September 2003. MSc students Nick Wicks and Meredith Thomas (Imperial College/NHM), who were carrying out research on *Chamaedorea* in collaboration with the Darwin xaté project, also attended EUNOPS3 and made valuable contacts with palm specialists. Collaborative links with the Millenium Seed Bank (Wakehurst Place, RBG Kew) to study seed storage properties of xaté seeds were also made at EUNOPS3.

Publications and Reports:

Two reports were prepared in 2003/04. "Sustainable harvesting of fishtail palms (*Chamaedorea ernesti-augustii*) in Belize" (Appendix 7) was submitted to the BFD in March 2004 by Holly Porter-Morgan, Sam Bridgewater, and Chapal Bol. This replaces the proposed background report on sustainable xaté harvesting in the Selva Maya due for completion in December 2004. Given the rapidly intensifying interest in xaté harvesting within Belize, the BFD and xaté Technical Committee requested that a report focused more on Belize than the broader region be made available as soon as possible. "Preliminary abundance and harvesting data for *Chamaedorea* (xaté) species in the Chiquibul Forest Reserve" by Nancy Garwood and others was an additional report prepared for a meeting with the xaté Technical Committee on 1 April 2004 (Appendix 6).

Two MSc theses (Imperial College/NHM) were submitted for work completed in September 2003 in collaboration with DI xaté project. See Table 2 for details.

Two popular articles by Nancy Garwood were published in 2003. "Xaté palms (*Chamaedorea* spp.) in Belize: conservation and sustainable management" appeared in the Las Cuevas Newsletter (Appendix 8). "Palms - highly prized, highly endangered" appeared in "NHM"(the

magazine for NHM supporters) (Appendix 9: pdf file). The importance of the DI xaté project was highlighted in "Nature First" (the NHM's magazine for members) and in the NHM Annual Report for 2002/03, both in 2003.

Difficulties in 2003/04:

Changes within Natural History Museum: Unexpected changes in NHM policies and staffing have necessitated changes in xaté project schedules but not in major objectives for 2003/04.

First, the NHM made a policy decision to withdraw from managing the Las Cuevas Research Station (LCRS) at the end of October 2004. The NHM remains committed to supporting biodiversity research in Belize and will, in addition, maintain a base and vehicles in Belize at nearby Santa Elena for an additional year and will continue to employ the Research Station Manager (RSM) and former LC Operations Manager, Sam Bridgewater and Chapal Bol, respectively, during this period. Our withdrawal from managing LCRS, located in the Chiquibul Forest, should not negatively affect the xaté project because the majority of the survey work in the Chiquibul will be completed before the withdrawal date. Follow-up monitoring can be accomplished using available equipment and vehicles from a temporary camp, if necessary, or from LCRS if future management arrangements permit.

Second, Mr. Chris Minty, the named RSM in the proposal, stepped down from post at the end of September 2003. Dr. Sam Bridgewater, his replacement, started on 13 February 2004. As the RSM is a key person in organising the field surveys of xaté in Belize, the majority of fieldwork in Belize has been delayed into the next financial year. However, the new RSM and other NHM-funded project personnel (M. Penn, N. Garwood, and C. Bol) conducted preliminary surveys this year to test survey protocols and will complete extensive surveys in the Chiquibul in 2004/05.

Third, Ms. Sally Henderson, our palm specialist and designated molecular researcher on the xaté project, unexpectedly extended her maternity leave from six to the maximum twelve months of her entitled leave and so will not return until April 2004. This has meant that she has not been present to complete the molecular phylogeny of *Chamaedorea*, begun by Ms. Meridith Thomas in summer 2003 as a MSc research project, although it is a prerequisite for undertaking the population genetics analysis of the Belizean xaté and needs to be completed before sampling of populations begins in Belize. Therefore, we reallocated salary funds designated for a Field Supervisor in Belize to a molecular technician to complete this essential work. We are fortunate that Ms. Thomas accepted a short-term contract to complete this phase of the project. Tasks that would have been conducted by the Field Supervisor will now be done by our new RSM, Dr. Bridgewater, who was selected because he is an accomplished botanist, conservationist and educator. About 50% of Dr. Bridgewater's time will be devoted the Darwin xaté project (a substantial increase over the expected 10% contribution of the former RSM). This percentage should be more than sufficient to cover for the lack of a Field Supervisor (6 months duration) over the course of the project. We will not be increasing the percentage time dedicated to the project of the RSM on Table A (Staff time) of the financial statement, however, as we believe it would be inappropriate to request additional overhead costs for this contribution.

Changes within Belize Forest Department: Although no official announcements have been made, it appears that there will be a change in the leadership in the BDF in the near future. The current Chief Forest Officer (CFO), Oswaldo Sabido, is also our host country counterpart on the project from BDF. Not surprisingly, he has been hesitant to make many firm commitments with respect to the project. We understand that his replacement is most likely to be Osmany Salas. As Mr. Salas is a representative on the Xaté Technical Committee, and attended our workshop at Las Cuevas on 1 April 2004, we have had a good opportunity to brief him on the Darwin xaté project. If and when the change in CFO is announced, we will formally note the change in counterpart at BDF.

Changes with Belize. The economic pressure for developing a local xaté industry is growing much more rapidly and intensely than anticipated even a year ago. The Belize Forest Department is being pushed to grant xaté harvesting concessions in many forest reserves in the near future. Yet data on xaté distributions in Belize's forests remain scant and often anecdotal. While surveying xaté in the Chiquibul Forest is one of our top priorities early in the new FY, we are concerned that Forestry may be pressured to grant harvesting concessions, the sustainability of which cannot be assured, before even a rapid inventory of resources can be carried out. We have prepared several

preliminary reports for Forestry (Appendices 6 and 7), met with the government Xaté Technical Committee, and continue to discuss the situation with Forestry.

There is also interest in developing large-scale plantations of xaté within Belize under a forest canopy, as is being promoted by the NGO Mundo Justo in Guatemala (see below). Although such a model may be economically more viable than wild harvesting and may relieve the pressure of wild populations, there are questions as to how much such large-scale capital intensive enterprises will ultimately benefit local communities, unless they are managed and controlled by them. Ideally any cultivation of xaté should empower small-scale local growers so that the benefits of a sustainable xaté industry are directed toward the economically disadvantaged. The large-scale plantations being proposed are not organic. Local small-scale farmers may increase the 'added-value' of their crops by adopting organic methods, a strategy promoted by the BBG. Farmers at San Antonio village (with whom we and BBG are working through the Itzama Society and the Elijo Panti National Park) are preparing to establish organic cocoa plantations and are exploring the possibility of underplanting these with xaté, which may provide a useful source of extra income. There is a danger that a monopoly may develop with regard to exportation of cut leaves from Belize which would place the smaller organic crop at a serious disadvantage. BBG also report that the intensifying commercial interest in xaté in Belize is souring relationships among local organisations which have previously exchanged information freely (Appendix 1, p. 1).

Ongoing discussions with both BFD and BBG may lead to modest changes in the DI project so it can better address the rapidly changing xaté scene in Belize.

Project Design Enhancements:

There have been no major enhancements in 2003/04.

Timetable 2004/05:

The 2004/05 portion of the Project Implementation Timetable (Annex 4) below indicates probable changes (in red) from the revised timetable submitted in February 2004. Note that some dates have been brought forward, whereas others have been delayed. Discussions on-going with BFD and BBG may lead to further changes to Key Milestones and Project Outputs so that we can better address the intensifying xaté situation in Belize.

Original Date (Annex 4)	Revised Date (changes in red)	Key Milestones (Annex 4)
May	August	Defoliation plots resampled in Chiquibul Forest (F)
May	December	Xaté harvesting areas in Mexico visited (F)
June	September	Background report on nursery techniques for xaté prepared and disseminated (B)
August	October	Tropical botanic gardens growing <i>Chamaedorea</i> (xaté) species visited (B)
October	October	Survey plots in Chiquibul Forest established (F)
December	March 2004	Background report on sustainable xaté harvesting in Belize* prepared and disseminated [*changed from Selva Maya because tighter focus on Belize needed] (R)
December	December	Nursery techniques tested in Belize and stock grown for planting experiments (B)
December	December	Xaté distribution/abundance survey data from Chiquibul

		modelled using GIS; map prepared (L)
January	January	Potential local growers identified and market interest in eco-labelling assessed (B)
February	February	Demonstration plots at BBG established (B)
March	June-July	Permanent plots (50)* in Chiquibul Forest resampled [*changed from survey plots, which are more numerous but will not be permanently marked] (F)
March	March	Genetics of xaté palms from Chiquibul Forest analysed (L)
March	March	Initial consultations with local farmers, communities and businesses completed (B)
March	March	Training for 2004/05 completed (F, B, L)

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

Not applicable.

6. Partnerships

Established Partners:

Collaboration with the Belize Botanic Gardens (BBG) has been excellent. They are working closely with two of our other partners: Teakettle Enterprises, which is supplying horticultural advice and seeds, and San Antonia village and its organisations (e.g. Itzama Society, Elijo Panti National Park), which are interested in cultivating xaté. They are initiating collaborations with other organisations within Belize to promote the sustainable cultivation of xaté.

We have had many discussions with Marcello Windsor, the Wildlife Officer of the Belize Forest Department. He attended our project planning workshop in May 2003 and also sits on the Xaté Technical Committee. We expect communication to improve further once a new head of Forestry is in place.

Contact with the University of Belize has not been extensive, as we lacked a Research Station Manager in Belize for about 6 months. The possibilities for collaboration will be explored by the new RSM in 2004/05.

The two MSc students (Imperial College/NHM) who completed their thesis projects on palms in August 2003 are both continuing research on *Chamaedorea* and/or xaté. As noted above, we hired M. Thomas to complete the phylogeny of *Chamaedorea*; we will submit the resulting manuscript to a high-impact journal in 2004/05. Nick Wicks has agreed to return to Las Cuevas to resample the 50 permanent plots. He will then go to work with Flora and Fauna International (FFI) and their local partners the Ya'axche' Conservation Trust (YCT) in Toledo in the south of Belize. Both FFI and YCI are attempting to develop xaté as a community-based biodiversity-friendly alternative crop, which we would integrate within existing outreach programmes with local communities in Toledo. This currently consists of organic cacao, intercropped with various fruit and timber trees, and other vegetables. Nick Wicks will explore the potential to develop collaborative links between the Darwin Initiative project and these local partners

PhD student Holly Porter-Morgan (New York Botanic Gardens) remains a keen collaborator on the project. Her knowledge of the literature has been extremely helpful in directing our focus, but also in preparing project reports. She is lead author on our report to BFD on the possibility of sustainable harvesting of xaté (Appendix 6). She will accompany Dr. Bridgewater on his visit to the Alianza para un Mundo Justo (see below) in April 2004, and help will draft a report on that project.

New Collaborations:

Dr Sam Bridgewater, our new Research Station Manager, has brought closer collaboration with the Royal Botanic Garden, Edinburgh (where he worked for many years). Philippa Pickles, a student on the Edinburgh University Natural Resources Management MSc course will come to Belize in 2004/05 to investigate the potential for eco-labeling xaté.

The biggest new player in the local xaté industry is the Alianza para un Mundo Justo (Alliance for a Just World), a partner of the UK NGO Just World, with headquarters in Flores, Guatemala. They have a large British grant to develop xaté plantations in Guatemala as part of a larger effort to defuse border tensions between Guatemala and Belize, and they intend to expand into Belize. They seek to provide sustainable livelihoods for impoverished local people and to provide alternative employment to those now working as xateros. BBG have exchanged visits with Mundo Justo and received valuable advice on cultivation techniques. However, their methods to achieve sustainable livelihoods do not appear to address some of the major questions concerning sustainable resource use and conservation, such as the genetic issues (raised above in Achievements in 2003/04: Genetic Analyses) and the empowerment of local people (raised above in Difficulties in 2003/04: changes within Belize). We will be making a site visit to Mundo Justo in April.

7. Impact and Sustainability

The profile of the project is very high in Belize, assisted by our long-term partnerships with BFD and BBG. The BFD and the Xaté Technical Committee are very keen to receive information, as they are being pressured to make decisions on concessions and import requests as soon as possible. We are much respected as an impartial source of information. Unfortunately, we are still in the process of collecting the required data and hesitate to make too many recommendations until the necessary data is collected and analysed. This is a potential source of increased tension as the project proceeds.

8. Post-Project Follow-up Activities

Not applicable.

9. Outputs, Outcomes and Dissemination

Most outputs in the schedule revised 17/2/04 were met in 2003/04. In Table 1 we comment on minor differences, outputs that were new to the revised schedule, and additional outputs that were achieved.

Dissemination activities have been directed at several audiences. The Government of Belize, especially the Xaté Technical Committee and the Belize Forest Department, have been recipients of reports, presentations and workshop discussions. An article published in the *Las Cuevas Newsletter* (Appendix 9) reached a selected audience as the newsletter is widely distributed in Belize among NGOs interested in conservation and biodiversity. An article published in the newspaper *Belize Times* (Appendix 1) reached a wide local audience. Groups touring the BBG received information on sustainable xaté cultivation.

Table 1. Project Outputs (According to Standard Output Measures)

Code No.	Quantity	Description	Comments
14A	1	Planning workshop, 20 May 2003	Completed on time

14A	1	Presentation to members of Belize government, 12 June 2003	Completed on time; new to revised outputs
14A	1	Local xaté workshop at BBG, October 16, 2003	Completed on time; new to revised outputs
14A	1	Local xaté workshop at LCRS, 1 April 2004, with Belize Xaté Technical Committee	Additional
14B	2	Talks given at conferences attended, April 2003 and September 2003	Brought forward from TBA
21	1	Education centre established and equipped at BBG	Mostly completed on time (refurbishment of rooms on-going); new to revised outputs
8	5 weeks	NHM (London) staff in Belize on project	Completed on time, but less than planned 8 weeks
8	4 weeks	LCRS staff in Belize on project	Completed on time
2	2	UK MSc students receive qualification for thesis on project topic	Additional
15B	1	Article published in Belize press	Additional
15C	4	Popular articles published in NHM magazines, annual reports	Additional

Table 2: Publications

Type *	Detail (title, author, year)	Appendix of this report	Publishers (name, city)	Available from (e.g. contact address, website)	Cost £
* report	"Sustainable harvesting of Fishtail Palms (<i>Chamaedorea ernesti-augustii</i>) in Belize: Fact or Fiction?", H. Porter-Morgan, S. Bridgwaer, N. Bol (2004)	6	-	lascuevas@btl.net	0
* report	"Preliminary abundance and harvesting data for <i>Chamaedorea</i> (xaté) species in the Chiquibul Forest Reserve, N. Garwood et al. (2004)	7	-	lascuevas@btl.net	0
MSc	"Niche diversification in a	-	-	Imperial College	-

Thesis	neotropical palm community", N. F. M. Wicks (2003), 41 pp.			Library, London, UK	
MSc Thesis	"A molecular phylogeny of the palm genus <i>Chamaedorea</i> , using the nuclear genes PRK and RPB2" M. M. Thomas (2003), 56 pp.	-	-	Imperial College Library, London, UK	-
* popular article	"Palms - highly prized, highly endangered", Nancy Garwood, <i>NHM Magazine</i> , Issue 2 (Summer 2003), pp 28-30	9	Natural History Museum, London, UK	NHM	-
* popular article	Xaté palms (<i>Chamaedorea</i> spp.) in Belize: conservation and sustainable management, Nancy Garwood, <i>Las Cuevas Newsletter</i> , Issue 11, August 2003, p. 12	8	Natural History Museum, London, UK	Department of Botany, Natural History Museum, Cromwell Road, SW7 5BD	-
*newspaper article	"Xaté controversy heats up", Judy duPlooy, <i>The Belize Times</i> , 2 November 2003	1	-	-	-

* Included with this report

10. Project Expenditure

Table 3: Project expenditure during the reporting period (Defra Financial Year 01 April to 31 March)

Item	Budget (Revised budget submitted to DI, 3 April 2003)	Expenditure	Balance
------	---	-------------	---------

Due to the unforeseen staff changes in the project, the expenditure was slow at the beginning as it was uncertain which direction we would be heading in. (Changes in staff within NHM and in hiring for the project are discussed in Section 4. Progress: Difficulties in 2003/04 - Changes within Natural History Museum). Towards the end of the financial year we were aware that much of the budget remained unspent and carry-over of funds into the next FY would not be approved by DI. Therefore, we decided that money should be outlaid on certain purchases in this financial year in preparation for the completion of future milestones. Thus, more money was spent than previously estimated in certain cost centres but this expenditure will be compensated for in the next financial year. Most of the Travel and Subsistence budget was unspent and these funds were mainly diverted into Other expenditure.

11. Monitoring, Evaluation and Lessons

Monitoring this year has primarily been through discussions with host country partners. BFD continues to ask us for scientific advice on xaté and has requested more interim reports. Project management is assessed through the standard NHM line-management system.

12. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum)

■ 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 2003/2004

Project summary	Measurable Indicators	Progress and Achievements April 2003-Mar 2004	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 poor in resources to achieve</p> <ul style="list-style-type: none"> • 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>Purpose To develop capacity in Belize for conserving and sustainably managing xaté palms (<i>Chamaedorea</i> spp.) and improving economic benefits to Belizeans from xaté collection</p>	<p>Belize capacity developed and used to ensure xaté populations and harvests do not decline and economic benefits from xaté increase</p>	<p>Preliminary recommendations for xaté harvesting intensity received with thanks from BFD; indications given that many elements will be incorporated into harvesting concession licenses</p>	<p>Increase dialog with BFD (which grants forest concessions and permission to import seed & nursery plants) to assess priorities following rapid increase in Belizean interest in xaté harvesting & cultivation but lack of data on impacts; try to mitigate pressure from economic interests to proceed before sustainability assessed</p>
<p>Outputs</p>			
<p>1) <u>Management plan</u> for sustainable xaté harvest</p>	<p>1) Plan completed and given to BFD</p>	<p>1) Collection of data to underpin MP commenced; preliminary reports given to BFD</p>	<p><u>Key Actions for 2004/05</u> 1) Collect required data, analyse data and issue interim reports delivered to BFD when necessary</p>
<p>2) <u>Field Guide</u> to Belizean Palms published</p>	<p>2) Guide tested in field; peer-reviewed; 500 copies distributed</p>	<p>2) Collection of information and photographs of Belizean palms initiated</p>	<p>2) Complete text and edit photographs</p>
<p>3) <u>Xaté information base</u> increased (permanent, experimental & demonstration plots; databases)</p>	<p>3) Forest plots surveyed, effects of defoliation quantified, harvestable yields calculated; cultivation demonstration plots established & compared</p>	<p>3) Permanent growth plots established, defoliation plots established, and survey plot protocols developed and tested in Chiquibul forest; demonstration seed beds and forest cultivation plots established at BBG</p>	<p>3) Resample growth plots and defoliation plots in Chiquibul forest; complete survey of xaté distribution in Chiquibul forest</p>

<p>4) <u>Publications/reports/manuals</u>: Xaté abundance, diversity, distribution in Belize determined; feasibility of xaté eco-labelling explored; nursery protocols developed</p>	<p>4) GIS analysis completed; maps produced; regional yields calculated; buyers, end-users and local suppliers interviewed; genetic analysis completed; nursery techniques described</p>	<p>4) Collection of data commenced; MSc student selected to study xaté eco-labelling; phylogeny of <i>Chamaedorea</i> completed, samples collected for genetic analyses; seed bed and nursery techniques tested</p>	<p>4) Eco-labelling study completed and disseminated; phylogeny paper published; genetic analyses completed and analysed; nursery techniques disseminated</p>
<p>5) <u>Training & education</u>: BFB, BBG, students & local people trained; groups educated about xaté</p>	<p>5) 30 individuals trained (horticulture, resource assessment, monitoring or GIS); group visits to BBG increase</p>	<p>5) First group of local people trained to survey xaté; BBG staff visit xaté plantation in Guatemala to receive horticultural training; Education Officer position advertised and interviews held; Education Centre established at BBG</p>	<p>5) Increase number of local people trained in resource assessment and monitoring, horticultural and GIS; develop education materials and expand education program</p>

Note: Please do NOT expand rows to include activities since their completion and outcomes should be reported under the column on progress and achievements at output and purpose levels.

Annex 2: LOGICAL FRAMEWORK (revised 17/2/04)

Please enter the details of your project onto the matrix using the note at Annex B of the Guidance Note. This should not have substantially changed from the Logical Framework submitted with your Stage 1 application

Project summary	Measurable indicators	Means of verification	Important assumptions
<p>Goal:</p> <ul style="list-style-type: none"> To draw on expertise relevant to biodiversity from within the United Kingdom 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>Purpose</p> <p>To develop capacity in Belize for conserving and sustainably managing xaté palms (<i>Chamaedorea</i> spp.) and improving economic benefits to Belizeans from xaté collection</p>	<p>Belize capacity developed and used to ensure xaté populations and harvests do not decline and economic benefits from xaté increase</p>	<p>Licensing agreements incorporate management plan recommendations; Surveys of monitoring plots, BFD records of Commercial harvest; Reports of GoB, IUCN, & CITES</p>	<p>BFD or NGOs continue to monitor plots and make data public</p> <p>Records of harvests made public</p>
<p>Outputs</p> <p>1) <u>Management plan</u> for sustainable xaté harvest</p> <p>2) <u>Field Guide</u> to Belizean Palms published</p> <p>3) <u>Xaté information base</u> increased (permanent, experimental & demonstration plots; databases)</p> <p>4) <u>Publications/reports/manuals</u>: xaté abundance, diversity, distribution in Belize determined; feasibility of xaté eco-labelling explored; nursery protocols developed</p> <p>5) <u>Training & education</u>: BFB, BBG, students & local people trained; group educated about xaté</p>	<p>1) Plan completed and given to BFD</p> <p>2) Guide tested in field; peer-reviewed; 500 copies distributed</p> <p>3) Forest plots surveyed, effects of defoliation quantified, harvestable yields calculated; cultivation demonstration plots established & compared</p> <p>4) GIS analysis completed; maps produced; regional yields calculated; buyers, end-users & local suppliers interviewed; genetic analysis completed; nursery techniques described</p> <p>5) 30 individuals trained (horticulture, resource assessment, monitoring or GIS); group visits to BBG increase</p>	<p>1) Acknowledgement by BFD</p> <p>2) Guide published & reviewed</p> <p>3) Databases, maps, and protocols distributed in Belize; demonstration plots reviewed</p> <p>4) Background Reports, Final Reports and publications submitted & disseminated 1-4 copies sent to DI</p> <p>5) Trained individuals obtain jobs; numbers of visiting groups</p>	<p>1) Technically possible; BFD adopt plan; outputs 2-4 successful & incorporated into Plan; income to BFD sufficient to carry out Plan</p> <p>2) Guide used for monitoring & education</p> <p>3) BFD & BBG continue to monitor plots; sufficient local seed available for BBG work</p> <p>4) Sampling sufficient to scale up to national levels; interviews successful</p> <p>5) Students & local people interested in participating and continue to work with xaté</p>
<p>Activities</p> <p>Field research & training</p> <p>Belize Botanic Gardens research & training</p> <p>Lab research & training</p> <p>Reports, plans & guides</p> <p>Workshops:</p>	<p>Activity Milestones (Summary of Project Implementation Timetable)</p> <p>Yr 1-2: visit xaté harvesting areas in Guatemala & Mexico; establish defoliation & survey plots in Chiquibul Forest; Yr 2 & 3: resample plots; Yr 2: establish survey plots elsewhere in Belize; Yr 1-3: training in resource assessment & monitoring</p> <p>Yr 1-2: visit tropical botanic gardens growing <i>Chamaedorea</i> spp. (including xaté spp.); test nursery techniques in Belize; grow stock for planting experiments; Yr 2: develop demonstration plots at BBG, identify local growers, study market interest in eco-labelling; Yr 3: enhance demonstration plots; Yr 1-3: training in horticultural techniques</p> <p>Yr 2: GIS modelling of distribution/abundance of Chiquibul survey data; Yr 3: revised GIS modelling, including resampling from defoliation & survey plots; GIS modelling throughout Belize; Yr 2-3: training in GIS; Yr 2-3: genetic analysis of xaté palms</p> <p>Yr 2: prepare Belize palm guide and test in field; prepare and disseminate background reports on (a) success of other sustainable xaté harvesting programmes in Selva Maya & (b) nursery techniques for xaté; Yr 2: publish & disseminate palm guide; Yr 3: prepare and disseminate Management Plan</p> <p>Yr 1: Project planning workshop in Belize; Yr 3: training workshops for BFD staff in xaté monitoring, workshops in xaté cultivation</p>		

Annex 3: Revised Project Outputs (17 February 2004)

Set out the project's measurable outputs using the attached list of output measures.

Project Outputs		
Year/ Month (starting 7 April)	Standard Output Number (see standard output list)	Description (include numbers of people involved, publications produced, days/weeks, etc.)
2003/2004		
May	14A	Planning workshop
June	14A	Presentation to Belize government officials (1)
September	14B	Conferences attended and talks given: 2 (formerly TBA)
October	14A	Local xaté workshop at BBG
March	21	Education centre established & equipped at BBG
March	8	NHM staff in Belize on project (2 [NG, MP], total 6 weeks; 1 [SB] – supervision February-April)
2004/2005		
July	3 or 6A/B	BBG staff receives BG management training at RBG Kew (1; 2 months)
August	4A; 4B	Training in xaté horticulture: undergraduate agricultural student (1; 3 months)
August	4A; 4B	Training in GIS data collection and analysis: 1 undergraduate (8 wks, Belize; 4 wks, UK)
October	6B	Training in xaté resource assessment: BFD staff (8 person-months + 16 person-months)
October	8	NHM staff in Belize on project (2 [SB, NB], total 24 weeks full-time, supervision throughout year)
November	4A; 4B	Training in xaté horticulture: undergraduate agricultural student (1; 3 months)
March	6B	Training in xaté resource assessment: BFD staff (8 person-months)
March	8	NHM staff in Belize on project (2 [NG, MP], total 10 weeks)
2005/2006		
June	7	Training materials, 2 types: xaté cultivation techniques manual (1), xaté sustainable-use poster (1)
June	4A; 4B	Training in xaté horticulture: 1 undergraduate agricultural student (3 months)
July	6B	Training in xaté resource assessment: BFD staff (16 person-months)

July	6A; 6B	Training workshop for teachers (15; 3 days)
July	8	NHM staff in Belize on project (2 [SB, NB], total 10 weeks full-time, supervision throughout year)
August	7	Training materials, 1 type xaté monitoring and assessment guide (1)
August	4A; 4B	Training in GIS data collection and analysis: 1 undergraduate (8 wks, Belize; 4 wks, UK)
November	6A; 4B	Training workshop: local growers in xaté cultivation (15; 3 days)
March	6B	Training in xaté resource assessment: BFD staff (8 person-months)
March	8	NHM staff in Belize on project (2 [NG, MP], total 10 weeks)
2006/2007		
May	10	Field Guide to Belizean Palms
June	6A; 6B	Training workshop: Forest Dept. staff in xaté monitoring (15; 3 days)
July	8	NHM staff in Belize on project (2 [CM, NB], total 10 weeks full-time, supervision throughout year)
August	9	Permanent xaté cultivation demonstration plots at Botanic Gardens (?number)
March	12A	Geo-referenced database, and GIS maps, given to Belize Information Centre and BFD (1)
March	22	Network of permanent xaté monitoring plots handed to BFD (1 network)
March	5	Education Officer completes 3-year period, receiving training and experience in production of educational materials for and teaching schools, teachers, farmers, and local community groups and NGOs
March	9	Management Plan for sustainable xaté harvesting in Chiquibul Forest, including (a) distribution and abundance of xaté; (b) harvesting potential and (c) feasibility analysis of eco-labelling scheme and supplemental local cultivation of xaté (1)
TBA		
TBA	14B	Conferences attended and talks or posters presented: 1 remaining
TBA	11B	Papers submitted to peer-reviewed journals: 2

Annex 4: Revised Project Implementation timetable (17 Feb 2004)

Provide a project implementation timetable that shows the key milestones in project activities.

Project implementation timetable	
Date	Key Milestones
2003/2004	Activity areas: F – Field research and training in Belize; B – Belize Botanic Gardens research and training; L – Laboratory research and training at NHM, London; R – Reports, plans and guides; W – workshops
May	Planning workshop in Belize completed (W)
May	Defoliation plots in Chiquibul Forest established (F)
September	Tropical botanic garden growing <i>Chamaedorea</i> (xaté) species visited (B)
March	Seeds collected in Belize and germination trials established (B)
March	Xaté harvesting areas in Guatemala visited (F)
2004/2005	
May	Defoliation plots resampled in Chiquibul Forest (F)
May	Xaté harvesting areas in Mexico visited (F)
June	Background report on nursery techniques for xaté prepared and disseminated (B)
August	Tropical botanic gardens growing <i>Chamaedorea</i> (xaté) species visited (B)
October	Survey plots in Chiquibul Forest established (F)
December	Background report on sustainable xaté harvesting in Selva Maya prepared and disseminated (R)
December	Nursery techniques tested in Belize and stock grown for planting experiments (B)
December	Xaté distribution/abundance survey data from Chiquibul modelled using GIS; map prepared (L)
January	Potential local growers identified and market interest in eco-labelling assessed (B)
February	Demonstration plots at BBG established (B)
March	Survey plots in Chiquibul Forest resampled (F)
March	Genetics of xaté palms from Chiquibul Forest analysed (L)
March	Initial consultations with local farmers, communities and businesses completed (B)
March	Training for 2004/05 completed (F, B, L)
2005/2006	
May	Defoliation plots resampled in Chiquibul Forest (F)
May	Draft of Belize Palm Guide (L) prepared and tested in field (F)
June	Educational materials completed for schools, growers and harvesters (B)

July	Survey plots elsewhere in Belize established (F)
July	Training workshop(s) held for teachers, using xaté as model for sustainable use of non-timber forest products and presenting xaté plants to schools (W)
August	Xaté cultivation manual disseminated (R)
October	Xaté distribution/abundance survey data from other Belize sites modelled using GIS and map prepared (L)
November	Training workshop(s) in xaté cultivation and market needs held for potential local growers (W)
March	Survey plots in Chiquibul Forest resampled (F)
March	Genetic analysis of xaté palms from elsewhere in Belize completed (L)
March	Training for 2005/06 completed (F, B, L)
2006/2007	
April	Training workshop(s) for BFD staff in xaté monitoring (W)
May	Regular school education visits to BBG in place (B)
May	Belize palm guide published and disseminated (R)
August	Demonstration plots enhanced throughout year and completed (B)
October	Resampling data from Chiquibul included in GIS model, map revised, sustainable yields predicted (L)
November	Management Plan prepared and sent to Forest Department for comment (R)
March	Management Plan revised and presented to Forest Department
2007/2008	
May	Drafts of peer-reviewed papers completed
April	Final Report submitted to Darwin