Biodiversity Inventory and Monitoring for Conservation of Threatened Sumatran Forest

THIRD ANNUAL REPORT

Submitted by

The Royal Society for the Protection of Birds
The Lodge, Sandy, Bedfordshire, SG19 2DL, UK

In partnership with:

April 2010

Important note:
To be completed with reference to the Reporting Guidance Notes for Project Leaders – it is expected that this report will be about 10 pages in length, excluding annexes
Submission deadline 30 April 2010

Darwin Project Information

Project Ref Number	162/16/005
Project Title	Biodiversity inventory and monitoring for conservation of threatened Sumatran forest
Country(ies)	Indonesia
UK Contract Holder Institution	The RSPB
Host country Partner Institution(s)	Royal Botanic Gardens, Kew
Other Partner Institution(s)	Burung Indonesia
Darwin Grant Value	£259,159
Start/End dates of Project	1 December 2007 – 30 November 2010
Reporting period (1 Apr 200x to 31 Mar 200y) and annual report number (1,2,3..)	April 2009 to March 2010 Annual Report 3
Project Leader Name	Jeremy Lindsell
Project website	www.harapanrainforest.org
Author(s) and main contributors, date	David Lee Jeri Imansyah Jeremy Lindsell Ian Rowland April 2010

1. Project Background

Sundaic lowland forest is one of the most biodiverse habitats in the world yet one of the most threatened. Current pressure to convert forest to oil palm for biofuel production has resulted in the large-scale loss of lowland forest from Sumatra. Very few areas of lowland forest remain outside of protected areas and large areas of logging concessions are at risk of permanent conversion to alternative landuse.

In response to this, in 2004 the Indonesian government introduced a new management category for production forests: ecosystem restoration. Harapan Rainforest (HRF), in south-central Sumatra (Jambi and South Sumatra provinces), is the first (and so far only) area to be designated to this category. The management licence for this site has been awarded to PT Restorasi Ekosistem Hutan Indonesian (PT REKI), a company established by a consortium of the RSPB, Burung Indonesia and BirdLife International, specifically to hold the licence. The shareholding of the company is held by a not-for-profit foundation, Yayasan Konservasi Ekosistem Hutan Indonesia (Yayasan KEHI), established by the consortium to undertake the day-to-day management of HRF.

Management activities on the site started in mid-2007. Effective management of the site requires good quality biological data to inform management decisions and to monitor progress. This Darwin project is focusing on collecting good baseline data through inventory fieldwork and establishing a monitoring system for ongoing assessment. This is being delivered through the development of a research centre in the forest and the provision of training to project staff.

2. Project Partnerships

Project Partnerships

Management structure of Research and Conservation (R&C) division:

There have been some important changes and valuable additions to the research team over the reporting period. One of the Biodiversity Officers, Willy Rombang (WR), left the project in February 2010 to pursue a PhD in hornbill ecology. The lead scientist of HRF, David Lee (DL), helped develop his successful proposal and application to the post-graduate system in Germany. In 2011, WR plans to begin his field research at HRF, and this will support ongoing key research in to the role of hornbills in seed dispersal and forest restoration at HRF.

To replace WR and to support HRF's expanding R&C programme, two new Biodiversity Officers have been recently recruited: Elva Gemita (EG) started in March 2010 and is working as a mammal specialist; while Deri Ramdhani (DR) will start in May 2010 and work as a bird specialist. Elva has considerable experience in mammal conservation in Indonesia, including work in Kerinci Seblat National Park with Flora and Fauna International (FFI) and in Jambi, including the area that is now HRF, with the Zoological Society of London. She possesses a Diploma in Endangered Species Management from the Durrell Wildlife Conservation Trust. As an ornithologist, Deri has supported numerous survey expeditions and assisted in environmental impact assessments across Indonesia. He has also helped develop a local non-governmental organisation and bird groups. Both join Jeri Imansyah (MJ) as project Biodiversity Officers reporting directly to DL. They are responsible for leading on their priority project areas, while assisting in other aspects of the research programme, including organising field surveys, training field staff in survey techniques and data recording and entry, and managing biodiversity data.

Of the six forest patrol staff initially recruited last year to work in the research section, five are now employed permanently as Research Assistants (RAs). They have all received full training in the biodiversity survey techniques employed, data recording and entry. With some restructuring of forest patrol staff, the R&C division hopes to recruit one more RA to support the expanding monitoring and research activities.

Two key staff previously under DL's management, Paul Hultera, the GIS Officer, and Yafid Gunawan (YG), the IT Officer, some of whose time was allocated to managing the herbarium, now work in a new project division, Data Management, and are managed by the Executive Head of HRF, Mr Yusup Cahyadin. The herbarium is still maintained by YG, while it is proposed to also use key forestry project staff to support herbarium activities and link these to restoration activities, such as phenology studies.

Harapan Rainforest research staff have monthly management meetings to plan the work activities for the coming month – project staff work on a three weeks on, one week off schedule. The outcomes of these meetings are discussed with the RAs, who also have the opportunity to provide input to the planning process. All research staff meet weekly to review the progress of their current work activities, and to identify and address any problems that may have arisen. The management team of HRF meet every two weeks to help integrate the activities of different work divisions and to report on progress made.

Most communications between project partners is via email. Quarterly conference calls are held between the Project Leader, Jeremy Lindsell (JL), and the lead scientist at HRF, DL; weekly email progress reports are also provided. JL visited the site for a one week trip in August 2009. There are regular visits to HRF by key RSPB staff during which time research matters are also discussed.

Collaborations/partnerships:

The review of the project's second annual report (for April 2009) commented that, although the project was forging links with a wide range of partners, too many partnerships might become a management distraction and weaken the focus of the project team. In addition, monitoring the conversion ratio between enquiries from researchers and field work might be a better measure of collaborative success. Over the last year the project has endeavoured to address these issues by focusing on developing fewer but stronger active collaborations. This approach has resulted in a higher proportion of enquiring researchers visiting and collaborating with HRF and produced more valuable outputs.

Collaboration with Bogor Herbarium, Indonesian Institute of Sciences (Lembaga Ilmu Pengetahuan Indonesia - LIPI), which holds duplicates of HRF botanical specimens, continues successfully. In October 2009, botanical surveys were conducted at HRF by LIPI and the Indonesia Office of Environment (Kantor Lingkungan Hidup - KLH) alongside HRF field staff. This work supported two projects led by Dr Teguh Triono (Head of the Taxonomy and Research Group, LIPI): the International Tropical Timber Organization (ITTO)-CITES project on ensuring international trade in CITES-listed timber species, in this case *Gonystylus* spp., is consistent with their sustainable management and

conservation; and a tree diversity comparative study across different land cover types in lowland Indonesia. For the former, a rapid assessment of the presence of *Gonystylus* species was made and supported by information already gathered by HRF staff in other project locations. For the latter project, two permanent plots were set up to assess and monitor tree diversity in forest adjacent to oil palm. Key HRF staff accompanied the LIPI-KLH botanists and were introduced to new habitat survey techniques and given further opportunity to develop their botanical identification skills. Harapan Rainforest is waiting to receive reports on the findings of both these projects later this year. Dr Triono also supported a successful funding application to the International Association for Bear Research & Management (IBA).

The Royal Botanic Gardens, Kew, provides specimen identification updates and ongoing guidance in plant collecting and herbarium techniques. It is envisaged that, with the expansion of forest restoration activities at HRF, herbarium specimens will be collected with greater regularity and sent to Kew for identification. Kew are currently providing input to the development of a detailed vegetation mapping approach that will help identify areas requiring particular restoration prescriptions (a stated result of HRF's overall goal).

The Forest Restoration Research Unit (FORRU), Chiang Mai, Thailand, continues to provide input to restoration activities at HRF and has supported the successful sun bear funding proposals.

Mr Uhaedi Sutisna of the Forestry Research and Development Agency (FORDA, Bogor) visited HRF for three weeks in March 2009 to assist in tree species identification, provide introductory training to forestry staff and initiate forest plots surveys with HRF's forestry division. Discussions are underway to try and secure his involvement with the on-site herbarium in the future.

Collaboration with the University of Jambi (UNJA) is important in building project research capability and supporting local research, being the nearest university to the project. In November 2009, DL met with Dr Bambang Hariyadi (Faculty of Biology, UNJA) to discuss potential undergraduate and postgraduate projects. The following month ten UNJA students visited HRF and received presentations on biodiversity surveys. In February 2010, seven more undergraduates participated in a five-day training course run at HRF by project research staff. The students received presentations on forest conservation and restoration, surveying habitat, gibbons and other mammals using transects and camera traps, and certificates of participation (Annex 3). Each presentation was supported by practical activities supervised by HRF RAs previously trained under the Darwin project. DL has since worked with Dr Hariyadi to develop potential undergraduate projects for these students.

Following further discussions with Drs Yeni A. Mulyani and Mirza Dikari Kusrini, Department of Forest Resources, Conservation & Ecotourism, Bogor Agricultural University (Institut Pertanian Bogor - IPB) in October 2009, the first IPB undergraduate students visited HRF in January 2010 to carry out their research projects. The student projects included a study of home range size and spatial use by Agile gibbons (*Hylobates agilis*), and the potential for hornbills to be used as a feature of special interest for developing ecotourism (Annex 4). A third project supervised by HRF's Community Development division looked at local community awareness of forest restoration. The planned involvement of IPB in surveys of amphibian and reptile species at HRF was unfortunately cancelled because IPB were requesting more money than was available for this work. Jeri Imansyah, one of the project's Biodiversity Officer, is currently looking at alternative options.

Collaborative work with Andalas University (UnAnd), Padang, has been refined to provide greater focus of shared activities. Mr Nasri Janra, a lecturer of UnAnd, again accompanied Ms Fangyuan Hua, a post-graduate candidate of the University of Florida, to HRF to assist in her research on understorey bird populations in mixed forest habitats. A Memorandum of Agreement (MoA) between HRF and UnAnd has been drafted to include the opportunity for staff and students to conduct research at HRF.

There is regular communication with the Indonesian Nature Conservation Agency (Balai Konservasi Sumber Daya Alam – BKSDA, Jambi) on shared conservation issues. Two presentations on gibbon survey techniques (August, October 2009) were given to BKSDA in Jambi to help build their capacity to conduct appropriate surveys of threatened wildlife.

Dr Mirza (IPB), Dr Noryati Ahmad (National University of Malaysia, Selangor), Amir Hamidy (Zoology Division, LIPI) and Wempy (BKSDA-Jambi) have all provided assistance in identifying photos of herptiles taken at HRF.

Further collaborative activities between HRF and Wildlife Conservation Society – Indonesia Program (WCS-IP) planned for autumn 2009 have been delayed due to asynchronous and heavy work schedules, and a lack of WCS-IP field staff available to support training activities at HRF. Both organisations are hopeful that joint elephant and tiger surveys can be carried out in and adjacent to HRF this summer. As part of WCS-IP's island-wide surveys of elephants, the two parties have discussed the potential for WCS-IP staff to train HRF staff and conduct some surveys within HRF, with trained project staff continuing the surveys on an annual basis.

The research division is developing its support of Community Development work in HRF. Since January 2010, the research division has worked to develop a flow of conservation information between the local community development partner, Indonesian Conservation Community - WARSI (Komunitas Konservasi Indonesia KKI-WARSI) and HRF. This has improved WARSI's current conservation understanding, helped support some of their awareness raising work with local communities, particularly with hornbill conservation, and given a better understanding of local community use of the forest.

Dr Tony Whitten, Senior Biodiversity Specialist for the East Asia and Pacific Region at the World Bank, visited in August 2009. This was part of a fact-finding mission for work focusing on conserving globally significant biodiversity through enhancing the sustainability of production forest by developing alternative non-timber income sources. While at HRF he undertook a rapid survey of fish species by scoop netting some representative water bodies within the concession. The survey captured around 40 species of fish. The project is waiting for the final species list, which will provide a baseline for fish diversity within HRF.

As a sabbatical project, an RSPB staff member (Martin Davies) embarked in 2009 upon a literature survey to draw up a provisional checklist of butterflies for Sumatra and to identify which of these are likely to be present in HRF. From the butterfly families studied so far, this work has identified some 311 species likely to occur at HRF. By analogy with neighbouring countries' fauna, it is estimated that this is probably represents around 50% of the likely total. The provisional list should be completed later this year. Photographs of butterflies encountered in the forest by various staff are being collated and sent to Martin Davies for identification to start compiling a list of actual species records for HRF.

Other Collaborations/Key Visits

A key visit to HRF was that of Patrick Hardcastle, a forestry development specialist with LTS International, to carry out the Darwin Mid-Term Review (MTR) in August 2009. The review concentrated on the logical framework, which was strengthened by detailing activities and refining project indicators. It was concluded that one output (Output 2), relating to the development of predictive models, was unlikely to be achieved within the remaining time. The idea was moved to stand as a possible area for collaborative research. The MTR was very favourable, identifying efficient planning and delivery of the surveys in accordance with the proposed timetable, a training component that has provided much improved skills, good management, and potential impact and sustainability.

Dr Daniel Murdiyarso, Stibniati Atmadja and Yani Saloh of The Centre for International Forestry Research (CIFOR, Bogor) visited in September 2009 and discussed the possibility of undertaking a study linked to Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD) in HRF. There may be some potential to link this to a Cambridge Conservation Initiative project led by Jeremy Lindsell that will look at methods for establishing baseline emission rates for REDD projects.

Dr John (Junaidi) Payne, Executive Director of the Borneo Rhino Alliance (BORA), visited in October 2009 and provided some input to the project's mammal work.

In November 2009, Dr Hannsjörg Wöll, a consultant in natural resources management and development, visited HRF to review the project's restoration activities. This included leading a study tour to visit forest projects in Sabah, Malaysia, which DL joined. This provided a valuable opportunity to see what research activities other restoration projects are undertaking and to share ideas and discuss solutions to common problems. Projects visited included the WWF Bilit Restoration Project, MESCOT Eco-Camp Cooperative, North Segama Forest Restoration Project, InfaPro and Red Ape Encounters.

In November 2009, Dr Dewi Prawiradilaga, of the Indonesian Bird Banding Scheme, Division of Zoology, LIPI, provided input on how HRF might be able to conduct bird netting and ringing surveys.

In January 2010, 60 members of the Indonesian Scouting movement (Gerakan Pramuka) visited HRF and planted c.2,500 trees. During this time they also received simple presentations on HRF's conservation activities.

Although led by the Forestry division of HRF, the research team provided guidance to an undergraduate project in February 2010 that looked at the composition and structure of regenerating forest. The student was from Winaya Mukti University, Bandung.

Board members of the Nature Society Singapore visited in February 2010 to see how they might provide support to the project. For R&C this includes helping to source taxonomic expertise in Singapore that can support biodiversity research at HRF.

Philip Wells and Betsy Yapp of Daemeter Consulting visited HRF in February 2010. They met with key staff, including the research division, to discuss the potential for a high conservation value area in the neighbouring oil palm plantation to be linked to HRF as a wildlife corridor.

In March 2010, DL met with Siew Te Wong, CEO of the Bornean Sun Bear Conservation Centre, in Sabah to share information on approaches to sun bear research in Borneo and in Sumatra. Siew Te Wong has supported the two successful sun bear applications submitted by HRF to the IBA. Through BirdLife International, a PhD student, Judith Schleicher, has expressed an interest in using HRF as a study site to look at lowland Sundaic Galliformes. She is currently finalising her final project outline and securing funding.

3. Project progress

3.1 Progress in carrying out project activities

Note: There have been some major changes to the logframe, mainly relating to the original Output 2 (Developing predictive models). All these changes were discussed and agreed during the MTR carried out by LTS International in August 2009, and have all been approved (Annex 2). This logframe is followed below.

Output 1: Biodiversity inventory and baseline surveys completed

Indicator 1a: Species lists compiled for birds, mammals, trees, herbaceous plants, herptiles and Lepidoptera

A total of 444 botanical species have been identified in the field at HRF by staff of Bogor Herbarium (Annex 5). This is supported by 212 botanical specimens held in the on-site herbarium.

To date, 296 bird species have been recorded in HRF, with seven of these being new site records added in the reporting period (Annex 6). One additional species, Woolly-necked Stork (*Ciconia episcopus*), has been recorded from habitat adjacent to HRF only. There have been four records of the most threatened bird on the site, Storm's Stork (*Ciconia stormi*; Endangered). Other records of note include two observations of Large Green-pigeon (*Treron capellei*), both in good forest habitat, and 12 independent records of Crestless Fireback (*Lophura erythrophthalma*) from camera traps (both Vulnerable species). Four bird species have been removed from the bird list due to doubts based on local distribution and elevational information: none of these species have been recorded during the Darwin project.

Of the 55 mammal species so far recorded at HRF, 26 of these are of global conservation concern (IUCN Red List) (Annex 7): one Critically Endangered, eight Endangered, 10 Vulnerable and seven Near Threatened species. One of these, Marbled Cat (*Pardofelis marmorata*; Vulnerable), is a new site record added in the reporting period and, excitingly, also new for this area of Sumatra; it has been independently recorded on camera traps five times. There is now some doubt over the presence of another felid species, Fishing Cat (*Prionailurus viverrinus*; Endangered), in Sumatra; the project's record of this species is based on a single record prior to HRF starting. Forest patrol teams have recorded signs of Sumatran Tiger (*Panthera tigris sumatrae*) 31 times and Asian Elephant (*Elephas maximus*) 6 times (not weighted by survey effort); there have been two direct observation of tigers by the research team and one by the forest patrols.

Herptile surveys, both diurnal and nocturnal searches, conducted by the research team have resulted in 15 new species of reptiles and five new species of amphibians recorded for HRF during the reporting period. This has been supported by external assistance in identification of field photos (see 2. Collaborations/Partnerships). The site herptile list now includes 29 species of amphibians and 45 species of reptiles (Annex 8). Of these, four amphibians, Southeast Asian Toadlet (*Pelophryne signata*), Giant Asian River Frog (*Limnonectes blythii*), Malesian Frog (*L. malesianus*) and Seep Frog (*Occidozyga baluensis*) (all Near Threatened), and one reptile, Spiny Turtle (*Heosemys spinosa*; Endangered) are of conservation concern.

A provisional species list for butterflies is being compiled by Martin Davies (The RSPB) from a literature search and photographs taken on-site. Identifications are currently being confirmed. Species of note so far include Raja Raja Brooke's Birdwing (*Trogonoptera brookiana*), a Sundaland endemic of the Sumatran endemic subspecies *trogon*, and *Papilio karna* another Sundaland endemic and of the Sumatran endemic subspecies *discordia*; this may prove to be one of the first records of this species for southern Sumatra. Recent confirmation of records of Tawny Costa (*Acraea violae*) in HRF subsequently represent a new species for Sumatra, albeit one which has been expanding its range greatly in SE Asia in recent years (Martin Davies *pers. comm*. March 2010).

Standard field data sheets and supporting guidance notes for all survey types have been translated and are used by the research team (Annexes 9-13). A mammal track field guide has been produced for use by the forest teams (Annex 14). .All biodiversity survey data is entered on to computer and stored electronically. All observations of important mammal and bird species are geo-referenced and

added to a database linked to the project's GIS. This helps support management, conservation and restoration activities.

Indicator 1b: Species accumulation curves approach asymptote for non-plants

The bird species accumulation curve, based on quarterly accumulation of new species records since the project started, is now nearing asymptote for the site. It is most likely any new additions to the bird species list will be either migratory species or waterbirds.

Similarly, the accumulation of new mammal species records is reaching asymptote. However, new species additions will be added with specific surveys for small mammals, including bats, while a few as yet unrecorded species of mustelids and viverids could occur in HRF.

The species accumulation curve for herptiles is expected to approach asymptote by the end of the year with further herptile baseline surveys planned throughout 2010.

The species list for butterflies in HRF could be more than 700 species (Martin Davies *pers. comm.* March 2010), so it is certain species accumulation for this group will continue beyond the Darwin project.

Indicator 1c: Representative geographic coverage achieved

Initially, baseline surveys of key taxonomic groups using agreed protocols were carried out based on visiting (mammal) occupancy survey grid cells across HRF (Annex , 2nd Annual Report. It became apparent that regularly conducting occupancy and transect surveys for mammals was too much of an undertaking for a small research team, reducing the probable sustainability of these monitoring activities beyond the Darwin and potential redundancy in repeated mammal survey effort. Therefore, after discussion with WCS-IP, who provided initial independent agreement to the mammal monitoring methods, it was agreed that mammal surveys would focus on line transects (alongside camera traps).

A geographic sampling design with appropriate site and habitat type coverage probabilities for monitoring biodiversity was produced using Distance v.5.0, release 2 software (Thomas *et al.* 2006) and ArcView GIS v.3.3 (Annex 15). The basic sample unit for biodiversity surveys is a 2.8km line transect. Bird and habitat survey points are positioned along the transects, but the transect remains the basic sample unit of the design. Transects are spaced systematically 1km apart along a west-east axis and 1.4km apart on a north-south axis; in total, 280 transects cover the concession (c.20% of these overlap the boundary of the concession).

This design will be followed for baseline activities and to monitor changes in biodiversity linked to natural regeneration and restoration approaches within the concession. It is not constrained by the requirements of the annual work compartments (see Indicator 2a). Although the sampling design proportionally represents the land cover types of the concession, even geographic coverage is difficult in places due to access difficulties, weather conditions and safety issues.

Indicator 1d: Abundances estimated for key species and/or taxonomic groups

Abundance data collected for mammals and some bird groups/species will be analysed in the coming months and presented in end of project biodiversity survey reports. The survey methods and effort enable abundances to be estimated for key species/groups. Preliminary camera trap data are presented in Annex 16.

Two abstracts have been accepted for presentation at the July 2010 International meeting of the Association for Tropical Biology and Conservation (ATBC) - "*Tropical biodiversity: surviving the food, energy and climate crisis*". One discusses density estimates of Sun bears and tapirs from camera trap surveys and line transects and will be given by DL, the second presents abundance estimates of Agile gibbons from call count surveys (Annex 17), and will be given by MJ (one of the project's Biodiversity Officers). All three are regarding as key species for research in HRF.

Indicator 1e: Herbarium specimens and photographic records collected for some taxonomic groups

The on-site herbarium now holds 212 botanical specimens, of which 32 are awaiting identification. Duplicates of most specimens are held with Royal Botanical Gardens Kew and Bogor Herbarium, while some are currently only held with Bogor Herbarium.

Photographic collections of herptiles, butterflies and dragonflies are being added to and stored electronically on-site. On-site photographic databases ('dry' specimen collections) are considered more appropriate for these taxonomic groups as opposed to traditional specimen collections since they are a readily accessible and transferable resource with minimal curatorial costs and specialist skills, meaning greater sustainability.

Output 2: Plan for monitoring selected taxonomic groups established

Indicator 2a: Ecosystem concession ecological monitoring requirements identified for improvement on current Ministry of Forestry requirements

Harapan Rainforest ecosystem restoration concession is legally committed to fulfilling MoF monitoring requirements, which for forestry and biodiversity are based on annual work compartments within the concession; one work compartment (c.1,200-2,000ha in size) is visited each year over a 35-year

period (Annex 18). Current biodiversity monitoring in HRF fulfils the stated MoF requirement of conducting activities in the relevant annual work compartment.
There remains reasonable flexibility in how biodiversity monitoring is designed and implemented within a work compartment, providing it generates useful population and habitat association information for key species/groups and is scientifically defendable. Therefore it is hoped that, providing the MoF is willing to engage in such discussions, the monitoring plans established by this project can refine the current requirements and in the process be applied to similar concessions elsewhere in Indonesia.

Indicator 2b: Monitoring protocols conform with published best practise and agreed by independent relevant taxonomic experts

The survey and monitoring methods employed for bird, mammals and habitats were largely finalised and agreed for last year's annual report. There have, however, been some important developments since then.
From September 2009, following the procurement of a permanent research team and agreement that occupancy survey grids added extra fieldwork with reduced extra benefit to data collection (see Indicator 1c), biodiversity surveys have followed a site-wide systematic sampling design based on line transects (Annex 15). The line transect method was agreed for last year's annual report.
A three-person survey team records direct observations of mammals along transects using distance sampling (Buckland *et al.* 2001) while also searching for indirect signs along the transect route, without compromising data collection or quality. Survey tasks are split amongst the team. Surveys of indirect signs utilise the techniques taught during WCS-IP's training course in December 2008. Data from the earlier occupancy surveys will still be analysed, while it is hoped that annual site-wide occupancy surveys for tigers and elephants, based on larger survey areas, can be conducted as part of forest patrol activities.
Camera trap surveys complement the transect surveys by collecting data on cryptic, nocturnal or very rare mammals (and terrestrial birds). After mainly trialling their application and surveying to add to the mammal baseline last year, cameras are positioned following two sampling designs: single cameras at fixed points on a systematic grid of points spaced 1.8km apart across the concession (338 locations; Annex 19); and pairs of cameras positioned at locations chosen to maximise the probability of detecting tigers, as well as confirming the presence of other species in a given area. The former approach is designed to determine species densities, while the latter allows identification of individual tigers from their unique strip patterns and, over time, to monitor this population. Cameras are left out for 4-5 weeks at a time. These approaches have been agreed with WCS-IP, with additional input from Flora and Fauna International-Indonesia, Dr Novarino Wilson (IUCN Tapir Specialist Group), Dr Joe Smith (Panthera) and Siew Te Wong (Bornean Sun Bear Conservation Trust and the University of Montana).
Bird survey and monitoring protocol has been agreed with independent taxonomic expertise from Dr Stuart Marsden (Manchester Metropolitan University, UK). Birds are surveyed from points positioned 200m apart along the mammal transects. Each point is surveyed for 10 minutes using distance sampling (Buckland *et al.* 2001). Hornbills are also surveyed along mammal line transects using distance sampling, and (calling) Great Argus (*Argusianus argus*; Near Threatened) from gibbon points (below).
Under a U.S. Fish and Wildlife Services (USFWS) grant, Agile gibbons (*Hylobates agilis*; Endangered) are surveyed from clusters of three listening posts (LPs) positioned 400m apart. Calling territory-holding family groups are mapped over four days from each set of LPs. This method has been agreed with Dr Susan Cheyne (Sebangau Gibbon Behavioural Ecology Project and Wildlife Conservation Research Unit, University of Oxford) and Dr Anna Nekaris (Oxford Brookes University).
Mammals, birds, habitat and herptiles are surveyed at different locations throughout the concession, with sampling based on the site-wide survey design. At each location, the research team aims to complete: 4-6 mammal transects, 48-72 bird survey points and habitat plots, two gibbon surveys, position 11-23 camera traps (with habitat surveys at these locations), and conduct *ad hoc* herptile surveys. Guidelines for monitoring these biodiversity components have been drafted, with final adjustments being made over the next six months.

Indicator 2c: Field methods validated through established error checking procedures

There is continuous assessment of the research staff and their application and understanding of the survey methods employed. Data entry checking systems are in place.

Output 3: Appropriate reporting systems for Ecosystem Restoration Concessions developed and submitted to MoF

Indicator 3a: Reporting systems coherent with concession management and research needs

The MoF requires monthly reporting on activities within the concession. The research division provides information to the project's forestry division, which is then submitted to the MoF, fulfilling this

requirement. Information provided includes cumulative sampling effort for specific surveys. This internal reporting process works effectively; one week in advance an email is sent out requesting the completion of a standard reporting form.

Indicator 3b: Redundant information collection minimised, time and costs of reporting show significant reduction

Occupancy surveys were stopped in July 2009 (Indicators 1c, 2b). This decision removed time and logistic costs relating to these surveys without compromising on the quality and quantity of the field data collected for mammals.

Habitat surveys are completed at all camera trap locations. Until October 2009 the habitat survey method followed that introduced by WCS-IP during their training course in December 2008. However, the habitat method HRF uses to survey habitat at bird points collects both similar and additional information to the WCS-IP approach. Consequently, from November 2009 both habitat survey types have been conducted at camera trap locations. These two data sets will be compared and analysed to find correlations between the two, which can then be used to classify WCS-IP habitat data collected before November 2009 using data types from the bird habitat survey method. The WCS-IP habitat surveys will then stop, minimising redundant data collection and the time taken to collect this information.

Output 4: Training and capacity building of local staff secures monitoring programme sustainability

Indicator 4a: Majority of monitoring data collected by project-trained staff in accordance with protocols

Since August 2009, a permanent team of five Research Assistants (RAs) recruited from the project's forest patrol team have been working for the research division of HRF. They have been fully trained in mammal (transects, indirect signs, camera traps, gibbons) and habitat survey techniques. Three of these staff are being trained how to survey birds, including developing bird identification skills. All data, except bird and herptile survey data, are collected by the RAs with minimal supervision and following agreed protocols. They are also capable of providing appropriate biodiversity survey training to forest patrol staff and visiting students.

Indicator 4b: Appropriate and effective training courses being held regularly

One of the recommendations following last year's annual report was to consider continuous assessment of trained staff. This has been possible for two Biodiversity Officers and the permanent Research Assistants which, alongside their six-month evaluations, identifies considerable personal development (Annex 20). This includes identification tests of mammals from photos and signs (Annexes 21-22).

They have been fully trained in mammal and habitat survey techniques, and data recording and entry. It has not yet been possible to monitor fully the retention of skills learnt through biodiversity training in other staff since they work for other project areas and across several different teams. We are currently planning how to assess these staff and their current, sustained levels of training-based knowledge.

Harapan Rainforest is developing a systematic training programme to include all staff and activities; R&C training will feed in to this programme. Until this is finalised, biodiversity training of project staff outside the research division remains on an *ad hoc* basis. Due to the nature of other project activities and their work plan schedules, it is more cost-effective to train project staff from other project areas for shorter periods of time, e.g. two project staff for 1-2 weeks, but more frequently. The overall training investment remains the same (see Table 1). Project staff trainees join the research team in the field for biodiversity training and practical activities, which grounds the training more effectively as the trainees are immediately applying what they have learned. Over the last year, 12 forest patrol staff have joined the research team to receive such training,

A second one-month tree climbing training course, coordinated by the R&C division, was run at HRF by IndoRope, Jakarta in December 2009. Four field staff selected from the first training course in December 2008 were trained in advanced climbing techniques and safety procedures for working at heights. They now form a designated tree climbing team. During this time a further eight artificial nest boxes for hornbills were erected. This training increased project capacity to maintain and develop the hornbill nest box scheme, and to build fire and wildlife monitoring platforms.

In July 2009, and with support from the research division in securing him a scholarship, Paul Hultera, the project's GIS officer, attended a two-week Society for Conservation GIS (SCGIS) training course in the application of GIS for the conservation of species and natural resources in California. He gave presentations at the ESRI User and SCGIS Annual Conferences on the role and activities of HRF.

One of the Biodiversity Officers, Jeri Imansyah, attended a UNESCO 3-day workshop hosted by LIPI and titled "*Awareness of climate change mitigation for tropical heritage forests of Sumatra*". He has disseminated this information to other HRF staff, helping develop project understanding of forest restoration and climate change.

Seven UNJA students and 19 project staff attended two half-day training workshops in gibbon ecology and surveying. Pre and post-workshop assessments showed that immediate knowledge of gibbon conservation increased on average by 69%. The students and eight forest patrol staff also received practical training and participated in gibbon surveys during the reporting period.
Training activities had been planned to include staff from the provincial government wildlife protection office (BKSDA-Jambi), but a lack of funding support from them has meant this has not been possible.

Output 5: Research capability, infrastructure and training centre established

Indicator 5a: Key research needs identified, including specific studies on species of conservation importance and research that supports site restoration activities, e.g. seed dispersers

In January 2010, HRF secured funding for four years with an overall goal to "Contribute to a significant CO_2 net emission reduction from Indonesia's forests whilst co-benefits (biodiversity, livelihoods) are stabilized" (see 7. Sustainability). HRF's management is in the process of identifying research areas that support this project. The document produced last year that outlined the long-term research and monitoring programme that should be addressed by HRF's R&C division is under review (Annex 12, 2nd Annual Report). This already takes into consideration the requirements of the MoF under the terms of the concession, but must also consider key areas pertinent to forest restoration and conservation as outlined in the new concession project document. The current priority research document provides a framework for decision making and future planning.
In order to increase the delivery of work under this document, the project and its key research needs have been presented to local universities, inviting research proposals on these topics and developing collaborations (see Collaborations). Approximately £3,000 is available from other sources to support undergraduate studies on sun bears, hornbills and gibbons, and for graduate volunteers to join the R&C division for 3-months at a time to help with key research areas. This is advertised on the HRF website.
In the last year the following additional funds have been secured that support research on key species:
$9,900 from IBA to quantify the distribution and abundance, and assess broad habitat preferences of Malayan Sun Bear (*Helarctos malayanus*) in HRF using camera traps;
$5,100 from IBA to identify the use of different trees by sun bears, identify tree characteristics and fruit tree use, initiate germination trials of seeds found in sun bear faeces, build capacity of Indonesian students through training and research;
$33,503 from USFWS to quantify the distribution and abundance of Agile gibbons (*Hylobates agilis*) in HRF, improve existing survey methods for hylobatids, assess broad habitat preferences, and build capacity of project staff and Indonesian students through training and direct involvement; under this, one undergraduate student from IPB has already conducted a study on gibbons at HRF;
$10,000 from SeaWorld Busch Gardens to continue developing HRF's hornbill nest-box scheme (providing a key resource for these species), train project staff in tree climbing skills, engage local communities in hornbill conservation, including searching for active nests, and collect information on seed dispersal and seedling germination associated with active hornbill nests.
These projects all aim to improve our knowledge of the target species so that viable, self-sustaining populations can be protected within the site in order to improve the conservation status of each species, and to ensure their role in forest regeneration at the site is maintained. They also provide recommendations for the conservation management of these species within HRF that can be incorporated within forest restoration plans.
A proposal to radio-track Sunda pangolins (*Manis javanica*; Endangered) has been submitted to The Mohamed bin Zayed Species Conservation Fund (MBZ). This aims to assess daily activity patterns and habitat resource use, train students and increase community awareness in this heavily traded and globally threatened species.

Indicator 5b: Appropriate resources available for research activities

Darwin has funded improvements to the R&C office space to include air-conditioning and a permanent, sealed floor for the herbarium. A desktop computer been purchased, which is used by the research team and visiting students, along with a printer and laptop for one of the Biodiversity Officers. Additional storage equipment has been bought, including a drying cabinet. The attendance and associated costs for two staff to present two research papers at the ATBC conference in July 2010 have been paid for. A number of equipment items have also been bought: six two-way radios with spare batteries, one Reconyx RC55 digital camera trap, one laser rangefinder, numerous batteries, three water carriers for camping, and complete field clothing and footwear for the five research assistants.
Additional research equipment has been purchased through securing additional research funds (see Indicator 5a). These items include: two Kawasaki motorbikes, six tents, two flysheets, eight sleeping mats, seven large and seven small rucksacks, three Trangia camping stoves, 10 head-torches, four

GPS units, three laser rangefinders, seven binoculars, one laptop, 12 camera traps, four digital cameras, one nest box camera, seed trapping and seedling monitoring equipment, and two camouflage hides.
The on-site herbarium is working effectively in storing useful botanical specimens. The library and electronic journals database have been added to when necessary to support research activities. The R&C office functions as the focus of research and monitoring activities, being the office space for the Biodiversity Officers and Research Assistants, and where research meetings and classroom training of internal and external trainees takes place.

Indicator 5c: Regular collaboration with visiting researchers

Members of LIPI and KLH visited HRF to conduct botanical surveys, including surveys for *Gonystylus* spp. as part of the ITTO-CITES project on international trade in CITES-listed timber species.
Four local research students have visited HRF in the reporting period to conduct undergraduate studies on gibbons, hornbills, forest structure, and community awareness of restoration. These have come from three different Indonesian universities and form the basis for long-term collaborations between their institutions and HRF.
HRF received one visiting researcher from the University of Florida and her field team from the University of Andalas, west Sumatra. She is investigating the impacts of forest fragmentation in the landscape on the bird communities.
The project retains a strong link with the provincial wildlife protection office, BKSDA-Jambi, although lack of funds has thus far prevented them visiting HRF for research-based activities.
Interest has also been received from a number of other researchers with a range of interests, including habitat preferences of prosimians, ecology of insectivorous birds, and remote sensing edge habitats. Having recently secured additional key R&C staff to help support and guide relevant external research projects, and help integrate them with current project activities, and with the project developing its logistic support to visitors, it is envisaged that a regular flow of a small number of researchers should be supported at HRF by the end of the 2010.
Under agreed contracts, all visiting researchers are requested to provide HRF with a copy of their data and any reports produced from their work at HRF and, where possible, to work alongside project staff to help increase their skills base.

Indicator 5d: Contribution to the development of site management prescriptions and protocols

A fundamental component of the concession's 20 year management plan is background information from which the key features of the site can be identified and appropriate management objectives and activities developed. The biodiversity information collected to date has highlighted the importance of HRF both for individual species and for assemblages and this information is being incorporated. An initial draft management plan is expected to be completed in mid-2010, using biodiversity information to the end of 2009. The final version of the plan will be prepared in 2011 and will incorporate all of the information collected during the Darwin project. HRF is also in the process of developing standardised protocols to increase management efficiency. An additional input to this is the intended use of a Management Information System (MIST), which is designed to support the management needs of conservation areas.

Indicator 5e: Value of research centre and activities recognised nationally and internationally

Formal presentations have been made to a range of different organisations over the last year. Provincially, presentations have been given to provincial women's organisations ('Darma Wanita'), introducing HRF's R&C activities to a wider audience, which included a local political presence. In July 2009, research staff presented conservation and monitoring information to the provincial environment agency (Dinas Lingkungan Hidup Jambi) in support of HRF's environmental management plan. In November 2009, as part of a forest restoration and silviculture treatments workshop for local government officials held in Jambi, a presentation was given outlining conservation research activities that support restoration approaches. In April 2010, the first conservation presentation was made to one of the local communities adjacent to HRF. This introduced basic information on protected species in HRF and their local, national and global importance. In May 2009, a detailed presentation supporting HRF's wider mission was given to the MoF in Jakarta during a national expose for forest restoration.
The ambassador of the MoF 'One Man, One Tree' tree planting programme (Mission - To help mitigate for the impact of climate change and to preserve forests) visited HRF in July 2009 to make a national documentary on forest restoration and conservation. This was a collaborative media project between the Netherlands Society for the Protection of Birds (Vogelbescherming Nederland), the Dutch BirdLife International partner, and Burung Indonesia, the Indonesian project partner institution. William Rombang, then a Biodiversity Officer at HRF, provided project information to support the making of the documentary and included pieces to camera.

In mid-2009 HRF representatives attended a workshop of the Global Partnership on Forest Landscape Restoration in Bali. As a result of that, and in recognition of HRF's groundbreaking forest restoration activities, HRF has become a formal learning site for the partnership: http://www.forestlandscaperestoration.org/regional-networks/asia-and-pacific/harapan_rainforest/
Several local journalists have visited HRF throughout the year, including from the national paper *The Jakarta Post*.
The national radio station, SmartFM, interviewed Ian Rowland, The RSPB'S Tropical Forest Conservation Manager, about HRF. This material was then sent out to provincial radio stations.
The HRF website (www.harapanrainforest.org) has regular blog content added while The RSPB adds project-related webcasts to their website.

3.2 Progress towards Project Outputs

Output 1: Biodiversity inventory and baseline surveys completed
During the reporting period, the following surveys have been completed (Annex 23): 32 single camera trap locations (for density estimation) and 38 selected locations using pairs of cameras; 283 x 0.20 ha habitat plots at bird points, and 43 x 0.20 ha habitat plots at camera trap locations (see also Indicator 3b); 26 mammal transects covering 66 km; 283 bird survey points; eleven gibbon surveys; eight herptile diurnal and nocturnal searches; (and3 x 3.24 km^2 occupancy gird cells (57.9km of trails)). These surveys have added 20 new herptile species, seven new bird records and one new mammal species to the site inventory.
In addition, the forestry division of HRF (trained by the research team) has collected tree inventory and some habitat structure data from 374 x 0.25 ha survey plots across the southern half of the concession in order to fulfil requirements specified by the MoF. A similar number of plots will be required in the north of the site. Although the design and methods of this assessment were determined externally and had, by definition, to be implemented rapidly, it nonetheless provides an extremely useful dataset on tree species diversity and distributions, approximate stocking levels, carbon density, regeneration potential, levels of human impacts and ground-truthing data for remote sensing interpretation. Although tree identification expertise is required by the project to complete full tree inventories within any habitat plots, and it is hoped this can continue to be provided by Bogor Herbarium, currently the only species information required by the MoF is for the main timber tree species. These data are being analysed by the forestry team with some guidance from the research division.
As part of a forestry consultancy in December 2009, Dr. Hannsjörg Wöll, a consultant in natural resources management and development, organised the purchase of a recent high resolution Spot image of HRF and a forest cover analysis, which was undertaken by a remote sensing specialist (M. Schweter, 2009). This provides a more detailed land cover classification for the concession, enabling greater accuracy in relating biodiversity field data to land cover type. The new classification does not affect the site-wide systematic sampling design.
The indicators for this output remain appropriate and realistic and the assumptions continue to be upheld. The baseline survey is the key output and the one least likely to fail. Some taxonomic groups proposed may only have a partial survey completed, but it is fully expected that collaborations with other researchers will result in coverage of groups not listed; for example, a preliminary fish survey has already been completed. Work on this is progressing well.
Output 2: Plan for monitoring selected taxonomic groups established
Continued progress has been made into reviewing appropriate methods for monitoring mammals and birds, having drawn on the experience of the project leader in West Africa and the lead scientist in the Philippines, and with input from regional experts in mammal and bird surveys. This is largely finalised but requires clarification on the proposed final role of forest patrols within the concession and the capacity they may have to regularly support site-wide monitoring of large mammals. It remains considered that appraisal of individual staff activities by qualified trainers would be a more appropriate way of indicating the success of the field manual, rather than attempting to make statistical comparisons of two datasets that may vary for a number of uncontrollable reasons. Otherwise, the indicators remain appropriate.
Output 3: Appropriate reporting systems for Ecosystem Restoration Concessions developed and submitted to MoF
Reporting of research and conservation activities feeds in to the current reporting system used to inform the MoF of the progress of concession activities. This is a manageable internal undertaking, but it remains to be seen whether the MoF is willing to consider amending their current requirements.
Output 4: Training and capacity building of local staff secures monitoring programme sustainability

Excellent progress has made in training key staff of HRF in biological survey methods with the successful completion of a second tree climbing course, a forest restoration study trip, gibbon survey and conservation workshops, and the ongoing mammal, habitat and hornbill survey training programme. Five local staff are permanently assigned to the research programme full-time and receive regular training, review and development. The recruitment of specialist Biodiversity Officers strengthens the ability of the team to build project capacity and secure sustainability. The current assumption seems entirely reasonable since these staff are local to the area.

Output 5: Research capability, infrastructure and training centre established

At present, all activities are based out of the site headquarters situated on the northeast edge of the concession area. The location of a new operations camp in the approximate centre of the forest has now been agreed and plans are also underway to establish up to ten forest patrol camps, all financed by the German Ministry of the Environment's International Climate Protection Initiative, at various sites around the concession to improve protection and monitoring of the site. These can be used as field base camps for other activities, including biodiversity surveys and will support representative geographic and physiographic coverage of the concession, as outlined in the survey and monitoring sampling design. The new central operations camp will also simplify logistics for conducting research and monitoring activities across the site. There is a steady stream of interest in undertaking research in the concession area and some work has already commenced. This indicator remains appropriate with continued development of site facilities that can support visiting researchers.

3.3 Standard Measures

The project is exceeding its targets in a number of areas.

Table 1 Project Standard Output Measures

Note: MTR revision notes for project output measures are added as footnotes

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	Total to date	Number planned for this reporting period	Total planned from application
5	10 Indonesian staff trained in survey techniques to conduct field data collection for baseline survey & monitoring over three years.		2	7		9	6	10
6A	30 people trained during course of 3 training programmes (one/year) of 4 weeks duration. Covering design, basic survey techniques, & analysis. 12 weeks in total.		21	12		33	16	30
6B	12 weeks in total	2	12	16		30	16	12
7	Up to 5 training manuals produced to cover survey design, survey techniques for birds, mammals & trees, data analysis.		2	1		3	1	5
8	18 weeks in total for J Lindsell & others.	2	5	15		22	10	18
9	Data supplied for the management plan for forest.		1	1		1	1	1
10	1 set of guidelines covering elements of monitoring protocol for the forest		1			1		1
11A	1 paper in press with initial							1

	observations from survey work							
11B	Up to 3 manuscripts submitted to journals covering forest inventory, wildlife-habitat relationships & human impacts.							3
12A	4 databases developed covering wildlife, habitat, human impacts (including logging history) and geographic information consolidated into one GIS for the project.	2	2			4		4
13A	3 collections established covering essential trees and shrubs, invertebrates and herptiles.	1	1	1		3	1	3
13B	3 national collections enhanced (herbaria, invertebrates and herptiles)	1				1		3
14B	3 conferences attended	1	1			2		3
15A	3 national press releases, one in each year.			1			1	3
15B	6 local press releases, two per year.			1		1	2	6
15C	2 UK national press releases, one at the beginning and one in year two		2	1		3		2
17A	1 research station website to be established		1			1		1
18A	1 in each year (local TV)			2		2	2	3
18B	1 (UK TV)							1
19A	1 in each year (local radio)	1		1		2	1	3
19B	1 (UK radio)							1
20	£46,205							
21	1 research and training centre established in the forest		1			1		1
22	Up to 1,000 habitat and wildlife monitoring plots (0.2 ha in size) established throughout the forest.		270	411 (307 -R&C; 104 - Forestry)		681	400	1,000
23	£208,400 raised from other sources. (*Includes research grants only*)		£6,500	£38,027		£44,527	£35,000	£208,400

MTR revision notes:

6A - Due to the nature of other project activities and their work plan schedules, it is more cost-effective to train project staff from other project areas for shorter periods of time, e.g. two project staff for 1-2 weeks, but more frequently. The overall training investment remains the same.

7, 11B - Fewer manuals and manuscripts can be produced providing the intent to produce these outputs can be displayed.
12A - It may be appropriate to describe this output as consolidating the named databases into one GIS for the project; this is currently being considered in light of possibly using MIST.
13A - Invertebrate and herptile collections will be based more on digitisation (of specimen photos) rather than wet specimens; reduces curation costs; easier to manage.
13B - Since invertebrate and herptile collections will focus more on digitisation rather than wet specimens, it may be harder to define how these two onsite electronic collections may enhance more traditional national collections.
15A, B - National and local media are less driven by press releases. Instead, site visits by journalists are more typical.
22 - Precise details will change here.
Project note:
5, 6A – Unfortunately there was small editing error in the total raining numbers reported in the 2nd Annual Report. This has now been rectified in Table 1.
9 – The concession's management plan evolves over time. Consequently, research activities constantly feed in to this document. Therefore, for each year the output is '1' while the total planned remains at '1'. With the likely adoption of MIST (see Indicator 5d) as the main recording and reporting tool for the project, biodiversity data collection will be a major source of information for directing site management decisions.
10 – These may evolve to consider combining approaches to monitoring carbon alongside existing biodiversity monitoring protocols.

Table 2 Publications

Type (e.g. journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (e.g. contact address, website)	Cost £

3.4 Progress towards the project purpose and outcomes

The purpose level indicator states that the results of biodiversity inventory work will inform the development of the management plan. The ongoing results of the biodiversity survey work are indeed being integrated into management planning. However a preliminary management plan will have to be produced well before the completion of this Darwin project so this indicator may only partially reflect the success of the project. The establishment of sustainable capacity to undertake biodiversity monitoring for the restoration project is the key outcome and this is evidenced by the ongoing activities of the research and monitoring department of the HRF management team. The assumptions remain valid.

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

The project is contributing directly to clear progress in the goal. The conservation status of numerous globally threatened mammals in Sumatra has improved with the implementation of the HRF initiative since threats from hunting and habitat destruction have been considerably reduced. The baseline surveys are revealing that the site holds important populations of Sumatran Tiger, Asian Tapir, Malayan Sun Bear and Agile Gibbon, for example, and that these are under a measure of protection that they did not benefit from previously.

4. Monitoring, evaluation and lessons

There is constant communication between the project leader and lead scientist to monitor progress of all aspects of the project and address any unforeseen difficulties that may arise, e.g. site access, logistic support. The lead scientist provides weekly research updates to the project leader, while quarterly conference calls are also held.

Harapan Rainforest staff that participate in training exercises are assessed by the trainers, who may be HRF research staff or from organisations other than HRF. The ability of trainees is normally

assessed using simple tests, e.g. multiple choice questions, before and after the training programme. Their overall grade of ability takes into account the amount of improvement they have shown over the training course. All trainers must agree on a final grading of a trainee's efforts, ability and potential. The personal development and capacity of the permanent research assistants is monitored continuously by assessments every six months.

Fieldwork periods have increased over those reported in the second annual report. The duration of each fieldwork period has increased as team capacity has expanded, although site accessibility can limit some fieldwork activities, but not to the detriment of representative survey effort. Survey locations are between 0.5-1.5 days rough travel from the main camp.
Correspondence with regional and taxa experts regarding survey design and research questions for particular groups has helped validate all survey design decisions thus far.

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

See half year report and recommendations in the MTR.

6. Other comments on progress not covered elsewhere

The overall sampling design of the project has been refined through the development of a clear survey and monitoring sampling design that incorporates all aspects of current activities. One difficulty has been that the survey design has been required to take on board commitments under the terms of the licence agreement with the Ministry of Forestry. This made planning a little more complicated but ensures that the outputs from this work will feed directly into the management of the site and inform national institutions at the highest level. The project does not face any particular risks.

7. Sustainability

This project is part of a long term commitment (100 years) to the management of the HRF. The overall project is receiving very high profile within Indonesia and internationally. The site is one of only three forest conservation projects featured on the Prince of Wales's Rainforest Project website, www.princesrainforestsproject.org. There has been significant progress in the development of biodiversity capacity amongst the project staff to the extent they can carry out most survey activities effectively and consistently. It is anticipated that the development of several contacts in the Indonesian university system will lead to research collaborations with long term benefits. As is made clear in the research strategy that was developed during this year, the work programme for the research station that is developed under this Darwin is long term and substantial. Good progress has already been made in developing mechanisms for undertaking this programme, including fundraising and outreach to local undergraduate and graduate students.
During this reporting period, HRF was successful in securing further operational funding sufficient for the next four years of operation, from the German Ministry of the Environment's International Climate Protection Initiative. This will allow fund-raising efforts to focus specifically on the trust fund established by the consortium of partners involved to grow the capital amount.
The trust fund will provide for the ongoing financial requirements for continuing this work. The process of securing capital for this trust fund has now started and the endowment accounts established. To date some £2.6 million (US$3.9 million) has been secured which since July 2009 is held in restricted endowment accounts in the International Eco Fund and BirdLife International. However, substantial further capital is required. This is being sought from corporate and agency funding sources in UK, Europe and America and the potential for securing carbon finance is also being actively pursued.
The greatest potential positive impact of HRF is slowly starting to be felt. Indonesia's production forest estate is approximately 60 million hectares, of which 30 million are considered to be logged over, abandoned, unmanaged and susceptible to formal or informal conversion. Harapan Rainforest is the first example of a management system that could protect these areas from further degradation. As of the time of reporting a further seven applications for ecosystem restoration licences have been lodged with the MoF. If successful, this will protect a further 700,000ha of forest in Indonesia.

8. Dissemination

Presentations have been made to local and national government, two local universities as follow-ups to last year's presentations, and to BKSDA-Jambi, the governmental wildlife conservation agency. The new HRF website has been live for a year now and reaches a global audience of researchers and students. Through the website, project activities will continue to be disseminated, while the capabilities of local staffing in the R&C division enables continued liaison with local universities and government offices.

9. Project Expenditure

Table 3 Project expenditure <u>during the reporting period</u> (Defra Financial Year 1 April 2009 to 31 March 2010)

Item	Budget	Expenditure	Variance
Rent, rates, heating, overheads etc			
Office costs (e.g. postage, telephone, stationery)			
Travel and subsistence (see below)			
T & S costs in Indonesia			
T & S costs in UK			
International flights			
Visa/documents			
Printing (as per contract)			
Conferences, seminars, etc (as per contract)			
Capital items/equipment (see below)			
Equipment purchased in UK			
Equipment purchased in Indonesia			
Other Costs (see below)			
Consultancies			
Salaries (see below)			
Research Scientist			
Research/survey staff on site (8 staff)			
TOTAL			

Note: The above expenditure figures are indicative at this stage, subject to project audit and submission of Q4 financial claim.

The project has operated a budget cap policy with regard to expenditure incurred in the project area. Thus, when the budget for a particular budget category has been fully expended, no further costs are charged to that budget category, and instead are funded from other sources. It is for this reason that the above table shows expenditure matching budget for many of the specified budget categories.

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

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

Camera trap surveys have recorded the globally threatened Marbled Cat (*P. marmorata;* Vulnerable) for the first time in this region of its distribution. This information will be provided to the IUNC/SSC Cat Specialist Group.

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2009/10

Project summary	Measurable Indicators	Progress and Achievements April 2009 - March 2010	Actions required/planned for next period
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* *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*		*(report on any contribution towards positive impact on biodiversity or positive changes in the conditions of human communities associated with biodiversity e.g. steps towards sustainable use or equitable sharing of costs or benefits)*	*(do not fill not applicable)*
Purpose. Biodiversity inventory, monitoring methods and capacity developed for the management of a lowland forest in Sumatra	- Site management plan is informed by and incorporates biodiversity inventory and monitoring strategy	Baselines surveys underway for trees, mammals, birds and herptiles; monitoring methods agreed for all key groups; training of project staff well advanced for most activities; biodiversity information forms an important part of the draft management plan.	Finalise systematic monitoring of herptiles. Integrate biodiversity surveys and monitoring with forest restoration activities. Secure long-term ornithological expertise in the project.
Output 1. Biodiversity inventory and baseline surveys completed	- Species lists compiled for birds, mammals, trees, herbaceous plants, herptiles and Lepidoptera - Species accumulation curves approach asymptote for non-plants - Representative geographical coverage achieved - Abundances estimated for key species and/or taxonomic groups - Herbarium specimens and photographic records collected for some taxonomic groups	Plant, tree, bird and mammal surveys are underway in systematic fashion. Herptile survey data are acquired on an ad hoc basis. Butterfly work is underway. c. 440 plant species identified to date. 212 specimens in herbarium. 296 bird species recorded to date including records of the Endangered Storm's Stork. 55 mammal species recorded to date, 26 of conservation concern. Camera trap photos acquired of Tiger, Dhole, Tapir, Sun Bear, Marbled Cat (new for the area) and various other species. Sampling design finalised. 411 habitat plots (including 370 forestry tree plots) surveyed on a systematic grid over the site. Indicators remain appropriate.	
- Consultation and methods established by end yr 1		All field equipment purchased for current field surveys. Methods agreed. Ongoing consultation on developing new strands of research important to HRF.	

- Survey areas and resources identified yr 2		Fully trained, permanent research team established (5 Research Assistants, 2 Biodiversity Officers, one more to start in May 2010)
- Survey data collected from surveys in multiple plots across the site, 50% yr 2 and 50% yr 3		411 habitat plots, 283 bird points, 62 km mammal transects, 11 gibbon surveys, 92 camera trap locations, (and 153.3km occupancy surveys) have been completed
- Survey data computerised for analysis, 50% yr 2 and 50% yr 3		Herbarium facility completed. 212 specimens already housed.
- Survey data analysis yr 3		Storage, office space and training rooms completed. Records geo-referenced and entered into computerised database.
- Mid-term baseline survey report mid yr 3, final baseline survey report end yr 3		Drafting mid-term survey report. Supported by two presentations due in July 2010 at the ATBC conference.
Output 2. Plan for monitoring selected taxonomic groups established	- Ecosystem concession ecological monitoring requirements identified for improvement on current Ministry of Forestry requirements - Monitoring protocols conform with published best practise and agreed by independent relevant taxonomic experts - Field methods validated through established error checking procedures	The research strategy developed for HRF last year may need refinement to support the overall goal of the concession, under new funding for the next four years. Monitoring protocols agreed.
- Consultation of literature and selected taxa experts and monitoring protocols agreed by mid yr 2		All finalised for key taxonomic groups except herptiles.
- Draft monitoring guidelines produced end yr 2		Robust and completed (except for herptiles).
- Monitoring data collected, computerised and analysed yr 3		All data so far collected are computerised. Analysis expected later in 2010.
- Final draft monitoring scheme produced after review yr 3		
- Trainee research staff test monitoring protocols in the field mid yr 3		
- Final adjustments made to monitoring protocols end yr 3		

Output 3. Appropriate reporting systems for Ecosystem Restoration Concessions developed and submitted to MoF	- Reporting systems coherent with concession management and research needs - Redundant information collection minimised, time and costs of reporting show significant reduction	Wide consultation has been undertaken for mammal and bird survey methods which are now being implemented. This includes gibbons, sun bears, tapir, tigers and elephants. Similar consultation is underway for herptiles.
- Comparison with existing regulations and proposal for their replacement by end yr 3		If MoF is receptive, then there is potential to propose alterations to existing regulations
- Regular meetings established with key personnel in MoF from yr 3		Point of contact established but need to develop more regular meetings
- System established that records time and cost inputs from yr 3		System being developed in parallel with adjusting research staff responsibilities
- Internal discussion and analysis of MoF reporting to identify coherent alternatives is a regular agenda item from yr 3		Discusisons now underway that reflect overall project goal
Output 4. Training and capacity building of local staff secures monitoring programme sustainability	- Majority of monitoring data collected by project-trained staff in accordance with established protocols	Almost all data are being collected by project-trained staff, with limited supervision. A great deal of progress has been made on this output. The indicator remains appropriate though the distinction between training for baseline surveys and monitoring work is no longer relevant.
	Appropriate and effective training courses being held regularly	Internal training is more ad hoc than originally planned due to availability of staff from other work divisions and their planned work activities.
- Training workshop for local staff with input from UK expertise yr 1		Numerous staff trained – see output 1.
- Research training requirements identified yr 2		This now forms part of the training programme conducted for research assistants
- Local staff introduced to and trained in selected baseline survey methods yr 2		Besides the core biodiversity staff, other HRF staff (especially forest patrol staff) are receiving training through this project to improve the value of data that they can collect when in the forest.
- Ongoing and assessed staff training programme to support baseline surveys and research activities yrs 2 and 3		Personal assessments by trainers have been undertaken and prove practical when undertaken alongside pre and post training tests. Research staff assessed every four months
- Comparison of research trainees' skills base and responsibilities between initial baseline data collection and final surveys yrs 2 and 3		Previous delays to survey work mean comparisons have not yet been made

Output 5. Research capability, infrastructure and training centre established	- Key research needs identified, including specific studies on species of conservation importance and research that supports site restoration activities, e.g. seed dispersers - Appropriate resources available for research activities - Regular collaboration with visiting researchers - Contribution to the development of site management prescriptions and protocols - Contribution to the development of site management prescriptions and protocols	A steady flow of interest from external scientist demonstrates that the profile of the project is already being raised. Press coverage has been good with coverage in Indonesian and UK media. Representation at two regional workshops has also raised the profile of the project. Good facilities have been established on site to provide a focus for research activities. Much progress has been from last year.
- Herbarium and library established, including appropriate field equipment, with specimens added yr 2 onwards		Fully operational on-site herbarium, all necessary field equipment purchased, supporting reference material in library. Some herbarium specimens added this year; photographic specimens of herptiles and butterflies collected.
- Computer facilities and electronic data storage, including relevant databases yrs 2 and 3		Established and now integrating biodiversity databases with central project database
- Standard operating procedures agreed for research partnerships and initiation of international research collaboration yr 3		Memorandum of agreements drafted with three national universities. Standard operating procedures agreed for visiting student researchers.
- Historic data on forest condition and logging collated; from literature and informal interview by yr 2		
- Research strategy developed and agreed yr 2		
- Research papers in review & submissions for publication acknowledged end yr 3		Two papers are being prepared for presentation at the ATBC conference in July 2010.

Annex 2 Project's full current logframe - Revised during the Mid-Term Review, August 2009

Project summary	Measurable Indicators	Means of verification	Important Assumptions
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 the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising out of the utilisation of genetic resources			
Purpose: Biodiversity inventory, monitoring methods and capacity developed for the management of a lowland forest in Sumatra	Site management plan is informed by and incorporates biodiversity inventory and monitoring strategy	Peer reviewed interim management plan for the site National capability to continue inventory and monitoring proven	Political changes in Indonesia do not impede management of the site by the conservation consortium MoF accepts monitoring systems developed
Outputs			
1. Biodiversity inventory and baseline surveys completed	Species lists compiled for birds, mammals, trees, herbaceous plants, herptiles and Lepidoptera	Completed field data sheets and computerised database of records	Political conditions or natural disasters do not prevent fieldwork
	Species accumulation curves approach asymptote for non-plants	Sampling design proves effective and biodiversity survey reports	
	Representative geographical coverage achieved		
	Abundances estimated for key species and/or taxonomic groups		
	Herbarium specimens and photographic records collected for some taxonomic groups	Onsite photographic and botanical specimen collections, including herbarium	
2. Plan for monitoring selected taxonomic groups established	Ecosystem concession ecological monitoring requirements identified for improvement on current Ministry of Forestry requirements	Communication with forestry authorities	Willingness of Min of Forestry to engage in this discussion
	Monitoring protocols conform with published best practise and agreed by independent relevant taxonomic experts	Accreditation from relevant experts Monitoring guidelines	
	Field methods validated through established error checking procedures.	Statistical robustness of monitoring manual procedures	
		Assessment of trainee competence	

3. Appropriate reporting systems for Ecosystem Restoration Concessions developed and submitted to MoF	Reporting systems coherent with concession management and research needs	Regular monitoring of reporting burden above internal needs	MoF willing to consider amending their current reporting requirements
	Redundant information collection minimised, time and costs of reporting show significant reduction	Analysis of records of reporting time and cost inputs	
4. Training and capacity building of local staff secures monitoring programme sustainability	Majority of monitoring data collected by project-trained staff in accordance with established protocols	Training assessment, completed field data sheets	Sufficient numbers of trained staff are retained by the project
		Permanent team of local research assistants with adequate expertise	
	Appropriate and effective training courses being held regularly	Training course records and trainee assessment results	
5. Research capability, infrastructure and training centre established	Key research needs identified, including specific studies on species of conservation importance and research that supports site restoration activities, e.g. seed dispersers	Prioritised research statement and strategy for internal and external use, including collaborators' research protocols Additional research funds raised	
	Appropriate resources available for research activities	Equipment asset list, herbarium	
	Regular collaboration with visiting researchers	Visitors book	
		Collaborative research reports	
		Terms of reference and memoranda of agreement with research organisations	
	Contribution to the development of site management prescriptions and protocols	Internal reports	
	Value of research centre and activities recognised nationally and internationally	Coverage in independent media	
		Scope, extent and results of collaborative research	
		Positive feedback from the Ministry of Forestry on piloting ecosystem restoration biodiversity research	

Activities	Activity Milestones	Indicative Timing	Notes
Baseline surveys and inventory			
1.1. Methods developed, piloted and refined	Consultation and methods established	Dec. 2008	
1.2. Survey logistics systems finalised	Survey areas and resources identified	April 2009	
1.3. Data collection, compilation and analysis	Survey data collected from surveys in multiple plots across the site	50%, June - Dec. 2009 50%, Jan. - July 2010	
	Survey data computerised for analysis	50%, June - Dec. 2009 50%, Jan. - July 2010	
	Survey data analysis	100%, Aug. - Sept. 2010	
1.4. Baseline reporting	Mid-term baseline survey report	April 2010	
	Final baseline survey report	Nov. 2010	
Monitoring programme			
2.1. Planning and design of monitoring programme	Consultation of literature and selected taxa experts and monitoring protocols agreed	March 2009	
2.2. Guidelines for field implementation	Draft monitoring guidelines produced	Nov. 2009	
2.3. Collection, quality assurance and analysis of monitoring data	Monitoring data collected, computerised and analysed	Nov. 2009 - Nov. 2010	
2.4. Reporting initial findings	Final draft monitoring scheme produced after review	Feb. 2010	
2.5. Testing and validation of protocols	Trainee research staff test monitoring protocols in the field	July 2010	
2.6. Finalisation of monitoring programme design	Final adjustments made to monitoring protocols	Nov. 2010	
Appropriate reporting			
3.1. Consultation with Ministry of Forestry	Comparison with existing regulations and proposal for their replacement	Nov. 2010	
3.2. Regular meetings with MoF to discuss progress and alternative options including relevance to other concessions	Regular meetings established with key personnel in MoF	Regular from Nov. 2009	
3.3. System established for recording all inputs on MoF reporting	System established that records time and cost inputs	Nov. 2009	

3.4. Internal discussion and analysis of MoF reporting to identify coherent alternatives	Regular agenda item	Ongoing from Nov 2009	
Staff capacity			
4.1. Initial training needs assessed and reviewed	Training workshop for local staff with input from UK expertise	May 2008	
	Research training requirements identified	June 2009	
4.2. Training programme delivery	Local staff introduced to and trained in selected baseline survey methods	April 2009	
4.3. Training evaluation, review and refinement	Ongoing and assessed staff training programme to support baseline surveys and research activities	Oct. 2008 - Nov. 2010	
4.4. Skills analysis and training needs assessment	Comparison of research trainees' skills base and responsibilities between initial baseline data collection and final surveys	April 2009 - Nov. 2010	
Research capability			
5.1. Herbarium and library built	Herbarium and library established, including appropriate field equipment	April 2009	
	Specimens added	April 2009 - Nov. 2010	
5.2. Data information storage systems established	Computer facilities and electronic data storage, including relevant databases	Dec. 2009	
5.3. Collaborative research support systems	Standard operating procedures agreed for research partnerships	June 2010	
	Initiation of international research collaboration	Nov. 2010	
5.4. Compilation of background and historical information	Historic data on forest condition and logging collated; from literature and informal interview	April 2009	
5.5. Formulation of research strategy	Research strategy developed and agreed	Sept. 2009	
5.6. Dissemination of research findings	Research papers in review and submissions for publication acknowledged	Nov. 2010	