Darwin Initiative Annual Report

1 April 2000 to 31 March 2001

An Information System for Biodiversity and Conservation Monitoring in Mauritius

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Darwin Initiative for the Survival of Species

Annual Report

1. Darwin Project Information

Project title	Information system for biodiversity and conservation management in Mauritius
Country	Mauritius
Contractor	Statistical Services Centre, The University of Reading, UK
Project Reference No.	162/08/064
Grant Value	£113,850
Start/Finishing dates	September 1999 – September 2002
Reporting period	1 April 2000 – 31 March 2001

2. Project Background

Conservation in Mauritius is well advanced in many respects, but information management has hitherto been piecemeal and not systematic. Programmes for the captive breeding and release of endangered birds, habitat restoration and studies on the status and distribution of other fauna (notably reptiles) produce large quantities of data. This project aims to lay the foundation for an integrated information system encompassing data from all of these sources so as to facilitate the effective use of information for conservation management, research and education.

3. Project Objectives

(1) To design and develop a computerised information system to serve as a tool for conservation management, research and education in Mauritius; the system will integrate data from a variety of sources, including geographical information.

(2) To strengthen the capacity of local institutions in the management and use of conservation information.

These remain the overall objectives of the project and no significant modifications have been made to the operational plan.

4. Progress

Summary up to 31 March 2000

Work on the project started in mid-September 1999. Preliminary work in UK consisted of evaluating options for software and computer hardware for the project, literature review,

initial software development and planning meetings at Reading and Jersey Zoo (with Dr J.E. Fa). The project leader (RWB) visited Mauritius for 4 weeks in November/December 1999 to help launch the project there (Output **8**). The team of local collaborators was established in Mauritius including members of the Mauritian Wildlife Foundation (MWF), the National Parks and Conservation Service (NPCS) and the University of Mauritius (UoM); Dr Rafic Dulymamode agreed to be the principal representative of the University of Mauritius.

In addition to several meetings with our partners, informal meetings were arranged to inform other potentially interested parties about the project. These included Prof. I. Fagoonee (Pro-VC of UoM), Dr J. Ramkeesoon (Director of the Food and Agriculture Research Council), Mr Y.T. Dwarka of the National Remote Sensing Centre and a number of UoM research staff.

The Memorandum of Understanding (see Appendix 1) was agreed with MWF as the principal local collaborators so that liaison with the other local collaborators is managed through them. Preliminary training/orientation sessions with three key collaborators (MWF staff: John Mauremootoo, Saoud Motala, Jennifer Ah-King – all Mauritian) were held during this visit. It was agreed that these three, in addition to receiving training themselves, should be trained as trainers; this training was initiated. Basic data required for system design was collected during this visit. Computing equipment (of value £8,301) was purchased, installed and tested at Reading (**Output 20**; verbal agreement for deferring expenditure of the remaining £2,199 of the budgeted £10,500 was obtained from DETR). The equipment comprised:

Desktop PC#1 plus keyboard, mouse, power cable
Monitor (19") plus power cable
Desktop PC#2 plus keyboard, mouse, power cable
Monitor (17") plus power cable
Windows NT Workstation 4.0
Network hub & transformer, RJ45 cables
Printer plus spares, printer cable, power cable
Digitiser, connecting cable, transformer, SCSI & USB cables
Scanner, slide adapter, power cable
CD/diskettes with software & documentation
4-way power adapter

A talk on the Darwin project was given at an international meeting of zoologists held on Ile aux Aigrettes, Mauritius, on 4th December 1999. Participants included staff of MWF and NPCS and a number of distinguished visiting scientists including Dr E.N. Arnold of the Natural History Museum, Dr G. Rodda and Dr D. Frits of the US Geological Survey, Prof S. Harris of the University of Bristol and Dr D.Bell of the University of East Anglia.

Summary of progress 1 April 2000 to 31 March 2001

Work in UK consisted of software development and the preparation of GIS materials and training programmes. Database systems were designed and the programming begun (**Output 12B**). Documents for guidance on data entry and data management were produced and handed over. Also, on-line help systems were begun; these, and a FAQ document, are as yet unfinished because it is more efficient to postpone their completion until the software is more fully developed (**Output 10**). In all, 12 person-weeks of UK staff time were spent in Mauritius on the project (*c.f.* 10 person-weeks anticipated as **Output 8** for this period; the extra two weeks arose because of lack of availability of flights to fit with other commitments). The dates of these visits were as follows: 12 Jun – 9 Jul 2000 (4 weeks) for RWB and ICD together; 1 Oct – 28 Oct (4 weeks) for RWB; 20 Nov – 16 Dec for ICD (4 weeks). Computing equipment (**Output 20**) purchased for the project was taken to Mauritius, handed

over to the local partners and installed during the June/July visit, and two weeks of training of key collaborators was undertaken (part of **Output 6A/B)**. Trainees drawn from all three participating institutions were selected and training continued throughout the two visits (**Output 6A/B**; details of the participants are in Table 1).

Organisational issues

The purpose of arranging liaison between Reading and our Mauritian partners through MWF is for convenience and ease of communication. MWF is a NGO and there is a smaller administrative overhead to deal with than would be the case with NPCS and UoM, which are governmental organisations.

It was decided with the partners that a project management meeting would be held at least once during each visit of UK staff to Mauritius. Other meetings between the local partners would be arranged as and when needed. (Notes from the project management meetings are in Appendix 2)

It was agreed with the partners that the National Remote Sensing Centre (NRSC) would be invited to participate in the Darwin project as an additional local partner. Permission would be sought from the Ministry of Agriculture (which has responsibility for the NRSC).

Local counterpart funding

We have been pleased to note that the existence of the Darwin project has enabled MWF to obtain counterpart funding from local Mauritian sources. In particular, MWF has received a three-year grant from the Mauritius Research Council to cover the salary (and overheads incurred) for the employment of Saoud Motala as Data Manager for the Darwin project. Jennifer Ah-King is employed by MWF as Research Assistant for Dr John Mauremootoo (MWF's Flora Manager), and she has been seconded to work on the Darwin project. Jennifer and Saoud are both very able biology graduates from the UoM with keen interests in conservation and computing.

Counterpart funding is also being provided by the NPCS to purchase computing equipment matching that provided by the Darwin Initiative to MWF. Specifications for suitable systems were given to NPCS.

Details of work achieved

Software development:

Three important components of the integrated information system that is to be the output of the project are databases for the management of three populations of endangered birds: the Mauritius Pink Pigeon (*Columba mayeri*), the Mauritius Kestrel (*Falco punctatus*) and the Echo Parakeet (*Psittacula eques echo*). The specification and design of these systems were completed during the early stages of the project and software development is under way. The Mauritius Kestrel is no longer being bred in captivity but exists in a number of self-sustaining populations in the wild after a successful re-introduction programme. The database for the Kestrel therefore has been designed for the main purpose of monitoring these populations and to allow the analysis of historical data for research purposes. The Pink Pigeon is still being captive-bred and a release programme has been under way since 1987. There are currently four independent populations of released birds, each receiving supplemental feeding. They are being intensively monitored and it is a matter of urgency to provide the means to process and analyse the large amount of data collected for the purposes of optimising the management of these populations and also for research. The programme for the Echo Parakeet is similar to

that of the pigeons but is at a much earlier stage. It is therefore intended to postpone the development of the database system for the parakeets until the pigeon work is nearing completion, with the idea of adapting the pigeon system for the parakeets.

It was decided to give the responsibility for the development of the kestrel database to Saoud Motala with close supervision from ICD and RWB, both by e-mail contact with Reading and during our visits. Although this may be a slower way to produce an up-and-running system, the overriding advantage is that Saoud has a substantial project from which to learn and gain valuable skills. This strategy has proved a success; programming the structure of the kestrel database is almost complete. The database is already being utilised to provide information for a Reading PhD student, Malcolm Nicoll (supervised by Dr Ken Norris); another PhD student, Steve Ewing, is about to begin work on the Kestrel with Dr Lucas Keller in Glasgow, and he will also be able to make use of the database.

The database system for the Pink Pigeon has a different function because this species is still being captive-bred. As well as serving as a record keeping system, the program needs to be able to provide information for the genetic management of the population. In particular, information is required which will enable optimal pairing choices for (a) the avoidance of inbreeding depression and (b) maximising the founder representation. There are software systems already available for this kind of genetic analysis, notably SPARKS (Single Population Animal Record Keeping System), which is widely used in zoos. This was reviewed and found to be inadequate for our purposes, mainly because it has no provision for data from *released* populations (nest records, migrations, feeding data, etc). Further reasons are that it has been designed primarily for use with mammals, and that there is little or no provision for morphometric and other data. It was therefore decided to development a custom system for the Pink Pigeon and, as mentioned above, to subsequently adapt it for the Echo Parakeet. Programming this system is now well advanced and its installation in envisaged during the next year of the project. The program is written in Visual Basic and has been designed to be user-friendly. Like all of the custom software to be provided by the project, it will have an extensive on-line help system (yet to be written) to ensure easy uptake by new recruits and should improve the long-term viability of the project.

Work is under way on a number of smaller database systems for plant conservation work: a nursery management system, a rare plants catalogue, a weed control management system for Ile aux Aigrettes and a slide catalogue. These are being developed mainly by Jennifer Ah-King, supervised by ICD from Reading and by John Mauremootoo in Mauritius. These systems are at various stages of completion, but it is anticipated that they will be functioning before the end of 2001.

Training:

During the visits in June/July and November/December, ICD provided training in database design, GIS (map digitising) and general computing skills. This was given mainly to the key MWF staff (Saoud Motala and Jen Ah-King) but also, as necessary, to the numerous volunteer and expatriate staff (many British) who do much of the fieldwork and data collection, and who thus have an important influence on the quality of the information. The intention is that this "training of volunteers" is to become a role for the local MWF staff. They have in fact begun training NPCS staff, although not yet to the extent that was intended (for reasons, see below), and are gradually gaining the expertise and confidence for this role.

The databases required for practical management of MWF's conservation data have deliberately been used as examples for the training, to ensure their relevance and to identify any problematic issues that need to be resolved. The Kestrel database (discussed above) is being designed in a generic fashion so that the principles will be relatively easy to adapt for

other species. The Nursery Management system, though designed for use at the Ile aux Aigrettes nursery, is able to be adapted for use at other sites where endemic plants are propagated. The Weed Control Management system under development, also for Ile aux Aigrettes, is a prototype of the system that will be needed in other areas of Mauritius and Rodrigues where restoration of the native ecosystems is being attempted. Other, simpler examples, such as the bibliography and slides databases, serve as training exercises and yet are very useful once completed.

GIS:
In parallel with the database work, GIS development work was carried out in the UK throughout the reporting period. The main activity was the construction of a GIS for Ile aux Aigrettes, into which various datasets from many studies can be combined.

The native forest ecosystem of this small (26 ha) offshore islet is gradually being restored by systematic eradication of invasive exotic plants and animals, through the work of local volunteer community action groups and MWF, with support via a World Bank/GEF project. The plant communities have been extensively studied for several years; there is now an abundance of data that can only be usefully combined spatially. The Ile aux Aigrettes GIS development is providing a useful training exercise for related systems that will be needed to guide the restoration work planned for other, more remote islets and areas of the upland forests. Jen Ah-King has done much of the Ile aux Aigrettes GIS development, supervised and assisted by ICD.

Data collection and data entry:
Field data collection forms currently in use were reviewed and substantially revised. Protocols for the collection and management of field data have been discussed with field staff and are still under revision. Revised data collection forms for Pink Pigeons are almost complete.

Historical Pink Pigeon data exists on several sites, both in Mauritius and in zoos in a number of countries. The most important data sets outside Mauritius are at the Durrell Wildlife Conservation Trust (Jersey Zoo), and Dr John Fa is collating these for use in the Darwin project. Much of the historical data collection is complete (and has been used by Kirsty Swinnerton for her PhD research).

Field data on Echo Parakeets (and data from the captive breeding work at the Black River aviaries) has been checked and collated and it is anticipated that it will be ready for data entry before the database software is completed. Most of the available historical Kestrel data has been entered into the database, including data donated to the Darwin project by Jim Groombridge on completion of his PhD research.

Difficulties encountered
There are been no major difficulties. However, a problem that to a large extent was anticipated is the slow response from Government departments. For example, we wrote to the Permanent Secretary of the Ministry of Agriculture in November 2000 to seek the Minister's approval for the participation of the National Remote Sensing Centre in The Darwin project. To date there has been no reply. Unfortunately administrative hold-ups also affect our partner, NPCS. A difficulty has been the irregular attendance at training sessions by NPCS staff. To some extent, this may be accounted for by the varied workload that NPCS staff have, but the main cause is the fact that NPCS have not yet acquired the computers to run the software required by the Darwin project, so that the NPCS staff have had no opportunity to do the practical work needed to consolidate their training received at MWF.

Project enhancements and changes

It has emerged that there is a greater need for training on methods of data collection in the field and sampling methodology than was initially anticipated. This is especially relevant for evaluating the status of endemic Round Island reptiles. MWF and NPCS have recently been awarded a substantial GEF grant for the management of Round Island, and inputs from the Darwin project were requested. Although the Darwin project proposal includes training on ecological sampling techniques during the last year of the project, it was decided to expand and bring some of this work forward, to fit in with work on the GEF grant. Sampling and monitoring methods for Round Island reptiles has proved to be a rather intractable problem over the years and MWF took the view that a statistician's view could make a significant contribution to the problem. RWB was invited to join a trip to Round Island in October 2000 to examine the field problems and make recommendations for appropriate sampling methods. A report on preliminary recommendations was prepared by RWB together with Fiona Underwood of the Research Unit for Wildlife Population Assessment, University of St Andrews, who also joined the Round Island trip.

Another way in which the project differs from what was envisaged at the time of the project proposal is the greater role given to our "key collaborators", especially Saoud Motala, but also Jen Ah-King and John Mauremootoo, in acting as trainers of NPCS collaborators. The reason for the change is that we had not anticipated such able partners before we started working with them, and it seems best to maintain their high level of motivation by giving them this extra responsibility. Saoud and Jen have also been helping with training visiting UK students in data management and GIS skills. Although training UK students is not a Darwin output, we feel that the experience gained by our local collaborators in undertaking this training is genuine evidence of capacity building.

Timetable 1 April 2001 to 31 March 2002

RWB and ICD to visit Mauritius for training and system development work in June/July 2001 and again in November/December 2001. John Fa to visit in 2002, as will RWB and ICD (timings yet to be finalised).

A training workshop on methods of Biodiversity Assessment has been arranged for July 2001, to be open to UoM students and staff, and to NPCS and MWF staff. It will be hosted by the UoM and organised by Dr Rafic Dulymamode. The workshop will be funded by an existing GEF grant with the collaboration of the Darwin project. It is anticipated that a large number of students will attend, and from these, students who plan to continue in conservation will be identified and invited to participate in further training under the Darwin project.

Further database and software development will continue, mainly at Reading. The Pink Pigeon program (databases and genetic analysis) will be installed in December 2001. Documentation for the software to be produced by the next visit in 2002. Software for the Echo Parakeet management system to be adapted from the Pink Pigeon software in 2002, once it has been thoroughly tested.

A website will be set up for the project, and for MWF/NPCS/UoM conservation activities in general.

Local dissemination in the form of press releases and radio/TV spots is planned during this period.

5. Partnerships

Collaboration with our Mauritian partners, MWF, NPCS and UoM, has for the most part been fruitful and, apart from the minor difficulties noted above, there have been no problems. The arrangement whereby MWF has a liaison role between Reading and the other local collaborators in our absence seems to work well.

As mentioned above, we are seeking to include the National Remote Sensing Centre among our local partners. We have had several informal meetings with staff of the NRSC and they are very enthusiastic about collaborating, as are the other partners. We are waiting for a formal response from the Ministry of Agriculture before we can proceed.

By means of providing data and other outputs, the Darwin project has made links with staff and researchers in at least three UK universities: East Anglia, Bristol and Kent. A useful link has been established with the Natural History Museum through Dr Nick Arnold, Head of Reptiles (although just retired, he maintains an office at the museum and is still very active).

6. Impact and Sustainability

Although it is rather early to judge, the Darwin project is already having a noticeable impact on local conservation work. Data and other outputs from the information system are being used for the purposes of management, research and training. UK based researchers are also making use of some of the project's outputs.

To encourage sustainability, we have spent considerable time "training trainers" (our key collaborators, John Mauremootoo, Jennifer Ah-King and Saoud Motala). When completed, the system documentation and on-line help, which will include tutorial material, will also contribute to making the system self-sustaining beyond the duration of the Darwin grant.

7. Outputs, Outcomes and Dissemination

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

Code No.	*Quantity*	*Description*
10	1	Data entry manual – in the form of booklets of general guidelines and on-line help systems.
20	£8,301	Computing equipment handed to MWF; permission for deferring expenditure of the remainder of the total budgeted amount of £10,500 was obtained verbally from DETR.
6A/B	6	Trainees (all Mauritian) who have had 4 weeks of training: Jen Ah-King (MWF) Saoud Motala (MWF) John Mauremootoo (MWF) Vimal Nundloll (NPCS) Suraj Gopal (NPCS) Nita Sooritan (NPCS) Note: none thus far from UoM (to be selected next year after workshop) Saoud and Jen have given a further 6 weeks of training to the NPCS staff in the above list.
12B	1	Multiple database system enhanced: details in Section 4 above.

Table 2: Publications

Type * *(e.g. journals, manual, CDs)*	***Detail*** *(title, author, year)*	***Publishers*** *(name, city)*	***Available from*** *(e.g. contact address, website)*	**Cost £**
Report	*Monitoring Round Island Reptile Populations: Some Preliminary Recommendations*, R.W. Burn and Fiona Underwood, 2001		MWF, Mauritius, or R.W. Burn, Reading University	

8. Project Expenditure

Table 3: Project expenditure during the reporting period

Item	Budget	Expenditure
Total		

Notes:

(a) The shortfall in expenditure on travel and subsistence is accounted for by unexpected economies in air fares.

(b) Equipment was shipped to Mauritius free of charge by British Airways under their "Assisting Conservation" scheme.

9. Monitoring, Evaluation and Lessons

Members of the review panel mentioned in the project proposal have been contacted and it is intended to submit a copy of this report (and subsequent ones) to them for comment.

Lessons: the need to foresee changed circumstances and priorities when drafting a project proposal!

10. Author(s) / Date

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18th October 2001

Appendix 1

MEMORANDUM OF UNDERSTANDING BETWEEN THE MAURITIAN WILDLIFE FOUNDATION AND THE STATISTICAL SERVICES CENTRE, THE UNIVERSITY OF READING

Appendix 2

Notes from Project Management Meeting held on 6th July 2000
(9:00–10:45) at the University of Mauritius, Réduit.

Present: Dr Rafic Dulymamode (chair) (University of Mauritius), Mr Yousoof Mungroo (Director of National Parks and Conservation Service, Government of Mauritius), Dr John Mauremootoo (Mauritian Wildlife Foundation), Bob Burn (University of Reading) and Ian Dale (University of Reading).

Bob Burn first outlined the project aims and reviewed progress so far.

There was some discussion about who the trainees should be in each of the participating organisations and how they should be selected in the event that there were too many candidates.

The nature and content of the training was discussed and agreed. Training workshops were suggested. It was pointed out that NPCS would have to acquire suitable computers to enable their staff to fully benefit from the training. It was understood from Mr Mungroo that funding was available for these.

The need for a policy on data sharing and proprietary rights was discussed. Mr Mungroo agreed to produce a pro forma agreement (ruling out commercial use).

Mr Mungroo suggested that there should be a local review panel for the project in Mauritius. It was generally agreed that this was a good idea and Mr Mungroo agreed to look into terms of reference and possible membership of this panel.