



MAURITIUS RESEARCH COUNCIL

**INFORMATION SYSTEMS FOR OPTIMIZED
DATA MANAGEMENT TO INCREASE THE
EFFICACY OF BIODIVERSITY
CONSERVATION EFFORTS IN MAURITIUS
AND RODRIGUES**

Final Report

MAURITIUS RESEARCH COUNCIL

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This report is based on work supported by the Mauritius Research Council under award number MRC/RUN-0402. Any opinions, findings, recommendations and conclusions expressed herein are the author's and do not necessarily reflect those of the Council.

THE MAURITIAN WILDLIFE FOUNDATION
Report to the Mauritius Research Council

FINAL REPORT

Information systems for optimised data management to increase the efficacy of biodiversity conservation efforts in Mauritius and Rodrigues (MRC –RUN 0018)

Introduction

The above Mauritius Research Council funded project has been implemented by the Mauritian Wildlife Foundation (MWF). The major focus of the project was the creation and management of fauna (endemic birds, seabird and reptiles), flora (rare plants) and support structure (nursery) databases. Several databases have been designed under the present project namely the Round Island Petrel, Nursery and Round Island Boa databases, whilst others were restructured and reinforced e.g. Pink Pigeon, Echo Parakeet, Mauritius Kestrel and Rare Plants.

Recognizing the need to promote conservation education and awareness, education workshops and the production of field guides constituted the second axis of the project.

Achievements

Pink Pigeon Database (PPDB 2.0)

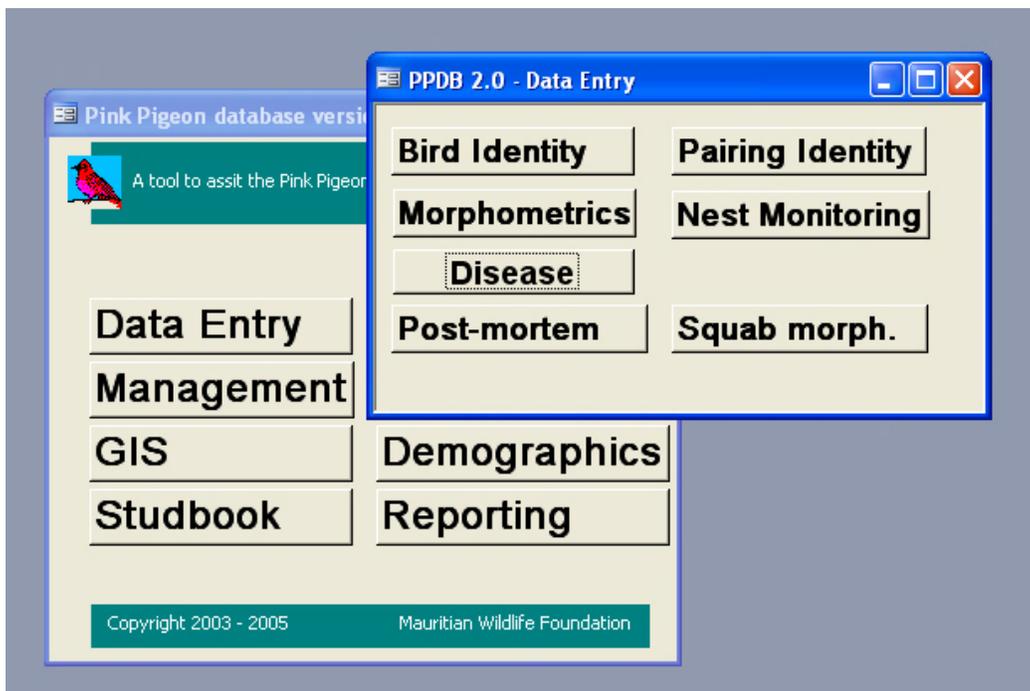
The PPDB 2.0 (Figure 1) is a comprehensive dataset on the biology and management of the Mauritius Pink Pigeon (*Nesoenas mayeri*) covering bird identity, pairing, nesting, adult and squab morphometrics, disease, post mortem and necropsy which have been designed to reorganise the data collected in the field.

The bird identity provides ringing data (metal ID and colour rings), parentage and hatching/fledging. The morphometric data includes weight of the bird and a range of measurement (wing, tarsus, bill, tail length) etc.

The disease sheet records information about the condition of the bird as well as the number of blood and other samples taken for analysis.

The post mortem field contains the facts and circumstances concerning the death of the focal bird. The pairing sheet documents the identities of the breeding birds and the nesting sheets give information about the outcome (success or failure) of nests of each breeding pair. The outcomes from the nest sheet give an idea of the stages at which the nests have been found such as nest building (NB) stage, egg laying and incubation stage and along with the final result.

The monitoring of squabs is done through the squab sheets recording information on the age, diet and health of the birds.



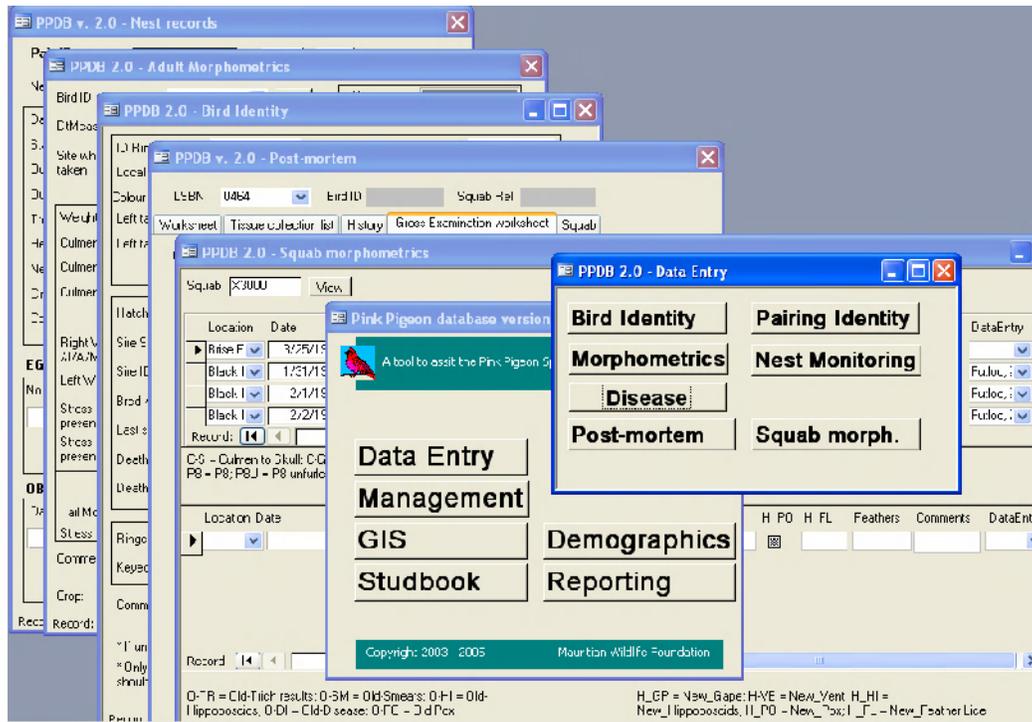


Figure 1. The Pink Pigeon Database (PPDB 2.0)

Echo Parakeet Database (ECHO 2.0)

Figure 2 shows the former version of the ECHO 2.0, designed in 2003 but this has now been updated/ modified and the revised, more user friendly version is presented below (Figure 3). Data can be easily entered and analysis can be done more rapidly using the appropriate software.

The requirements of the database have changed in the last three years; more accurate information as well as new information (e.g. blood sample analysis, genetic studies/tests, and beak and feather disease) has been incorporated. Some corrupt data and unfinished reporting from the previous database has been removed. Thus all data from the previous database along with additional data is now present in the new database (Figure 3).

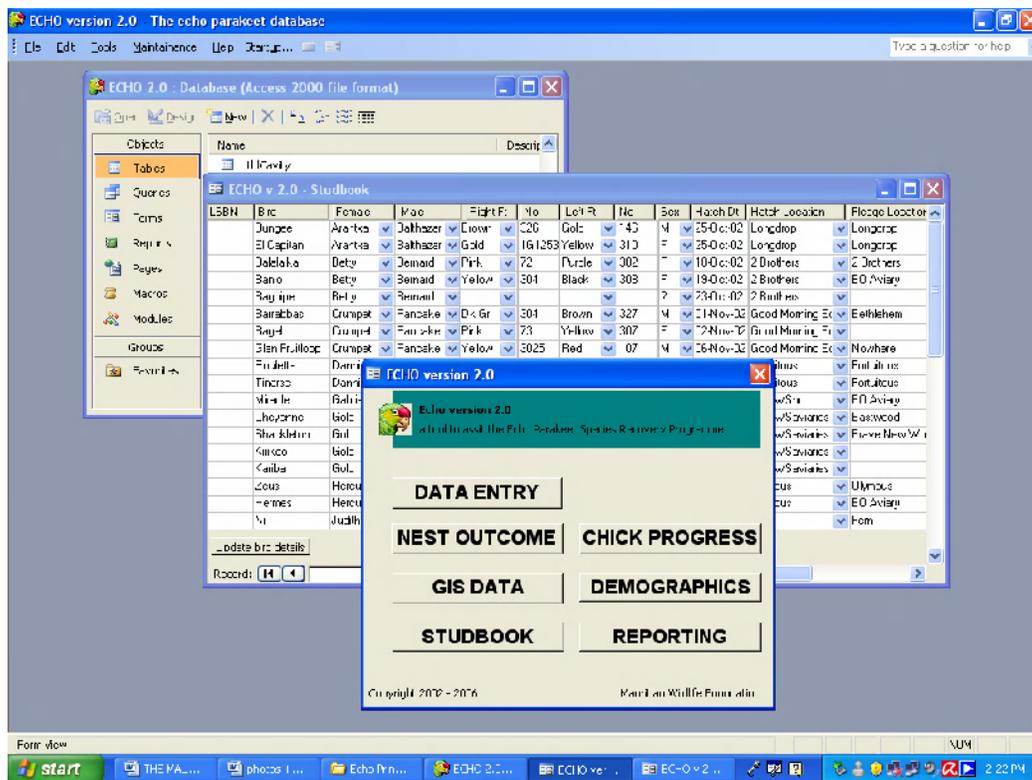


Figure 2. Former version of Echo Parakeet database

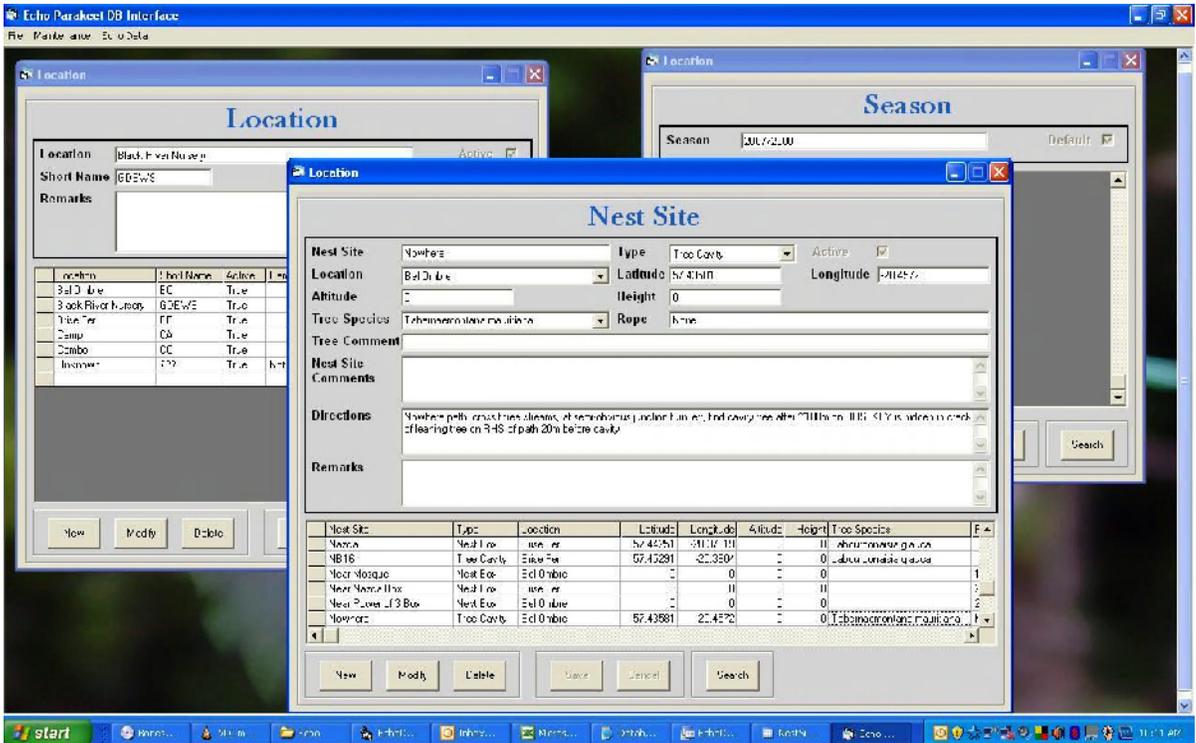
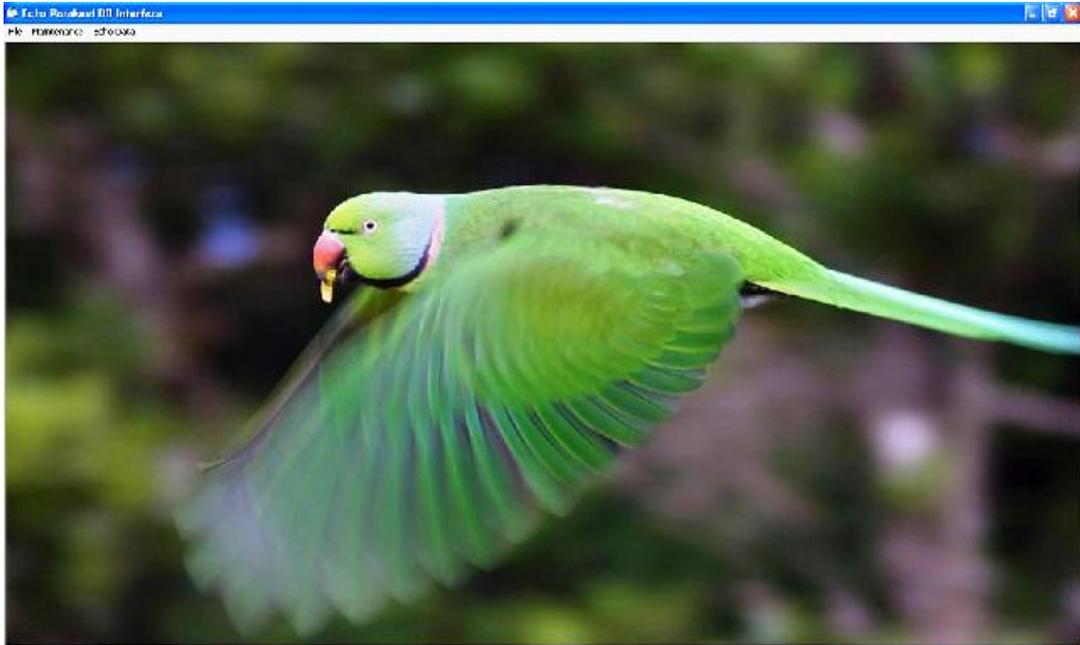
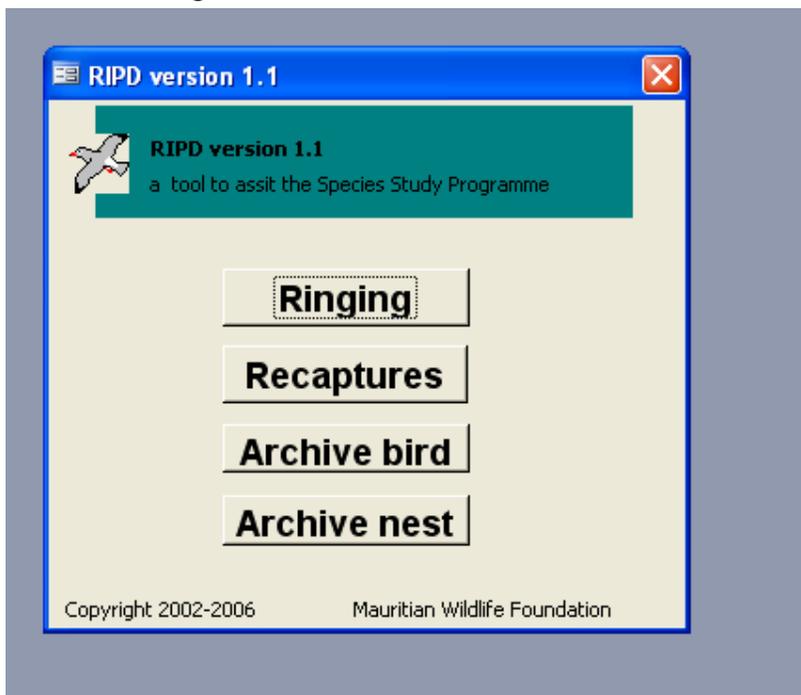


Figure 3. New version of Echo Parakeet Database currently being used

Round Island Petrel Database (RIPD)

The Round Island Petrel (*Pterodroma spp. indet.*) database (Figure 4) is currently being used for the study of this complex seabird. The database consists of different fields such as the ringing which gives information about the ringing dates, age class when ringed, which area of Round Island and/or nest sites where ringed, IDs of birds, breeding or non-breeding activity, plumage. The 'recapture' field provides information on the dates of recapture of each bird, where caught, breeding or non-breeding status. The archive nest shows the nesting sites and area of the birds breeding on the island.



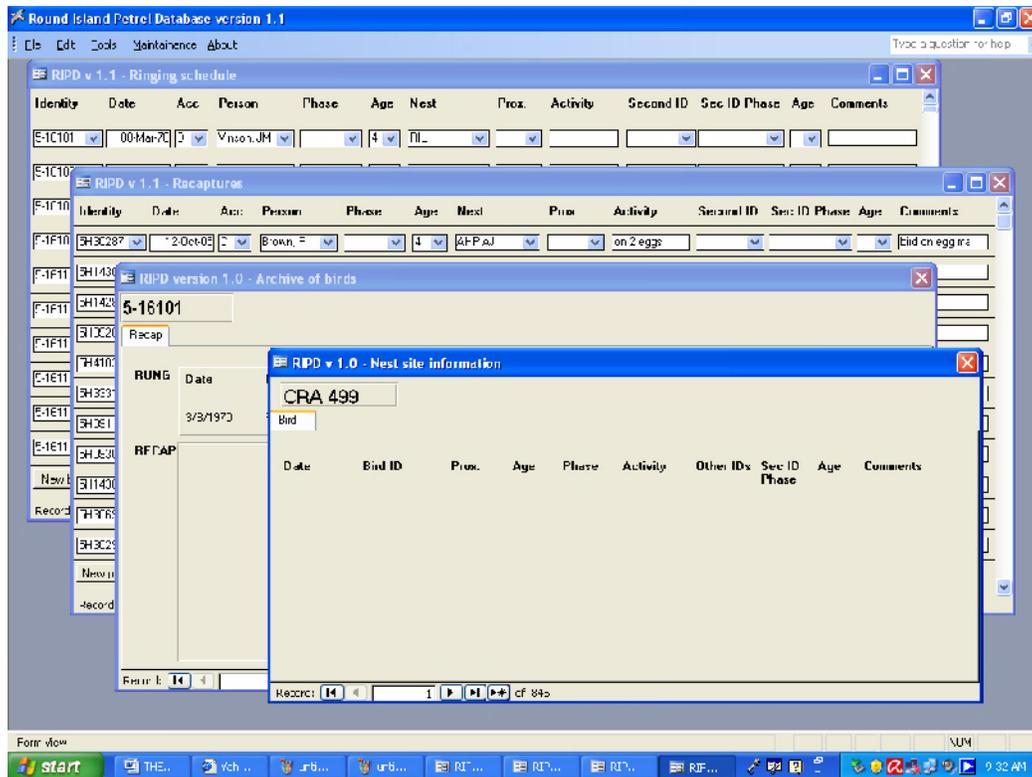
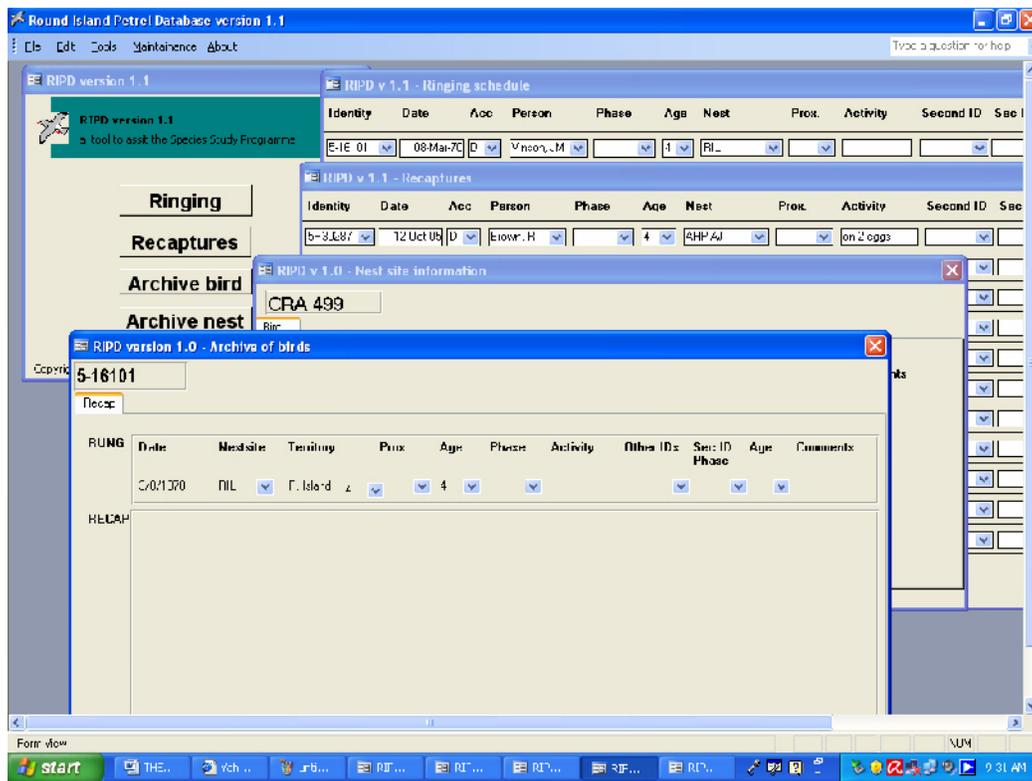
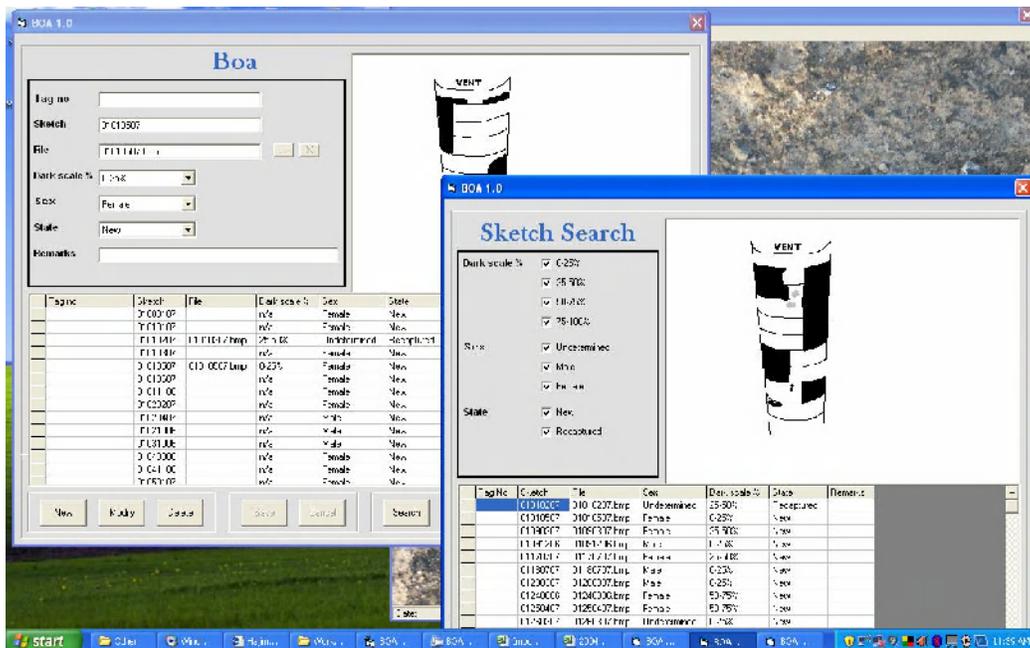


Figure 4. The Round Island Petrel Database

Round Island Boa Database

The Round Island Boa *Casarea dussumieri* Database (Figure 5) helps us manage information on this most singular reptile. It is expected that in a few years, a vast amount of information will be available on the distribution of this reptile across the different habitats (palm-rich forest, coastal area, grasslands, slab/rocky areas etc) surveyed on the island.

Then, a reliable estimate of the actual size of the population can be obtained. Translocation of these snakes to other islets could be envisaged in the near future so as to ensure its survival as Round Island harbours the last surviving population.



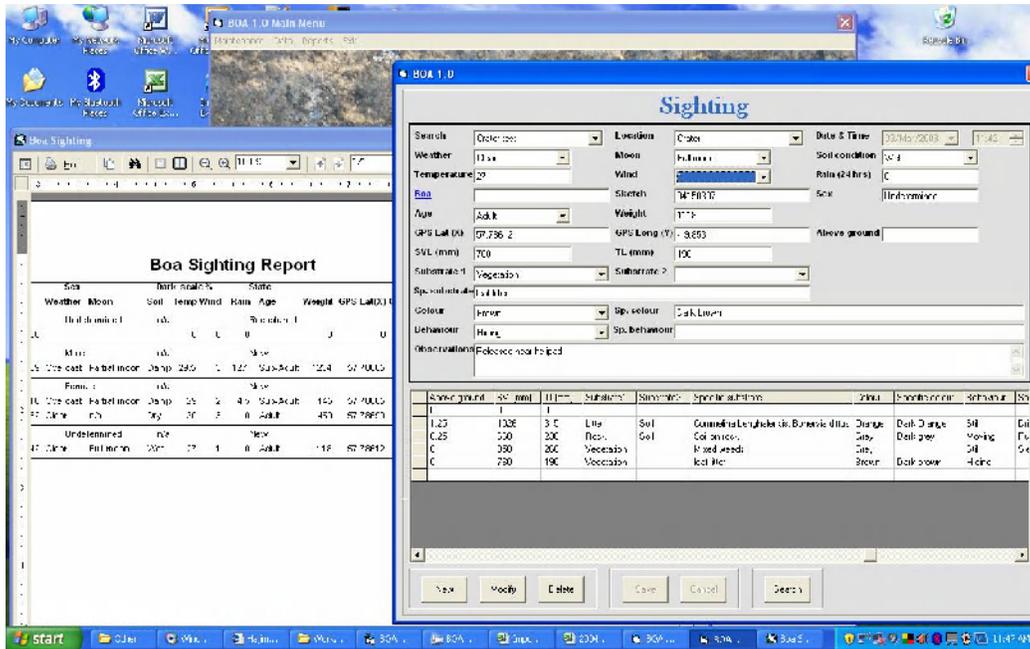
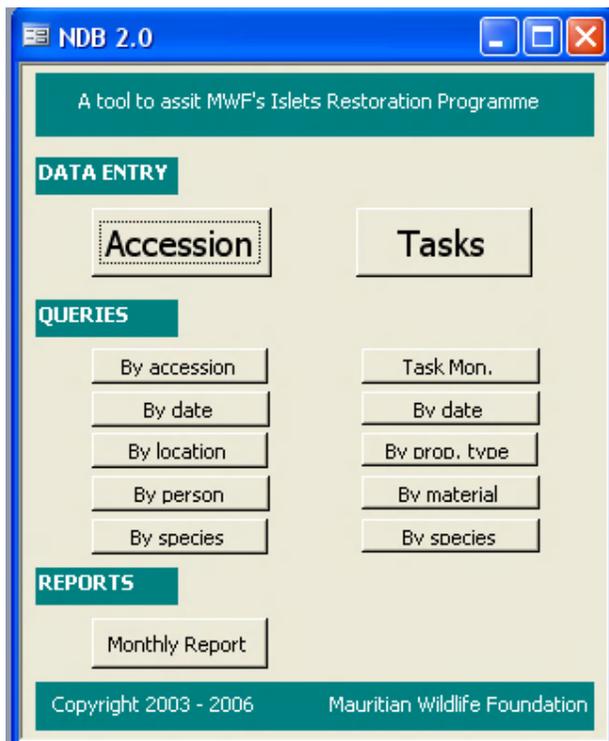


Figure 5. The Round Island Boa Database

Nursery Database (NDB 2.0)

The Nursery Database (Figure 6) is an important tool for the archiving of plant accessions in and dispatch of plants from MWF's nurseries (Ile aux Aigrettes, Pigeon Wood, Round Island, Rodrigues). It also assesses the germination and growing success in the nurseries. The reporting section of the database groups all the different tasks which have been completed during a specific month.



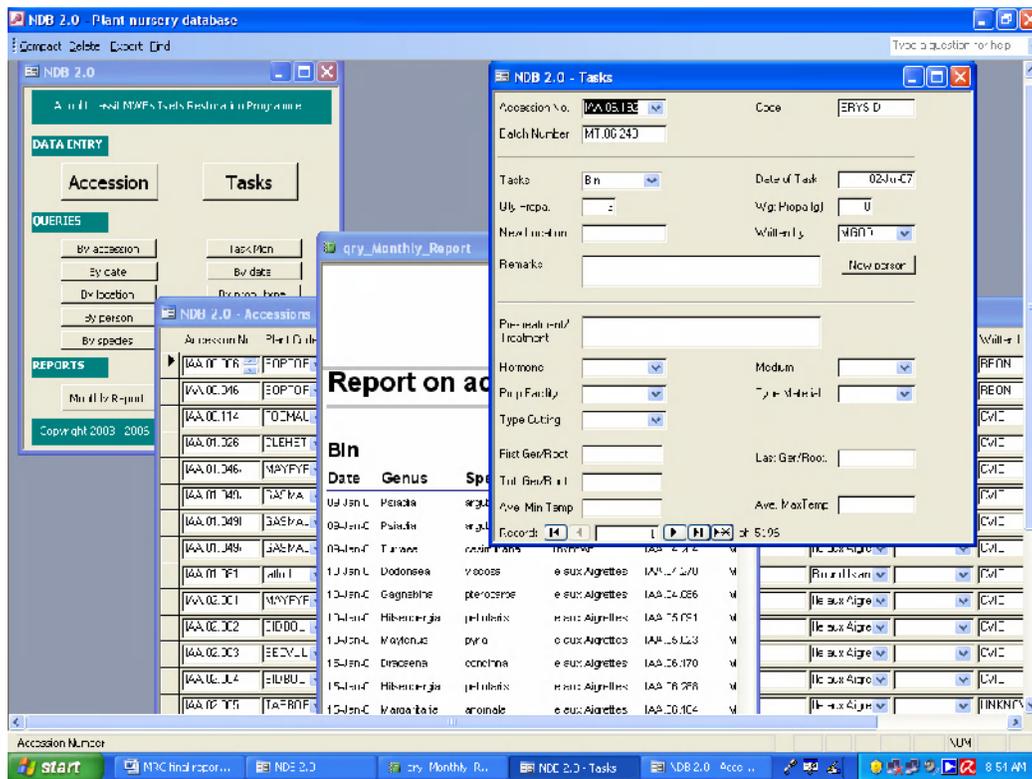


Figure 6. The Nursery Database (NDB2.0)

The Conservation Education Workshop

The education component of this project consisted of the organising of education workshops for secondary teachers and pupils in order to promote biodiversity, which is sparsely covered in the school syllabus. The main aim was to kindle interest and enthusiasm for teaching and learning about our native biodiversity. This component underwent several adjustments, after which it was successfully implemented.

The initial stakeholder consultation was carried out with the assistance of two major stakeholders in education namely the Mauritius Institute of Education (MIE) and the Appui Régional à la Promotion d'une Education pour la Gestion de l'Environnement (ARPEGE) project. It had been observed that although a wealth of information already exists, the information flow from conservation bodies to teachers is inefficient. Hence, a training and discussion was organised with a pilot group of secondary school teachers during a workshop organised in December 2005.

The height of the MRC project was unquestionably the three day workshop organised in June 2007(Figures 7 to 10).



Figure 7. Lecture on botany and biodiversity by Amruta Rane (Phenology Researcher)



Figure 8. Mini-workshop on botanical drawings



Figure 9. Pupils at work for the drawing competition



Figure 10. Filling of questionnaires on native plants

Field guides

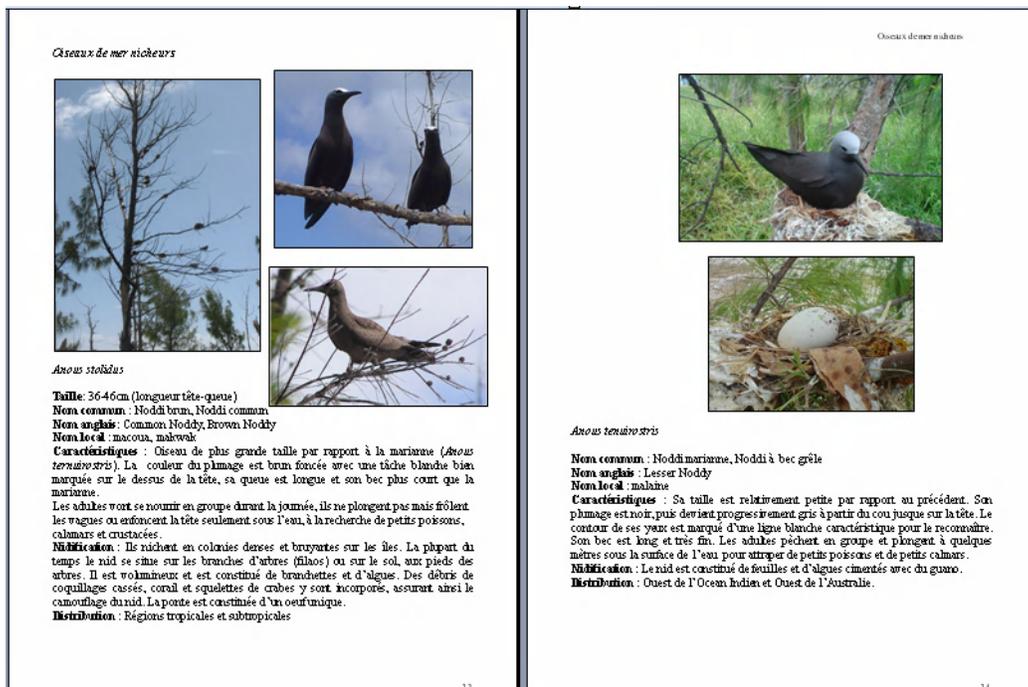
The following field guides have been produced: the ‘Phenology’, ‘Ile aux Cocos’ and ‘Reptile’ guides. Below are some illustrations from the three guides.

The Ile aux coco guide

Title: *Guide Faunistique et Floristique de L’Ile Cocos (Rodrigues)*

“L’Ile Cocos est un des derniers joyaux naturels de Rodrigues. Ce domaine des plantes côtières indigènes de Rodrigues et également très appréciée pour ces oiseaux de mer et son paysage. L’île est incontournable pour la grande majorité des touristes, de Maurice ou d’horizons plus lointains, et des Rodriguais. Pas étonnant donc, qu’il soit une fierté pour la toute jeune Rodrigues autonome..... ”

“La Mauritian Wildlife Foundation tient à remercier Carole Verchère et Sébastien Dufner qui ont grandement contribué a la rédaction du document, ainsi que le Mauritius Research Council qui finance le projet de gestion de bases de données, qui ont été utilisées pour l’évaluation de niveaux de danger des certaines espèces décrites dans ce guide...”



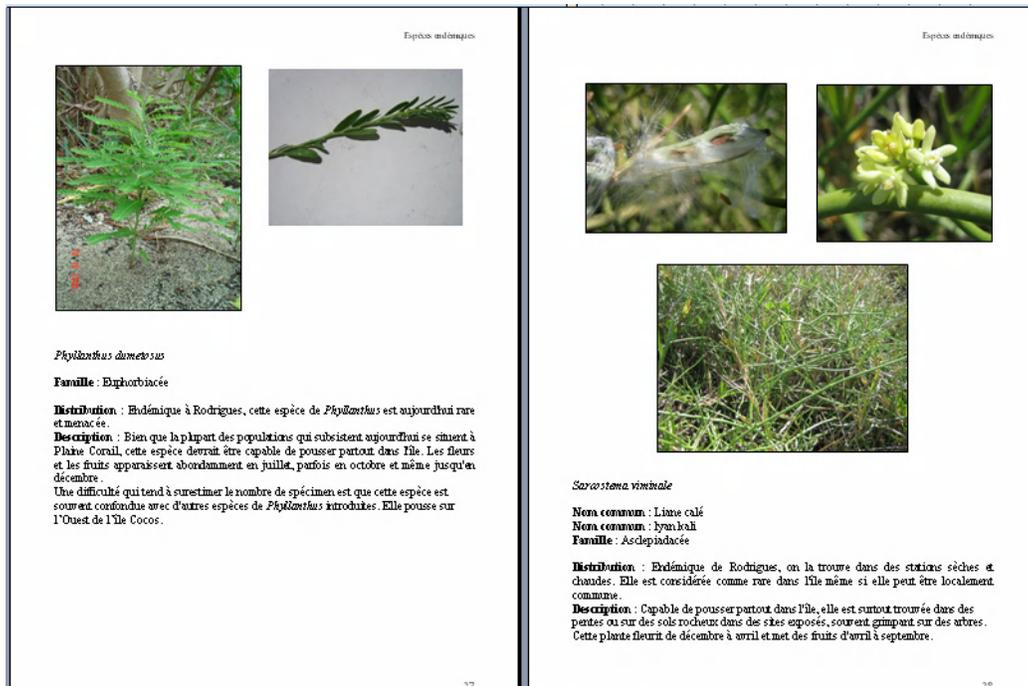
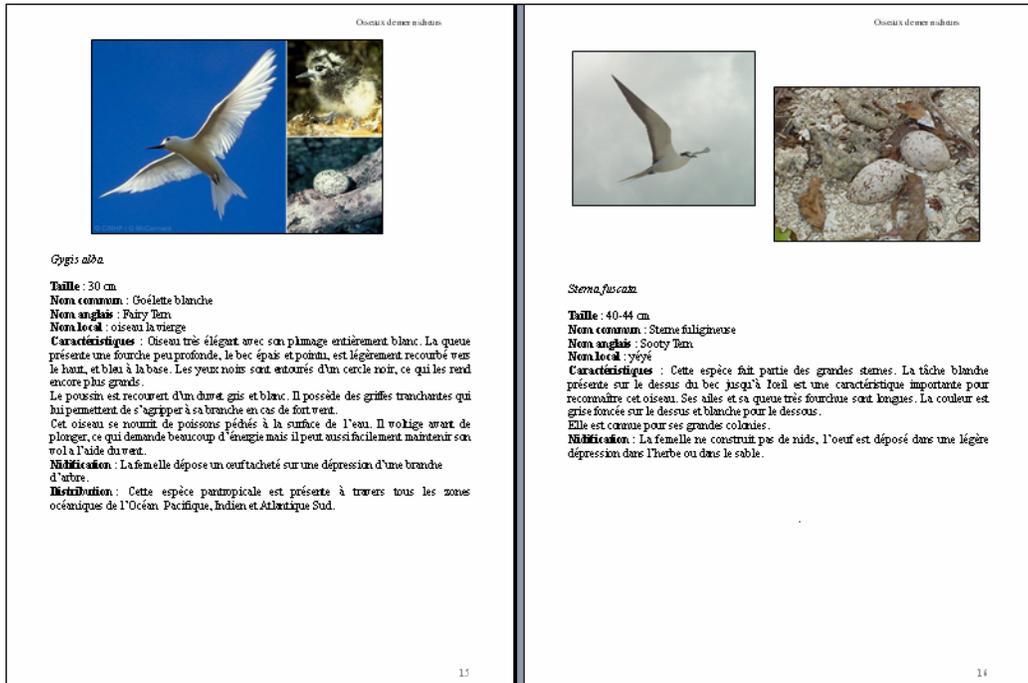


Figure 11. Illustrations from the Ile aux Cocos field guide

The Phenology guide

Title: *The Phenology Monitoring Manual*

“The incentive for writing this manual is to help the field staff, volunteers and any interested field scientist understand the notion behind setting up and functioning of the phenology project. Hours are spent in the field looking at trees, trying to quantify the tiniest flowers-fruits whilst filling in lengthy phenology observation sheets. This manual gives a brief background about the rationale behind all this hard work. By taking the time to read this manual and refer documents from the bibliography, the field staff will hopefully find their participation in the phenology project even more meaningful, interesting and enjoyable.....”

<p style="text-align: center;"><i>Classialia</i> spp Baka Coral Family: Rubiaceae</p> <p>Conservation status: Vulnerable (Corston), Distribution: Upland forest and mossy forest Critically endangered (Crapthair)</p> <p style="text-align: center;">MORPHOLOGICAL CHARACTERISTICS</p> <ul style="list-style-type: none">Habit: Small tree < 4m with lots of branchesBark: GreyLeaf Arrangement: Simple opposite, spread along the branchLimbs: Yellowish green to light green, elliptical, about 10-18cm, thick and shiny, plastic texture, margin curled insideApex: PointedBase: Tapering basePetioles: Petiole (about 1-2cm long)Venation: Reticulate, venation prominent on both the surfaces, distinct mid-ribInflorescence: Terminal, cyme, headFlower: White or purple or pink, conspicuous (about 1-2cm, long tubular corolla resembling coral)Fruit: Berry, dark-red or waxy white in colour, oval or ellipsoid, about 5-8mmExpected flowering and fruiting:   	<p style="text-align: center;"><i>Condamoya integrifolia</i> Baka pigeon Family: Euphorbiaceae</p> <p>Conservation status: Least concern Distribution: Intermediate and upland forest</p> <p style="text-align: center;">MORPHOLOGICAL CHARACTERISTICS</p> <ul style="list-style-type: none">Habit: Tall tree (8-15 m in height)Bark: Pinkish-brown bark, watery sap, branches covered with secretionsLeaf Arrangement: Simple alternate, leaves grouping at the end of the branchesLimbs: Dark green, elliptical, large 20-25cm long, glabrous, entire marginApex: Pointed acute apexBase: RoundedPetioles: Long reddish petiole up to 15-20cm long, thickVenation: Reticulate, midrib and primary veins are prominent and yellowish-whiteInflorescence: Axillary, simple raceme, sometimes panicle, small orange flowers in spraysFlower: Small about 12mm, orange-yellow, lower buds glabrous, long and glabrous pedicel, separate male and female inflorescences, male inflorescences with lots of flowers compared to female inflorescences.Fruit: Capsule 12-14 mm, roundish, horned fruit in 3 sectionsExpected flowering and fruiting:   
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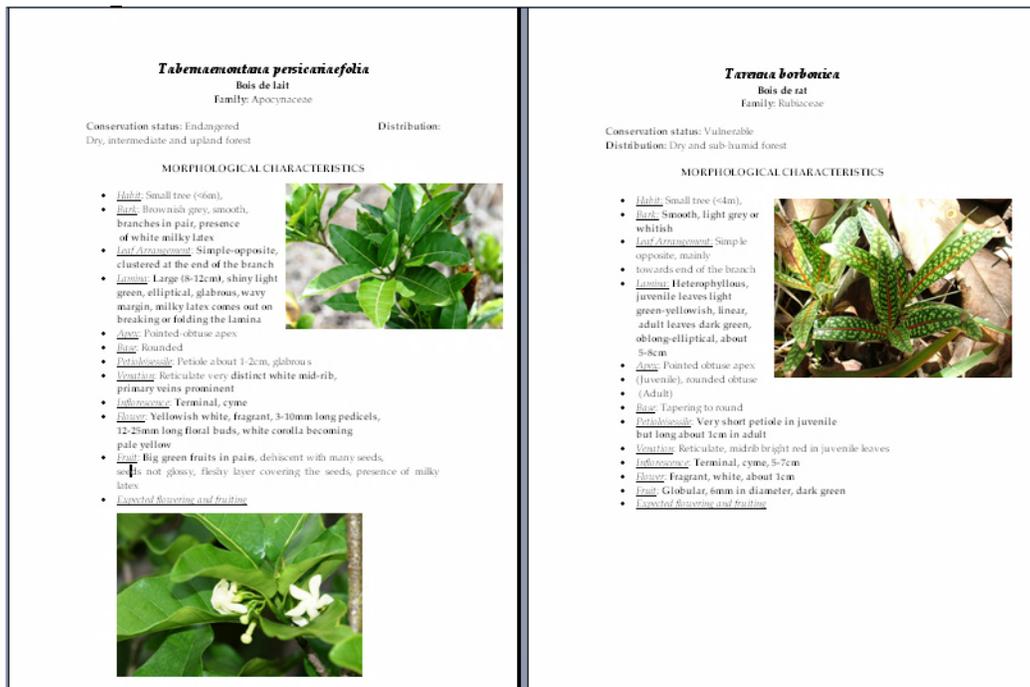
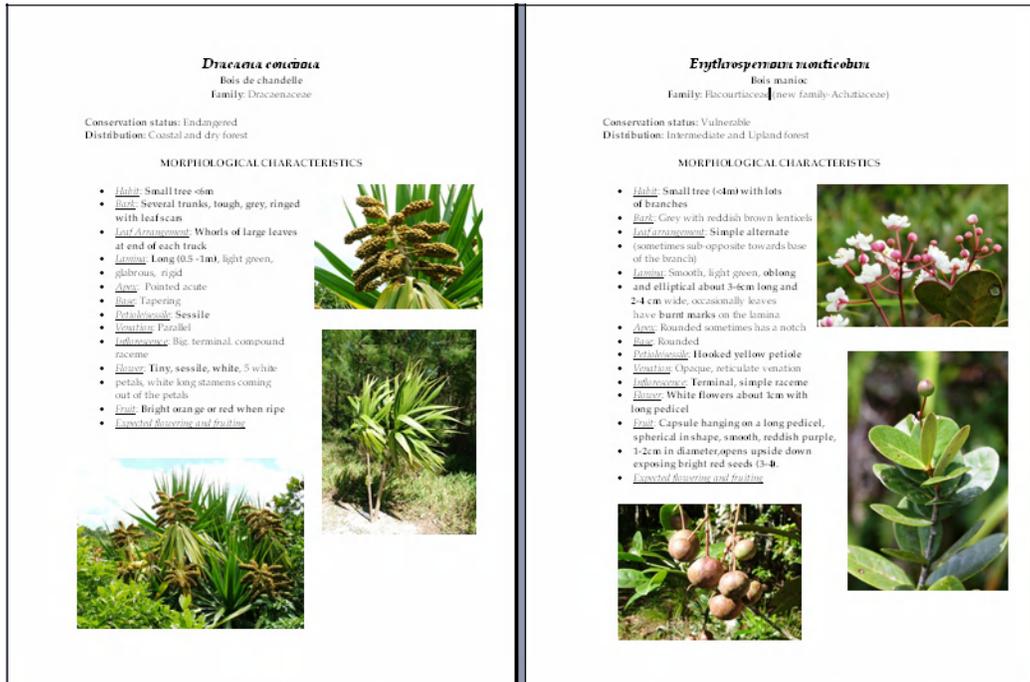


Figure 12. Illustrations from the Phenology guide

The Reptile Guide

Title: *Amphibians and Reptiles of Mauritius*

“This is a non-scientific guide for the identification of the native and introduced reptiles and amphibians of Mauritius and its offshore islands. The guide starts with a brief introduction to Mauritius, its history of destruction and the impact this has had upon the Country’s unique reptiles. The guide continues by listing the reptile species that have become extinct and the exotic reptiles and amphibians that pose a threat of becoming established. Each of the 35 known species that currently occupy Mauritius are then described starting with the geckos, then skinks, snakes, tortoises, turtles and amphibians.....”

A short history of destruction

The unique Mauritian ecosystem was soon to change after its discovery by Europeans in 1507, when the island was sighted by the Portuguese and they possibly introduced the first and most devastating animal to any island ecosystem, the ship rat. In 1598 the Dutch arrived, officially settling on the island in 1638, bringing a host of other exotic animal and plant species including sugar cane, cats, pigs, chickens and more ship rats. Cattle, deer and goats degraded the natural habitat through grazing and howling and enhanced the spread of exotic plants. The Dutch also filled much of the island's on-forest with sheep and goats, which caused more reptile extinctions than any other species. The sheep ate the black and white ferns of the island's on-forest, which were the main food source of the endemic ebony frog. In 1721 the island was settled by the French, who continued to clear the forests and introduce more exotic species, such as the brown rat, mask shrew, henze, mynah bird and Chinese guava. It was then the turn of the British who claimed control in 1810 and with the emancipation of slaves and the immigration of Indian workers, the sugar industry blossomed, this led to a marked population boom and the rapid destruction of much of the island's natural forests and vegetation. Under British rule even more exotic species were introduced, such as the mongoose, wolf snake, and whiskered bulbul, carnivorous snake and parrot to name but a few. Despite the designation of some areas as nature reserves, there was little management so by the time the island was granted independence in 1968 very little of the original ecosystem



was left. Destruction of 98% of the island's natural forests and the influx of exotic predators and competitors has caused the severe decline and fragmentation of nearly all the reptile populations, as well as the loss of more than 60% of the reptile species from mainland Mauritius. The Indian mask shrew, *Suncus murinus*, has contributed to the loss of several reptile populations and the extinction of five endemic aples.

Rats have had the greatest impact upon the reptiles, particularly for the larger lizards and snakes, whilst the loss of smaller skinks and night geckos can be attributed to predation by the mask shrew, wolf snake and additionally for the night geckos: competition and predation by the house gecko, *Hemidactylus bowata*. The day gecko populations have been mostly suffered by habitat destruction, although exotic predators and competitors have taken their toll. Many other species of introduced animal and plant in combination with habitat loss and human disturbance have shaped the distribution and abundance of the Mauritian reptiles and amphibians. An Indian wolf snake, *Lycodon aulicus*, introduced a common house gecko, *Hemidactylus frenatus*. Both of these introduced reptiles have caused disturbances to the natural Mauritian reptiles. continue to do so.



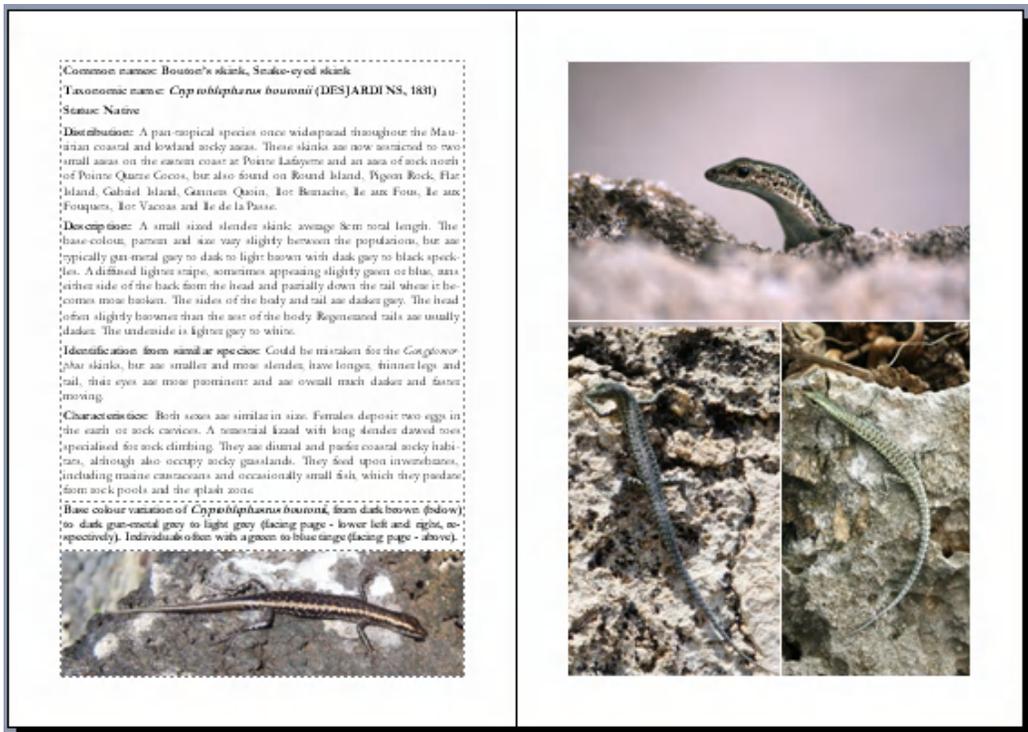
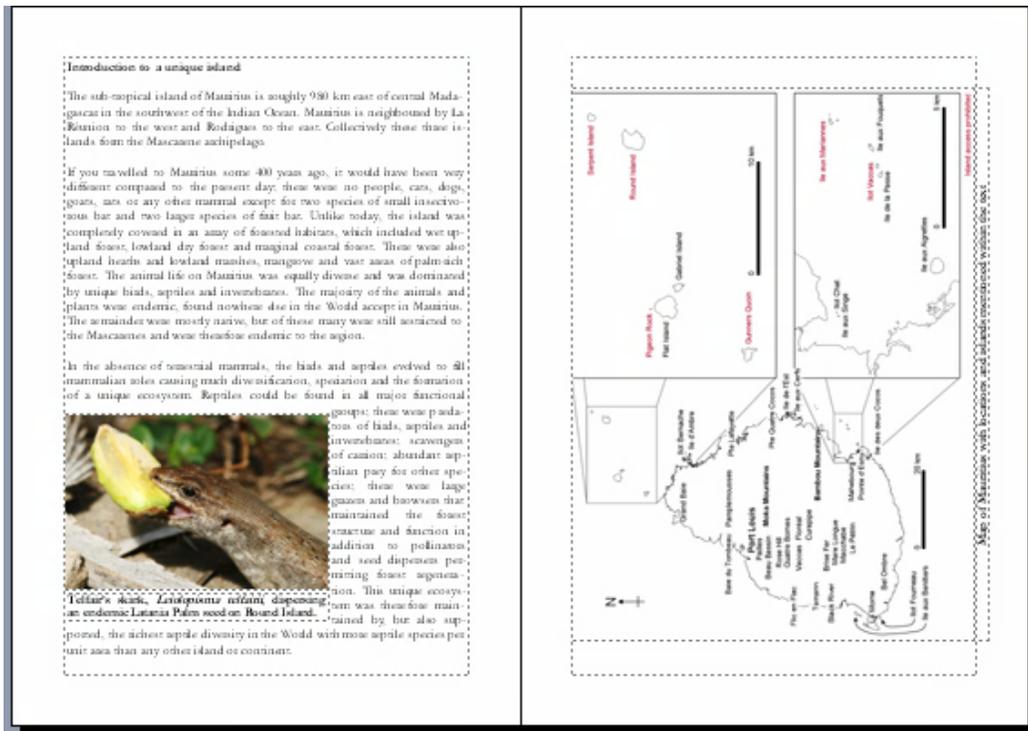



Figure 13. Illustrations from the Reptile guide

Conclusion

The components scheduled in the MRC project have been successfully implemented, although some underwent delays in their implementation, which were often beyond our control.

Several databases have been created and/or modified to facilitate task of users and improve data retrieval and analysis. These databases are functional and capable of generating data already.

The education workshops have been completed following modifications, but in the end have achieved their desired objectives. The lessons learnt from these have now been integrated in the RARE Pride Campaign, an education programme currently being implemented by MWF.

Three field guides (two of which will be for sale and distribution to the public) have been produced, and information from the databases were used in two other field guides that are sold to the public, namely 'A guide to the plants in Mauritius' and 'The native Plants and Animals of Mauritius'.

The main lesson learnt from the MRC funded projects are that databases continuously need to be created or improved so that they can serve as strategic management tools in conservation.

It also became clear that conservation awareness was not being sufficiently addressed in our education system, leaving students unaware of the biological richness of Mauritius and the need to preserve this unique heritage. We also demonstrated that conservation education could help in the promotion of several subjects, including biology, ecology, languages, arts, history, geography, mathematics etc and that there was interest from both teachers and pupils for further development in the curriculum to reflect this.

With the last point in mind, the Mauritian Wildlife Foundation is keen to discuss a follow-up project with the Mauritius Research Council, with a major focus on conservation and environmental awareness, and with ramifications into the Science and Arts curriculum.

Acknowledgements

The Mauritian Wildlife Foundation wishes to thank the Mauritius Research Council for its continuous support to conservation and for having funded conservation databases - a strategic management tool. We also wish to extend our gratitude to the various partners and supporters, throughout the duration of this three year project; the National Parks and Conservation Service, the Ministry of Education and Human Resources, the AREGE Project (Indian Ocean Commission), teachers and pupils from participating schools, the Forestry Service, the Darwin Initiative Project and MWF staff members who have taken a keen interest in the project.