

Proposal for Review

Project Title:	Mauritius Biodiversity Restoration
Focal Area:	Biodiversity
Country Eligibility:	Convention Ratified September 4, 1992
Total Project Cost:	US\$1.6 million
Proposed GET Financing:	US\$1.2 million
Government Counterpart:	US\$0.2 million (Ministry of Agriculture, Fisheries and Natural Resources)
Co-Financing:	US\$150,000 (Non-Governmental Environmental Organizations) US\$50,000 (Local Private Sector)
Implementing Agency:	World Bank
Executing Agency:	Mauritian Wildlife Fund
Coordinating Govt. Ministries:	Ministry of Agriculture, Fisheries and Natural Resources Ministry of Environment & Quality of Life
Estimated Starting Date:	August, 1995
Project Duration:	5 years
GEF Preparation Costs:	No PPA/PDF resources were used to prepare this project.

MAURITIUS: BIODIVERSITY RESTORATION

COUNTRY ECONOMIC BACKGROUND AND ENVIRONMENTAL CONTEXT

1. Mauritius is one of the third world's economic success stories. Led by a burgeoning export-based industrial sector, the country transformed itself within two decades from a sugar-dependent economy with a per-capita income of US\$400 to a middle-income country with a per capita income of about US\$2700, an annual average increase of 9.6% in current dollar terms. However, this period of rapid economic growth, and the centuries leading up to it, have taken a significant toll on the nation's biodiversity.

2. In part this is because small oceanic islands such as the Mascarenes (of which Mauritius is a part) present special challenges for the conservation of biodiversity because they are often characterized by extensive habitat degradation and high rates of species extinction. The Mascarenes encompass a number of islands in the Western Indian Ocean, including the largest islands of Mauritius and Rodrigues, and numerous remote and smaller islands. Their diverse climatic, geological and topographical regimes have resulted in the evolution of diverse biota with a high degree of endemism, further promoted by the islands' age and isolation.

3. With the exception of some of the more remote oceanic islands, Mauritian ecosystems were profoundly modified and degraded after the uninhabited Mascarenes were discovered and colonized.

A period of lumber extraction (ebony) in the 17th Century was followed by agricultural development for sugar cane. As a result, only relictual areas of original habitat survive. With this habitat loss has come a series of extinctions, most notably of the endemic flightless avifauna, among others of the Dodo and the Solitaire, and of reptile species like giant tortoises. The loss of species and populations has been caused by out-competition and predation by invasive exotic species (plants as well as animals), uncontrolled exploitation and the inherent genetic/demographic vulnerability of small populations. Even if all remnant habitat areas were protected, species and habitat loss would continue because of the continuing influence of exotic species and the poor demographic security of small populations.

4. Now that the major period of historical habitat loss has passed, the surviving remnants of the biota offer an opportunity for the restoration of largely destroyed, pre-colonial ecosystems, and in particular for their associated endangered species. The islands of Rodrigues, Ile aux Aigrettes and Round Island offer differing but complimentary opportunities for habitat restoration and species recovery.

5. The Biodiversity of Mauritius. Despite these historical pressures, Mauritius and its dependency of Rodrigues are still globally recognized as centers of endemism for vascular plants, birds, reptiles and mollusks. Between 800 and 900 plant species occur on Mauritius, including 8 endemic genera. About 300 species are endemic to Mauritius, of these approximately 80% are

threatened. The flora of Rodrigues counts 145 indigenous species, of which 41 are endemic. A large proportion of the threatened plant species survive as tiny relictual populations that possess a very high probability of imminent extinction. The floristic inventory has yet to be completed.

6. Rodrigues Island. Recognized since the nineteenth century as one of the world's most degraded tropical islands, Rodrigues has 45 endemic species. The majority of these are critically threatened, 7 of which now survive with fewer than 10 wild individuals. The island Forestry Service, with support from World Wide Fund for Nature volunteers, has been running a successful propagation and re-introduction programme. However, the long term success of this work is seriously compromised by poor facilities and a lack of professional training in horticulture, applied conservation biology, project planning and monitoring. Without additional resources, a number of critically endangered species are likely to become extinct or have their chances for long term conservation reduced through poor genetic/demographic management.

7. Round Island. Round Island is the site for one of the best documented island restoration efforts. It represents the largest area in the Mascarenes free of introduced animals and contains the last remnants of the palm savannah once characteristic of northern Mauritius. Drawing on expertise in restoration ecology of both Mauritius and New Zealand, the Jersey Wildlife Preservation Trust and the Ministry of Agriculture, Fisheries and Natural Resources (MOA) prepared a management plan for the restoration of Round Island. Following the successful removal of feral animals (goats and rabbits) and on-going efforts to eradicate exotic plants, the island can now be restored and the original palm savannah and hard wood forest re-established. Locally extinct animals can be re-introduced. Because of the widely prevalent threats to endemic species on the main island of Mauritius, Round Island represents one of the best chances to restore and maintain endangered Mauritian plant and animal communities.

8. Ile aux Aigrettes. Leased by the Mauritian Wildlife Fund (MWF), this 25 hectare island contains the last viable area of coastal ebony forest, a type of forest now lost on the island of Mauritius. Under the direction of MWF, an ambitious habitat restoration program was initiated which can be developed in parallel to the restoration of Round Island to restore the coastal forest and palm savannah communities and re-introduce missing elements of the fauna.

9. Mauritian Wildlife Fund. The Mauritian Wildlife Fund is a non-governmental group promoting the integrated management of threatened species the nation of Mauritius. It is known internationally for innovative approaches to threatened species management, and most notably for its captive breeding, genetic and demographic studies, reintroduction and habitat management of the Mauritian kestrel and pink pigeon. For 10 years it has collaborated closely with the Conservation Unit in the Forestry Department within MOA. Recently, MOA signed a Memorandum of Understanding, concerning cooperation with a group of international NGOs and the MWF in matters of biodiversity conservation. The group has a demonstrated ability to work on the islands and enjoys an excellent working relationship with GOM and local private sugar cane estates.

10. Environmental Strategy and Policy Contexts. The Government of Mauritius (GOM) has been aware for many years of the considerable environmental issues confronting the islands, and has reacted by developing a sound body of plans, strategies and investment programs. Mauritius prepared a National Environmental Action Plan (NEAP) in 1990, and then approved its Environmental Investment Plan (EIP) to support the NEAP. The EIP outlines a \$109 million program focusing on (i) institutional strengthening to develop the necessary framework of environmental policy and legislation; (ii) land management and tourism control to ensure the protection of natural resources and historic architecture; (iii) industrial, sewerage and solid waste pollution to address the effects of such land-based pollution; (iv) marine conservation to preserve and monitor marine resources; (v) agricultural residues to control the effects of pesticides and fertilizers; and (vi) terrestrial conservation to protect and/or restore natural habitats. A largely IBRD/GOM-financed project, Environmental Monitoring and Development Project, has been under implementation since 1990. It provides \$20.5 million to pursue priority actions identified in the EIP, including monitoring marine pollution, water quality and ecosystem health, improvement of laboratory analysis facilities, land-use and infrastructural planning, development of a national solid waste management plan, research on integrated pest management, and the creation of terrestrial and marine parks, including the Black River Gorges National Park, Mauritius' first national park. This project provided key input into the government's recently completed Sewerage Master Plan, for which GOM is seeking financing estimated at \$50 million. The Sewerage Master Plan would support civil works for land-based pollution control, and institutional strengthening for a newly established Waste Water Authority. Certain measures to combat marine pollution are already under preparation.

11. Biodiversity Strategy and Actions. Mauritius was the first country in the world to ratify the Biodiversity Convention, and GOM is committed to prepare a biodiversity conservation strategy, as required by the Convention, to complement the highest priority actions already identified in its NEAP. Mauritius also ratified the Convention on International Trade in Endangered Species (CITES). Through effective policies, collaboration with NGOs, bilateral and multilateral agencies, public education and control of certain forms of pollution, GOM has now largely halted terrestrial habitat destruction. Its official biodiversity priority is now to extend protection to key habitats and to restore some of its most unique ecosystems. Consequently, GOM is financing the establishment of Black River Gorges National Park, and has reserved two entire uninhabited offshore islands, Ile aux Aigrettes and Round Island, for species and habitat restoration efforts, as recommended in the NEAP. It is also beginning a program to monitor marine pollution and ecosystem health. It is funding the Management of Nature Reserves initiative. ODA supported surveys of flora and fauna through the Offshore Islets Initiative and provided recommendations for conserving biodiversity on the various islands. In the late 1980s and early 1990s, the World Wide Fund for Nature (WWF) ran an upland forest restoration and species reintroduction program, and a UNDP-implemented Pilot Phase GEF project is preparing to undertake forest restoration work in Black River Gorges National Park. An European Community/ Indian Ocean Commission funded program for coastal management and plant conservation may begin activities soon, too.

PROJECT OBJECTIVES

12. This project intends to help GOM to meet some of its outstanding global obligations, identified in domestic environmental strategies and plans and specified under the Biodiversity Convention, for which full domestic funding is not forthcoming. Specifically, it would (i) protect critically endangered biodiversity of international importance by restoring degraded small island habitats and propagating & reintroducing endemic species to these habitats, and (ii) strengthen capacity for the management and monitoring of biodiversity restoration.

PROJECT DESCRIPTION

13. The project would support innovative efforts in habitat and species restoration. Local capacity and facilities would be strengthened to undertake the required horticultural, monitoring and managerial activities necessary to execute the project and to identify and execute similar future activities. The project would focus on Rodrigues and Round Islands and Ile aux Aigrettes, which offer differing but complementary opportunities for habitat restoration and species recovery that are more promising than on the island of Mauritius. On Rodrigues, it is proposed to develop the existing government nursery at Solitude, and to expand or consolidate the restoration work underway in 3 reserve areas (Grande Montagne, Cascade Mourouk and Anse Quitor) where, amongst other species, 41 endemic plants and trees (7 of which now survive with less than 10 individuals) would be propagated and transplanted. The restored forest plots would also play a pivotal role in re-establishing viable populations of two endemic birds, the Rodrigues fody and the Rodrigues warbler, and the endemic Rodrigues fruit bat. On Round Island, the first phase of restoration has been completed with the eradication of feral goats and rabbits. Restoration of the palm savannah and hardwood forest can now proceed by weeding undesirable exotic species and reintroducing lost species from Mauritius, some of which have little chance of survival on the mainland because of competition and predation by introduced species. On Ile Aux Aigrettes, the lowland ebony forest would be restored while reintroduction of two endemic and endangered bird species, the Mauritius kestrel and pink pigeon, is in progress. In the long run, this could lead to the reintroduction of other lost ecosystem components (flightless rails, giant tortoise). A small nursery would be developed on Ile aux Aigrettes to serve its needs and those of Round Island, with improved accommodation for field workers and researchers.

14. The project would consist of four specific components:

- (a) a survey for (a) the identification of original habitat/community types for determining species recovery and habitat restoration targets at the three sites, Rodrigues Island, Ile aux Aigrettes and Round Island, and (b) the eradication or control of undesired exotic species (\$115,000);
- (b)
- (c) investment in required infrastructure for the ex-situ propagation and cultivation of threatened plants (\$195,000);
- (d) propagation, replanting and reseedling of endemic plants, and reintroduction of endemic animals from captive-bred populations (\$950,000); and
- (e)
- (f) technical assistance to strengthen the governmental and non-governmental institutions involved, based on a skills audit and training needs analysis (\$350,000). This would develop (a) skills in project planning and administration, (b) horticultural expertise and facilities to ensure the viability of support propagation services and the long term holding of plant populations, (c) expertise in applied conservation biology including the genetic/demographic management of endangered plant populations, and (d) skills in habitat monitoring.

All strategic and policy documents as well as investment plans mentioned in this document are available from the Government of Mauritius.

RATIONALE FOR GEF FINANCING

15. The project addresses high priority issues identified in Mauritius' NEAP and EIP, and complements the Black River Gorges National Park initiative financed by GOM. It seeks to preserve highly threatened endemic species and ecosystems by going beyond traditional protection measures and establishing a replicable model for species reintroduction and habitat and ecosystem restoration and monitoring, which would be especially valuable for other island ecosystem and species projects. It involves Government-NGO partnerships, and brings together international, domestic and private sector expertise and/or resources; raising awareness domestically and internationally and increasing opportunities for future resource mobilization. It builds upon the restoration work initiated by MWF, WWF and UNDP/GEF by expanding and amplifying activities on critical island habitats. Finally, it strengthens local technical and administrative capacity to identify and respond to similar biodiversity threats in the future. The project is consistent with priorities identified by the first Conference of the Parties of the Convention on Biological Diversity since it is a demonstration project to promote conservation of endemic species in small island ecosystems.

SUSTAINABILITY AND PARTICIPATION

16. The crucial element for sustainability would be continued monitoring and maintenance of habitats under restoration. Sugar estates already provide workers free of charge to weed exotic species and plant desired species during the industry's off-season, and this is expected to continue. Using sugar laborers can have the secondary benefit of raising public awareness of biodiversity conservation issues. Through its local Forestry Department staff, GOM would maintain the project on Rodrigues. MWF has long-term leases to manage Ile aux Aigrettes, and is expected to continue to raise funds internationally and domestically for its activities, including monitoring and maintenance of

project sites. As the project is executed, diminishing maintenance is expected since the restored ecosystems would grow towards a stable climax state. In the unlikely event MWF does not renew its lease, GOM may consider visitor fees for Ile aux Aigrettes (the only accessible site of the three in this project) to raise funds to support conservation activities. The project emphasizes strengthening of local technical and administrative capacity to identify and respond to similar biodiversity threats in the future, and takes full advantage of the cooperative spirit between government, NGOs and the private sector to establish long-term relationships.

17. **Social Impacts and Participation.** This project is not expected to have any negative social impacts. It targets areas that are not only uninhabited but are not currently used for economic purposes. It was prepared with and would be executed by MWF, a respected local NGO. Through the use of off-season labor from sugar estates, it would increase local awareness and ownership of biodiversity restoration efforts.

LESSONS FROM PREVIOUS BANK AND GEF INVOLVEMENT, AND GEF TECHNICAL REVIEW

18. In 1988, the Bank participated in the formulation of the recommendations that were incorporated in the NEAP. Subsequently, the Bank cofinanced the Environmental Monitoring and Development Project, currently under execution, and is executing projects in other sectors. In general, project implementation has been relatively successful, due largely to (i) good institutional capacity, (ii) strong ownership when institutions are involved at the onset, and (iii) strong follow-up once decisions are made. This project devotes significant resources to capacity-building. It was prepared in close cooperation with and enjoys strong commitment from relevant stakeholders in GOM and the environmental NGO community. The associated NGOs are experienced in Mauritius and were active in the formulation of the NEAP and EIP. Two (JWPT, WWF) participated meaningfully in the appraisal of the Black River Gorges National Park component of the Environmental Monitoring and Development Project. The Pilot Phase GEF project in Mauritius, Ecological Restoration of Highly Degraded and Threatened Native Forest, managed by UNDP, has not yet begun implementation, but the preparation experience of this project highlighted the needs to continuously monitor and guard against invasive species. The proposed project therefore chose to work on off-shore islands to isolate restored species and habitats from invasive species, and to work with organizations with long-term commitments to these sites.

19. A technical review was held for the project on December 22, 1994. The meeting requested full presentation of the global benefits of the project, innovative aspects and replicability in other countries, lessons from past experience, and sustainability. The documentation was duly modified. The written comments of the technical reviewer praised the proposal, calling it "the best GEF proposal I've yet seen" and citing how it (a) establishes a model for species/ecosystem protection and rehabilitation, (b) builds on successful local initiatives already underway, (c) involves collaboration with high quality international NGOs, and (d) is limited but feasible in scope. The reviewer recommended building in long-term monitoring and control of exotic species in the future, and requiring local counterpart financing. Both recommendations were incorporated into project

documentation by clarifying the mechanisms of monitoring and control of exotic species, and local counterpart contributions (see Annex 1).

PROJECT COSTS AND FINANCING

20. A grant of US \$ 1.2 million is sought from the GET, while \$0.4 million in related local costs would be funded locally. The financing plan is summarized as follows:

GET	GOM	NGO	Private	Total
1.2	0.2	0.15	0.05	1.6

21. GOM would finance about \$200,000 for salaries, local transport and other recurrent costs of the Ministry of Agriculture, Fisheries and Natural Resources while the GET would finance civil works, equipment, operating costs and consultants/technical assistance, both local (\$700,000) and foreign (\$500,000). Sugar estates and NGOs, through MWF, would contribute services valued at \$200,000.

INCREMENTAL COSTS

22. The Government of Mauritius is in the process of executing priority elements of a \$109 million Environmental Investment Plan, using its operating budget and borrowing from IBRD and other financiers. While GOM has demonstrated clear commitment to biodiversity protection in its NEAP and EIP, and through financing the establishment of the Black River Gorges National Park, it cannot afford to pay for all needed biodiversity protection initiatives, whose benefits accrue largely to the international community. Thus the project's baseline costs, valued at \$200,000, are the MOA salaries, transportation and other recurrent costs to coordinate the activities. In addition to financial and staff resources, GOM is donating land for nurseries and has leased for a nominal fee (\$1 per year for 20 years) the entire island of Ile aux Aigrettes to the MWF. The private sector would provide free labor (estimated value of at least \$50,000 over five years) and international and national NGOs are expected to contribute an estimated \$150,000 to their support for captive breeding facilities. On completion of the project, recurrent costs would be covered by MWF and its supporting international NGOs. The estimated total cost is \$1.6 million, and a GET grant of \$1.2 million is sought to cover the incremental costs. In tabular form:

	Total Project Costs	1,600,000
minus	Baseline Costs (MOA costs)	200,000
	Co-financing (NGO/Private)	200,000
	Land	FREE
	Incremental Costs	1,200,000

ISSUES, RISKS AND ACTIONS

23. The project requires effective coordination between GOM (Forestry Department) and MWF, which was formalized through signing of a memorandum of agreement. The project is also at risk of destruction from hurricanes, drought and the inadvertent introduction of alien species. This last risk, although significant, would be minimized by the presence of a warden and other project staff. Another danger is that continued support from participating NGOs and labor from sugar estates are discontinued, although these actors have not indicated any intention to withdraw support.

24. As conditions of effectiveness, (i) the Mauritian Wildlife Fund would hire a program plant conservation manager, a plant conservation officer for Rodrigues, and a resident warden for Ile aux Aigrettes; and (ii) MOA would prepare a formal authorization acceptable to the GEF and the Bank to delegate to MWF the procurement of works, goods and services. Within the first six months after grant effectiveness, MWF would prepare a comprehensive training program as described under Project Description. In the same time period, MWF would also develop a year-by-year work program for the project, and expand its indicators of success from earlier restoration activities to cover the proposed project's activities.

25. The project would be implemented by the MWF in collaboration with MOA (project administration, local transport, some labor), the Jersey Wildlife Preservation Trust (island restoration and vertebrate reintroductions), the Royal Botanical Gardens, Kew (training in horticultural and conservation management of threatened plants) and the Faunal and Floral Preservation Society (training and organizational strengthening). Close cooperation would be established with the National Parks and Conservation Service and the Department of Forestry of the MOA, whose personnel would work part time in the project. A Memorandum of Agreement was recently signed between MOA and MWF for cooperation in matters of biodiversity conservation. Procurement would comply with standard World Bank Procurement Guidelines. The project would last 5 years. Project plans would be drafted, and training, institutional strengthening and construction of facilities would commence in year 1.

26. Monitoring and Evaluation. Monitoring of the biodiversity component is inherent in project design since resident technicians would be constantly on location, monitoring project progress and exotic species invasions, in which case off-season sugar estate labor would be used to respond. Progress reports would be submitted every six months, and every two years MWF would prepare, as it already does now, evaluation reports for its activities. MOA/MWF would jointly prepare a final project evaluation within 6 months of the project closing date.

ANNEX A: SUMMARY OF TECHNICAL REVIEW AND OUTCOMES**MAURITIUS: BIODIVERSITY RESTORATION**

1. The technical reviewer praised the proposal, calling it "the best GEF proposal I've yet seen" and citing how it (a) establishes a model for species/ecosystem protection and rehabilitation, (b) builds on successful local initiatives already underway, (c) involves collaboration with high quality international NGOs, and (d) is limited but feasible in scope. The reviewer recommended building in long-term monitoring and control of exotic species in the future, and requiring local counterpart financing.

2. In response, it was noted that long-term monitoring and control of exotic species are inherent in project design. The principal executing agencies (Department of Forestry and MWF) have staff assigned and long-term commitments to the project sites to monitor the success of eradication programs of exotic species. Furthermore, because of their isolation and/or protection, all three sites have a relatively low risk of introduction of exotic species. The arrangement with sugar estates to provide labor to weed exotic species has proven popular among laborers and estate owners, and is not expected to change. Finally, local counterpart support to the project was made explicit in project documentation.