

The Evolution of Conservation Efforts in Madagascar

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ABSTRACT. The Indian Ocean nation of Madagascar is home to world-renowned levels of biological diversity, destructive trends of environmental degradation, and extreme poverty. International conservation action on the island has accelerated at a dramatic rate since the 1980s, including the implementation of a national environmental action plan, several debt-for-nature swaps, and more than a dozen integrated conservation and development projects. This article reviews the evolution of international involvement in Madagascar and develops a conceptual model to explain this recent explosion in activity. The model suggests that the environmental context of megadiversity and severe degradation, the growing global environmental movement, and the political-economic situation of Madagascar are the ultimate factors behind international conservation action. The particular timing of the conservation boom can be explained by the proximate factors of environmental research, 1980s environmentalism, and 1980s politics, facilitated by awareness, individual actors, group cooperation, and economic incentives. The results of the boom are tangible, with new protected areas, improved reserve management, and soil conservation programs. Yet criticisms abound regarding impacts on local residents and wasted money. Many would agree it is too early to judge the success of the conservation boom.

Introduction

The Indian Ocean mini-continent of Madagascar witnessed an incredible "boom" in conservation activity by northern environmental and development organizations starting in the mid-1980s. Conservation spending by the World Wide Fund for Nature (WWF) in Madagascar increased more than ten times between 1983 and 1993 (see Figure 1). The United States Agency for International Development (USAID) rapidly expanded its programs in the late 1980s, allocating more than \$71 million to conservation projects. The island has also become a focal nation for Switzerland's development aid, witnessing a fivefold increase in spending in the last decade (see Figure 2). The capstone

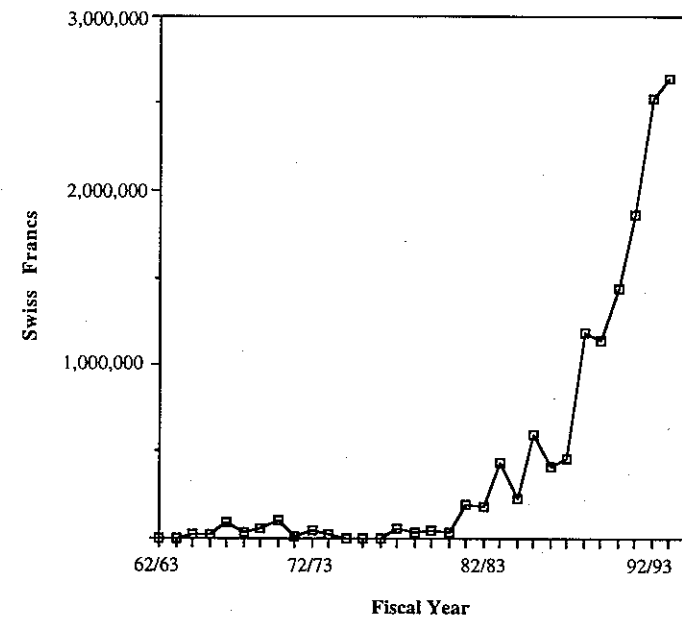


Fig. 1. World Wide Fund for Nature (WWF) expenditures for Madagascar, 1963–1994. Includes generally only funds passing through the Swiss headquarters of WWF. (Source: WWF-International/PFPS.)

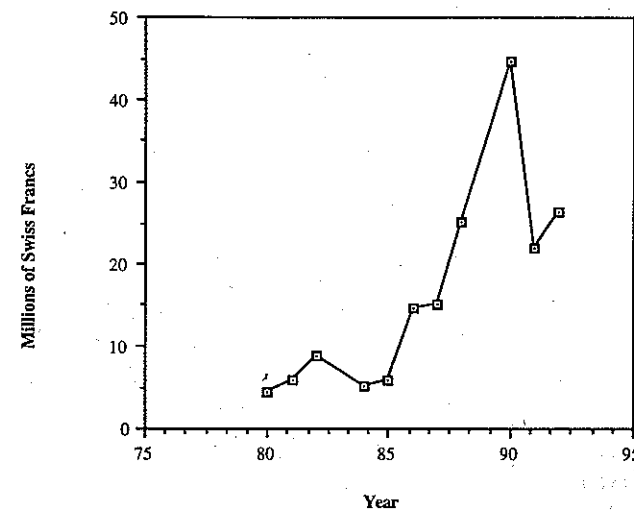


Fig. 2. Swiss bilateral aid to Madagascar, 1980–1992. (Source: Rapports Annuel, Coopération au Développement de la Confédération Suisse.)

of this conservation boom is the World Bank-facilitated Environmental Action Plan, to which over \$100 million of foreign money was pledged in 1990.

The Malagasy conservation boom is an interesting case study of the dynamics and effects of international environmental politics. In addition, the dramatic events of the past decade have important implications for the politics, citizens, and natural resources of Madagascar. Where post-colonial France once exerted its heavy influence on the newly independent Malagasy Republic, now the World Bank largely dictates economic policy, and a consortium of foreign donor agencies essentially manages the protected areas. For the Malagasy people, the conservation and development boom means an increased presence of foreign-funded projects in their regions. And for the natural resources, forests, and biodiversity, the events of the past decade represent a frantic effort by northern conservationists to stop the much-touted "spiral of environmental degradation."

This article dissects the roots of this dramatic trend. Did environmental degradation pass some critical threshold that inspired action? Can we attribute this trend to the international wave of environmental consciousness characterizing the late twentieth century? What role does Madagascar's situation as a poor, indebted Third World nation play? To answer these questions, I rely on the published and unpublished literature of academics and donor organizations as well as on a series of interviews of conservation and development professionals. Their anonymous contributions are acknowledged in this paper as "anon-x," where the extra letter indicates the individual.

No single one of the above reasons, including degradation, environmentalism, or political economy, is sufficient in itself to explain the events of the last decade. To balance the contributions of interrelated explanations, I rely on a conceptual model that identifies ultimate factors, proximate factors, and facilitators. The ultimate origins of international conservation activity in Madagascar include the environmental context, northern environmental ethics, and global political and economic relations. The recent surge in activity is due to the conjunction in time of the 1980s sustainability movement with concurrent political events. Facilitating factors include the social "construction" of environmental crisis, individual initiatives, and economic incentives.

In this analysis of the dramatic surge of conservation activity, I begin by outlining the important events in Malagasy environmental and conservation history. This has not been done extensively in the literature, and thus will serve as useful background. The second section presents a conceptual model to guide the analysis of the conservation boom. By presenting an analysis of the history and underlying causes of the conservation boom, this article will aid in understanding the motivations of the international groups involved in Malagasy conservation, as well as illuminate the contributions of Malagasy scientists and policy makers. Finally, I conclude by evaluating the results of conservation action in Madagascar thus far, emphasizing the implications of the boom for the environment and the local people.

History of Conservation in Madagascar

The roots of the recent surge in activity in Madagascar include the creation of the first reserves in 1927 and the laws of the nineteenth-century Merina kingdom. In fact, environmental and land-use history since before human settlement is important as historical context to the present discussion, both ecologically and culturally. Thus, this section relates the story of Malagasy conservation from millions of years ago up to the present. There are three main purposes to this discussion: first, to present a history of Malagasy conservation; second, to document further the existence of a conservation boom; and third, to provide background to the arguments presented in the analysis.

Beginnings

The island of Madagascar separated from continental Africa some 165 million years ago; the resulting isolation is a key factor in the incredible endemism and diversity of flora and fauna found on the island. The island, fourth largest in the world, boasts more known plant taxa, for example, than almost all other African nations, and more than 80 percent of these are endemic. There are more than 400 endemic vertebrate species, including all 30 species of lemurs as well as all rodents, carnivores, and insectivores. Madagascar possesses more chameleon and baobab species than the rest of the world and more orchids than the rest of Africa; 110 of its 112 palms are found nowhere else.¹

Uninhabited during most of its history, Madagascar was settled around 1,500 years ago by successive waves of emigration from present day Indonesia, as well as from coastal Africa and Arabia. Presettlement vegetation patterns changed as the climate changed; when humans arrived they probably found tropical rainforests in the East and a dynamic mosaic of montane forests, dry forests, open woodlands, and grasslands in the highlands and West.² The historical human imprint on ongoing vegetation dynamics is seen in the gradual conversion of many areas into fire climax grasslands and agricultural lands.

The original populations expanded, influenced by Indian Ocean trade and eventually European contact, and now constitute about 20 different ethnicities. At the turn of the nineteenth century the rice-irrigating Merina peoples of the Central Highlands gained prominence as they were unified by King Andrianampoinimerina (1782–1810). His son, Radama I (1810–1828), conquered most of the island with British military aid. During this period the nation of Madagascar was recognized diplomatically by Europe as well as the United States.³

Events of the nineteenth century are significant to a conservation history for three reasons. First of all, the proliferation of contact with Europeans set the stage for long-term northern influences—from missionaries and colonists to global trade and environmental politics. Second, the early explorers who

brought stories of the island's exotic natural beauty back to Europe, such as Commerson and Grandidier, contributed to the romantic myth of a wild Africa that lies at the roots of the conservation movement.⁴ Finally, this period includes several historical precedents for forest conservation policies and state resource control, including King Andrianampoinimerina's ban on cutting live firewood and the 1881 Code of 305 Articles, which banned the burning of forests.⁵

French colonial rule

France conquered Madagascar in 1896 and controlled the island until 1960. These 64 years of colonialism were an important precursor to today's power relations, and resulted in many lasting administrative, legal, and social structures. For example, the Académie Malgache, founded by Governor General Joseph Galliéni in 1902, was instrumental in banning the killing of lemurs and in the establishment of ten Réserves Naturelles Intégrales (strict nature reserves) in 1927. The Académie Malgache, chiefly inspired by Professor Henri Humbert, was moved to action by the progressive disappearance of the island's unique flora and fauna.

Concurrently, however, while the colonial government banned shifting cultivation, logging and forest concessions contributed significantly to continuing deforestation. In fact, almost three-quarters of the remaining primary rainforest was destroyed in the first 30 years of French rule.⁶ While the French exploited the native forests for tropical hardwoods, they also pursued aggressive reforestation schemes in the treeless highlands and along train lines to meet construction and woodfuel needs. Beginning in the 1890s, introduced Eucalyptus, Acacia decurrens, and Pinus were grown in large plantations and in village woodlots.⁷ By 1960, reforestations covered more than 200,000 hectares.

Independence and the First Republic

The Republic of Madagascar recovered its independence in 1960 under President Philibert Tsiranana. In the last years of French rule and the early years of the Malagasy First Republic, five additional categories of resource conservation areas were established to complement the strict nature reserves: national parks, special reserves, classified forests, reforestation zones, and nonhunting reserves (Table 1). A fairly complete set of environmental legislation was created during the First Republic.⁸ Land tenure and land use laws in 1960 to 1964 stressed the social obligation to develop land and put uncultivated land back into cultivation, yet land clearance was only legally permitted within set boundaries subject to written authorization. In addition, all deliberate fires except those for clearing pastures were forbidden, and these fires were limited

Table 1. Types of Protected Areas

Type	Description
Strict nature reserves	All access forbidden except for scientific research. Original 10 established in 1927; currently 11 in number, covering 570,000 ha.
National parks	Controlled access; tourism allowed; rights to neighboring villages to exploit certain forest products. Legislation since 1958; currently 5 in number covering 162,700 ha.
Special reserves	To protect specific plant or animal species. Free access; hunting, fishing, grazing livestock, collection of natural products, introduction of foreign species are all forbidden. Currently 23 in number, covering 365,500 ha.
Classified forests	Protected from current exploitation as economic 'reserves'; certain local traditional rights respected. 158 forests covering ca. 2,671,000 ha.
Reforestation and restoration zones	To stabilize and protect watersheds and prevent erosion. Land use is regulated, reforestation and anti-erosion measures are implemented. 77 zones cover ca. 820,000 ha.
No hunting reserves	Hunting is prohibited or seasonally closed; free access. 4 in number.

to low-risk days and to one hectare per head of cattle,⁹ and allowed only with government permission. Reforestation was encouraged in a 1962 presidential decree requiring all men to plant 100 seedlings a year or to face a tax; this was abolished in 1972. As for endangered fauna, a decree in 1961 superseded all previous laws and created a threatened species list. All lemurs, the dugong, the blind cave fish, the radiated and plowshare tortoises, the boa snakes, and several bird species were protected legally from hunting and capture. Unfortunately, enforcement of this set of laws was meager.¹⁰

The First Republic also saw the commencement of non-French foreign involvement by development and conservation agencies (described in Table 2). WWF began working in Madagascar in 1963 with WWF/IUCN (International Union for the Conservation of Nature) project No. 0015, aimed at preserving the endangered Aye-Aye, a lemur. USAID began its activities with a 1966 loan for railway improvements, and Coopération Suisse began to develop its Malagasy aid program at the same time.

In 1970 the Malagasy government, working in close collaboration with the IUCN and French naturalist Jean-Jacques Petter, hosted the International Conference on the Conservation of Natural Resources. The justifications for these high-level meetings, cosponsored and attended by the leaders of institutions such as WWF, the Food and Agricultural Organization of the United Nations, France's overseas research office (ORSTOM), and the Paris Museum

Table 2. The Major Categories of Stakeholders in Malagasy Conservation

<i>The Malagasy people</i>	<p><i>Description:</i> The 12 million residents are 85% rural, with a GNP per capita of \$230; literacy is 73% for women and 88% for men.</p> <p><i>Views:</i> Influenced by cultural factors (reverence for ancestors, family focus), socio-economic factors (strong class distinctions with associated power relations), ecological factors (farmers and pastoralists are very conscious about their environment). The central concern is personal welfare: food, housing, clothing, health, education, and infrastructure.</p> <p><i>Influence:</i> The richest 3% of the population hold great political and economic power. Most early conservation ignored the locals; some recent projects involve villagers in delineating goals.</p>
<i>Malagasy NGOs</i>	<p><i>Description:</i> The <i>Association pour la Sauvegarde de l'Environnement</i> is a conservation organization; many small development NGOs have sprung up in the last decade.</p> <p><i>Views:</i> Varies by NGO; many focus on social development and natural resource management.</p> <p><i>Influence:</i> Some conservation and development work occurs through the NGOs.</p>
<i>The Malagasy government</i>	<p><i>Description:</i> Currently led by President Albert Zafy and Prime Minister Francisque Ravony.</p> <p><i>Views:</i> Expressed in the <i>Charte de l'Environnement</i>. Recognizes the importance of conservation and the conservation movement; however, currently monetary concerns are paramount.</p> <p><i>Influence:</i> Large, especially as all foreign participation must go through the government.</p>
<i>International and Euro-American NGOs</i>	<p><i>Description:</i> Includes WWF (the World Wide Fund for Nature), Conservation International, Missouri Botanical Gardens, Jersey Wildlife Preservation Trust, Wildlife Conservation Society, CARE-International, etc.</p> <p><i>Views:</i> The general outlook of conservation NGOs is expressed in the World Conservation Strategy, which aims to achieve sustainable development through the conservation of living resources; by maintaining essential ecological processes and life-support systems, preserving genetic diversity, and ensuring sustainable utilization of species and ecosystems. Development NGOs seek to improve the quality of human life. Approaches and philosophies can vary; for example, the Jersey Wildlife Preservation Trust specializes in <i>ex situ</i> species conservation, while WWF emphasizes integrated conservation and development around protected areas.</p>

Table 2. (Continued)

<i>International and Euro-American NGOs</i> (continued)	<p><i>Influence:</i> Large, including significant financial expenditures, policy influence, and major involvement in protected areas management, environmental education, species conservation, and institutional support. WWF, which has worked in Madagascar since 1963, is the largest and most well-known conservation NGO in the country.</p>
<i>Universities and research organizations</i>	<p><i>Description:</i> Scientists are the root of the conservation effort. Key actors have included H. Humbert of the Académie Malgache, responsible for the original nature reserves; J. J. Petter of the Paris Museum of Natural History; Roland Albignac of ORSTOM, a key force behind Mananara Biosphere Reserve, and G. Ravelojaona of the University of Madagascar, who set up the Beza-Mahafaly reserve. More recently, primatologists A. Jolly, A. Richard, P. Wright, R. Sussman, etc. have had a major influence.</p> <p><i>Views:</i> While research of primatological, botanical, and anthropological nature were central concerns for a long while, the scope has recently expanded to include agriculture and development. Close cooperation with conservation organizations leads to considerable overlap in goals.</p> <p><i>Influence:</i> Heavy involvement in Malagasy environmental actions. Dominant influences in the 1970 and 1985 International Conferences. Close cooperation with conservation groups.</p>
<i>Bilateral aid</i>	<p><i>Description:</i> The major relevant donors include the U.S. (USAID), Switzerland (Coopération Suisse), Norway (NORAD), Germany (GTZ and KfW), and France (CIRAD). USAID activity was minimal until 1988 after which 6 of 10 new projects focused on conservation. Coopération Suisse concentrates on agriculture, forestry, health, and transportation.</p> <p><i>Views:</i> Goals of aid programs are generally of humanitarian, economic, and environmental character, sometimes with political motivations hidden underneath. USAID was a leader in incorporating environmental projects. Coopération Suisse, for its part, aims for the sustainable use of natural resources as the basis for people's livelihoods.</p> <p><i>Influence:</i> The influence of bilateral aid is immense, with average annual assistance amounting to \$331 million in the late 1980s, i.e., over 14% of the GNP. USAID and Coop. Suisse were instrumental parties in the creation of the Environmental Action Plan.</p>

Table 2. (Continued)

International governmental organizations	<p><i>Description:</i> Relevant institutions include the World Bank, the UN Development Program (UNDP), and the UN Educational, Scientific, and Cultural Organization (UNESCO).</p> <p><i>Views:</i> The World Bank, primarily interested in financing economic development, has sought to show its environmental commitment in Madagascar. UNDP and UNESCO are primarily active in human needs and biosphere reserve work.</p> <p><i>Influence:</i> Since 1986, the World Bank has been the dominant source of funding, and the nation has participated in an IMF dictated structural adjustment program. Madagascar is wholly dependent on World Bank funded projects.</p>
Religious organizations	<p><i>Description:</i> Rising out of a strong missionary heritage, actors in conservation include the Agricultural Development Department of the Malagasy Lutheran church (SA.FA.FI.), and SAF-FJKM (of the Eglise de Jesus Christ à Madagascar).</p> <p><i>Views:</i> The primary goal of church organizations is human welfare. SA.FA.FI., for example, performed some rural development aspects of the Masoala integrated conservation and development project.</p> <p><i>Influence:</i> Considerable, especially at the grass roots level. The politically influential Federation of Malagasy Churches strongly supported the EAP.</p>

of Natural History, were the intense environmental degradation, species extinctions, and the scientific importance of Malagasy nature. Calvin Tsiebo, then vice president of the Republic, stated in his opening remarks:

Unfortunately, our incomparable natural heritage, this unique natural capital, is gravely endangered. According to the specialists, few areas of the world suffer from such grand and rapid degradation [as Madagascar].¹¹

Tsiebo's statement, as well as those of other officials present, reflects the catalytic effects of the conference in provoking increased environmental awareness among the nation's leaders. The conference was a milestone in Malagasy conservation; it put the issues on the front page of the newspapers (anon-e). Tsiebo closed the conference by calling for actions that included new protected areas and, most importantly, increased involvement and financial support from international and national organizations. His demands are well reflected in the resolutions of the conference, presented in Table 3.

At the same conference, however, the dominance of foreign scientists was questioned by Dr. Etienne Rakotomaria, then Director of Scientific Research:

Table 3. Resolutions of the 1970 International Conference on the Conservation of Nature and Its Resources in Madagascar

<p><i>Resolution 1—Inclusion of nature conservation in national planning</i> Emphasis on research, sedentarization of pastoralists and intensification of agriculture, giving priority to foreign aid projects which emphasize conservation.</p>
<p><i>Resolution 2—Land use planning based on ecological principles</i> Includes: preserving primary forests, reforestation, improved livestock techniques, research.</p>
<p><i>Resolution 3—Scientific research</i> Create a committee for research; promote cooperation.</p>
<p><i>Resolution 4—Education</i> Provide for environmental education, public awareness campaigns, and technical training.</p>
<p><i>Resolution 5—Exotic species</i> Prevent their arrival on the island.</p>
<p><i>Resolution 6—Trade in endangered species</i> To be prohibited.</p>
<p><i>Resolution 7—Forest conservation</i> Protect existing forests, reforestation, additional reserves.</p>
<p><i>Resolution 8—Wetland conservation</i> Take part in international programs; create reserves.</p>
<p><i>Resolution 9—Littoral zones</i> Protect the coral reefs at Toliara and Baie des Assassins.</p>
<p><i>Resolution 10—Marine turtles</i> Protect marine turtles.</p>
<p><i>Resolution 11—Endangered species</i> Create special reserves and protect endangered species.</p>
<p><i>Resolution 12—Protected areas</i> Create a national system of protected areas, add specific reserves and national parks, improve reserve and park management.</p>
<p><i>Resolution 13—ACCN</i> Establish the Malagasy Association pour la conservation et la connaissance de la nature.</p>
<p><i>Resolution 14—WWF</i> Establish a Madagascar section of WWF.</p>

Source: IUCN, "Comptes rendus de la Conférence internationale sur la Conservation de la Nature et de ses Ressources à Madagascar, Tananarive 7-11 Octobre 1970," *Publications UICN Nouvelle Série, Document Supplémentaire*, No. 36 (Morges, Switzerland: IUCN, 1972).

We have touched on three problems—forest reserves, education, and the role of foreign scientists. In all three spheres we have seen international organizations negotiate with Frenchmen in the name of Madagascar but systematically exclude the Malagasy from our own concerns . . . in the future, however, you will find that negotiations must take place only with our government's representatives. Scientists will only be allowed to work here if they arrange reciprocal benefits for Malagasy colleagues. The people in this room know that Malagasy nature is a world heritage. We are not sure that others realize that it is our heritage.¹²

Rakotomaria's statement embodies a notion of central concern, that the conservation boom of the present is still largely driven by non-Malagasy interests.

The statement also foreshadows the events after the conference, when dissent within the government led to riots, revolution, and a nationalist surge. The 1972 "May Revolution" was seen as a second independence from continued French domination. The government had been full of French advisors and even some French ministers, 80 percent of the economy was controlled by foreigners, and university instructors were predominantly French. During this tumultuous period, most Western technical assistants and scientists were banned and conservation efforts stalled.¹³

The Second Republic

The three years after 1972 were turbulent, characterized by power struggles, riots, and a presidential assassination. After intense efforts at establishing support among the civilian and military groups, Didier Ratsiraka in 1975 became president of the Democratic Republic of Madagascar. Thus began the Second Republic, characterized at its inception by a commitment to nationalization, scientific socialism, humanist Marxism, and a lack of environmental concern.¹⁴

Beginning in 1978, stimulated both by northern pressure and internal needs, the government decided to take advantage of its good credit rating and embarked on an investment binge, indebting itself to foreign governments and banks. This all-out investment of northern money went toward education, the armed forces, transportation, communications, and industrial development. This irresponsible program of omnidirectional borrowing, combined with the worldwide recession, led to a rapidly deepening crisis of government deficits, unpayable debts, and inflation. By 1980 the billion dollar external debt meant the nation had little choice but to seek assistance from the International Monetary Fund. A rapprochement with western nations ensued, especially with France, the United States, and the United Kingdom, and the country acceded to a program of structural adjustment. By 1986, the World Bank had become the dominant source of funding.¹⁵

It is within this political and economic context that conservation activities resumed. Acting on Resolution 14 of the 1970 Conference, in 1979 WWF established an official representation in Antananarivo under the direction of Barthélemy Vaohita. Vaohita, a long-time conservation activist, was a strong advocate for environmental education, and this influence is seen in later WWF programs. As a good public speaker and a friend of President Ratsiraka, Vaohita was important in aiding progress in Malagasy conservation (anon-g). While WWF continued to focus on species conservation and protected areas, it also initiated an awareness campaign aimed at decision makers and the public.¹⁶

In the early 1980s, the nation began to recognize the potential negative consequences of its xenophobic isolation; the pitiful example of North Korea—with which Madagascar had cultivated relations—loomed large. Foreign research was invited again and in 1983 a council was created, under the guid-

ance of the Jersey Wildlife Preservation Trust and Yale, Duke, and Washington universities, that facilitated the granting of research permissions (anon-h).

By the mid-1980s, the momentum created at the 1970 conference resumed. The 1980s were a decade when Malagasy governmental opinion shifted from "outright denial that the environment could affect human welfare, to being one of the leading countries in at least the rhetoric of sound policy."¹⁷ In 1984, Madagascar adopted the National Strategy for Conservation and Development, signed by every government minister. Such strategies were called for in the World Conservation Strategy,¹⁸ and Madagascar was the first major nation in the Afrotropics to do so. The strategy stresses public awareness and environmental education, behavioral changes with respect to the environment, technical competency, program evaluation, and local participation.

What precipitated this groundbreaking document? According to one conservationist, "it was kind of a Malagasy thing," and "few expatriates were involved"; yet another supposed that WWF pressure did have an influence (anon-c; anon-j). In opening a 1988 regional conference, the president of the National Commission of Conservation for Development, Remi Tiandraza (also Supreme Counselor of the Revolution), stated that "the priority accorded to natural resource conservation in our country is one of our essential ways to reach agricultural self-sufficiency."¹⁹

A major conference in November 1985 provided additional impetus to conservation and showcased Malagasy environmental concern. The government invited scientists, aid donors, and Malagasy administrators to a second International Conference on Conservation for Development, where the National Conservation Strategy and possible means of funding and implementation were discussed. Joseph Randrianasolo, then minister of Livestock, Water, and Forests, declared that "before, people only spoke of the beauty and scientific interest of our flora and fauna. This time we are speaking of our people, and how to manage our resources to be self-sufficient in food and fuelwood."²⁰ The "specter of Ethiopia," then undergoing severe degradation and starvation, was omnipresent.²¹ Thus the linkage of human welfare to conservation in the new concept of sustainable development was a critical factor in the government's interest and initiative. The link between the people and the land, painfully clear in Madagascar, is a much more immediately compelling reason for conservation than the aesthetic or intrinsic values of biodiversity preservation.

The 1985 conference was attended by many international agencies and government members, as well as by Prince Philip, the international president of WWF. The conference is remembered by many as the moment when Philip confronted President Ratsiraka with the statement, "your nation is committing environmental suicide," and is thus another major milestone in Malagasy conservation awareness. One conservation agent called it the key event in his career, as he was deeply impressed by the intense external interest in his nation's natural heritage (anon-f). During the conference, Minister Randri-

anasolo established the first new protected area since the 1960s, Beza-Mahafaly Special Reserve, and the government requested financial and technical assistance to implement the National Conservation Strategy. Several programs were initiated as a result. These include, for example, soil conservation and forest management projects financed by the World Bank, Switzerland, and Norway. For the conservation of biodiversity, WWF and American universities were asked to assist in the management of protected areas with USAID and UNESCO funding. Finally, WWF was asked to develop an environmental education program, which by 1992 had reached most of the school districts.²²

As a result of the government request, WWF hired naturalists Martin Nicoll and Olivier Langrand in 1986 to perform an extensive review of the protected area system. This dynamic pair aggressively worked to stimulate conservation, developing plans for integrated conservation and development projects and encouraging collaboration among the nongovernmental organizations (NGOs) as well as with the Malagasy forest service (anon-j).²³

Despite high expectations, the programs of the mid-1980s proved too limited to have any impact on the spiral of degradation. The agency responsible for the protected areas, the Direction des Eaux et Forêts (DEF), was caught between budget austerity requirements and an overwhelming number of projects.²⁴ In response, a few years after the adoption of the National Conservation Strategy, the government asked international donors to help design a more effective action plan for the environment. Around the same time, in 1987, the president of the World Bank, Barber Conable, announced the reorganization of the Bank to focus more attention on environmental issues. The Bank had faced many years of harsh environmental criticism and desired to demonstrate its new-found awareness. The Malagasy interest in a national Environmental Action Plan (EAP) fit the bill, and the project took off.²⁵ On the Malagasy side, political support was not immediate from all parts of government, yet it came in due time:

Many of the influential Malagasy were preoccupied with the country's urgent economic problems, and they felt that they simply had other priorities than the environment. Under the initial sponsorship of the Director of Planning the EAP did not have the required political visibility. However, the support of donors, Malagasy experts and particularly the media professionals helped to improve the situation. On the basis of the alarming estimates of the costs of the environmental degradation the Prime Minister joined the Director of Planning as a sponsor of the EAP. The President initially remained on the sidelines even though some of his advisors were involved in the work of the EAP. Subsequently the President was obliged to enter the arena after the showing of an excellent series of televised environmental episodes produced by Radio Television Malgache. The environmental series was intended to strengthen public opinion in favor of the EAP. This coincided with the start of the President's re-election campaign, and under the journalists' pressure the President was obliged to present his environmental policies to the public. Happily, the development of the EAP came at a good time, and the President adopted it and became an ardent supporter of the EAP.²⁶

This recounting may be somewhat naive: another source claims that the 1989 appointment of Victor Ramahatra to prime minister was pushed by the World Bank, thus ensuring support and good coordination of the EAP (anon-a). Malagasy cooperation in environmental action was never an explicit condition for World Bank aid, yet "which government can ignore the strong wishes of its foreign donors?" (anon-d).

The Madagascar EAP aims to end the spiral of degradation by reconciling the population with the environment. The EAP's specific objectives, principles, and priority programs are outlined in Table 4. The plan has a 15- to 20-year vision, unusually long for the World Bank and elected politicians. The EAP aims to increase the number of protected areas from 36 to 50, adding 400,000 hectares to the system. Over \$100 million was provided for the initial years of the EAP by foreign donors in a financial accord signed on January 15, 1990, in Paris. The plan was put into law as the Charte de l'Environnement by the national assembly later that year. Articles 3 and 4 of this environmental charter state that the environment is a primary responsibility of the state, and that protection and respect for the environment are of general interest.²⁷

Conservation activities in Madagascar accelerated rapidly following the EAP, ushering in an era of big money and multimillion dollar projects. USAID, which had sponsored only a smattering of projects in Madagascar, introduced no fewer than six major conservation projects in the years 1988 to 1992, and

Table 4. The Aims, Principles, and Priority Programs of the Madagascar Environmental Action Plan

Aims

1. Develop human resources (education, awareness, training)
2. Promote sustained development through improved resource management
3. Conserve and manage the natural heritage
4. Raise rural and urban living standards

Principles

1. A long-term view (15-20 years) and continuity of programs with international support
2. Emphasis on communication and dialogue as opposed to top-down
3. Presentation of the Plan to local communities as benefits rather than constraints
4. Set up mechanisms to finance small projects concerning environmental and village lands

Priority programs

1. Protect and manage biodiversity; develop eco-tourism
2. Environmental protection in rural and urban communities
3. A mapping and land management program
4. Environmental education, training, and awareness
5. Support program (institutional support, research, and strengthening of management tools)

Source: World Bank, *Madagascar Environmental Action Plan, preliminary version, volume 1: general synthesis and proposed actions* (World Bank, USAID, Coop. Suisse, Unesco, UNDP, WWF, 1988).

took the lead in sponsoring the biodiversity component of the EAP. Conservation International, WWF, and USAID facilitated at least seven debt-for-nature swaps beginning in 1989, and donor agencies are sponsoring at least fourteen integrated conservation and development projects at various protected areas. In 1991, Madagascar inaugurated Ranomafana National Park with the help of Duke University and a broad consortium of sponsors, including USAID. This is one of three new national parks gazetted since the creation of the first two in 1958 and 1962, increasing the current number of protected areas to 39.

The environmental charter resulted in much restructuring of the government agencies responsible for the environment, creating a new set of agencies to carry out the EAP (Figure 3). The Office National de l'Environnement (ONE) was established in 1991 to coordinate the activities of the plan. ONE oversees ANGAP—l'Association Nationale pour la Gestion des Aires Protégées—a parastatal agency that coordinates protected areas management. The composition of ANGAP reflects the government's choice to privatize natural resource management, as responsibility for protected areas management was temporarily given to international NGOs, with the intention of building up

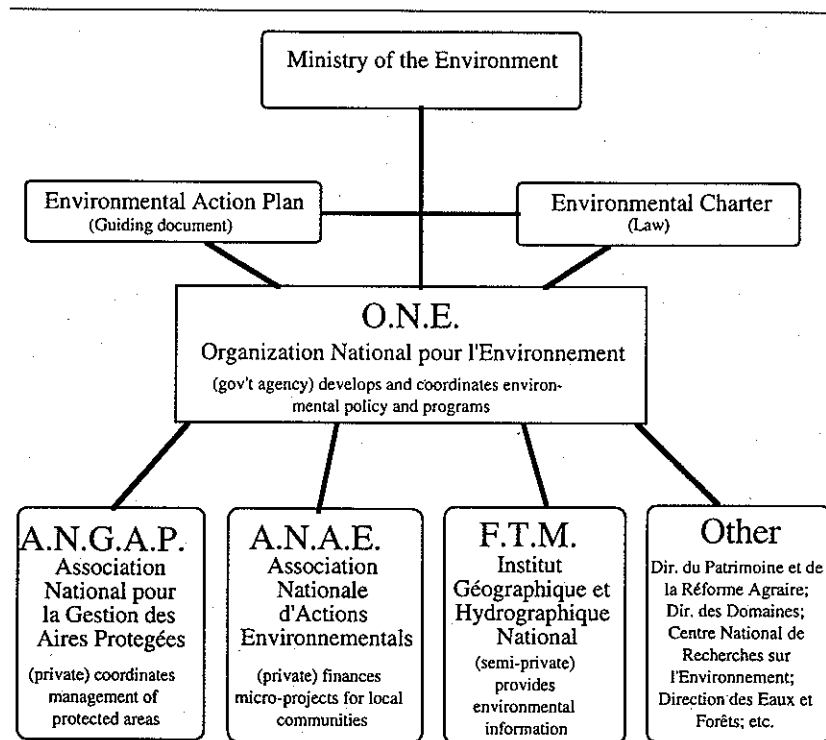


Fig. 3. Institutional structures involved in the Environmental Action Plan.

local capacity to take over (anon-j). ONE also coordinates the environmental efforts of the Association Nationale d'Actions Environnementales (ANAE), the National Geographic Institute (FTM) and several other agencies, yet some institutional problems exist with empowering ONE and its parent organization, the Ministry of the Environment—created in 1994—relative to other government sectors. For example, DEF, the agency historically responsible for the protected areas, resisted transferring authority over the protected areas to ANGAP (anon-e), and the mandate of the Ministry of the Environment has yet to be firmly established.²⁸

The Third Republic

In 1991 conservation activities were dealt minor setbacks as the opposition to authoritarian President Ratsiraka organized a general strike that paralyzed the economy for two years. A new constitution in August 1992 marked the beginning of the Third Republic. On February 10, 1993, a general election replaced Ratsiraka with Dr. Albert Zafy, leader of the opposition coalition, in a smooth transition. Zafy's fledgling government, led by Prime Minister Francisque Ravony, has been preoccupied with addressing the overall economic problems, but has not slowed the march of the Environmental Action Plan. Recent indications suggest that the new government is now more aware of the critical role of environmental factors in economic development, especially in attracting foreign money.²⁹ The EAP is nearing the end of its first five-year phase, and preparations are under way for Phase Two in 1996.

So far, the 1990s have been characterized by political struggle, economic uncertainty, natural disasters, lack of organization, and the free reign of conservation organizations. Madagascar has become an "El Dorado" for conservation (anon-a), witnessing an incredible surge in conservation activity.³⁰ That expansion continues today: for example, the U.S. Peace Corps arrived in September 1993, and in 1994 began to send volunteers to work in environmental projects connected to the protected areas. This conservation boom has many explanations, from the attraction to endangered lemurs to the fact that it is cheaper and easier to work in Madagascar than, for example, Brazil (anon-a; anon-g). These questions of causality are explored in the next section.

The Evolution of Conservation: Causes

The history of international conservation in Madagascar shows that the events of the past decade have antecedents and driving forces. To promote successful future activities, it is incumbent to understand these factors and their influence on the character of conservation and development in Madagascar. In such an analysis, the arguments are easily directed by one's research paradigm—a Marxist may predominantly cite political-economic and neocolonial

reasonings, while a conservation biologist could point to factors of endemism, diversity, and critical degradation. While I cannot claim exclusion from these tendencies, I intend to present an analysis that draws on the strengths of various paradigms in a pragmatic attempt to find the most powerful and useful explanations in the specific context of Madagascar. Such a synthetic pragmatic approach benefits to some extent from discussions in geography and anthropology of "political ecology," an approach that encourages pluralities of problem statements and rationalities.³¹ The politics-ecology approach has previously been applied to an analysis of national-level environmental programs by Lori Ann Thrupp, who criticized environmental initiatives in Costa Rica for their lack of concern for political and economic underlying factors, the needs of the poor, and the perpetuated dominance of foreign interests.³²

The present analysis relies on a conceptual framework to structure the analysis of complementary explanations. The framework is a simple conceptual model that identifies the ultimate factors, proximate factors, and facilitators of the phenomenon being investigated.³³ The ultimate factors are structural or systemic factors that predispose a system to certain behavior. Proximate factors are more immediate and situational forces that are directly related to the event in question. Finally, facilitators are elements that facilitate or catalyze the action caused by the other factors. In this analysis of the Malagasy conservation boom, the ultimate factors are long-term structures that predispose Madagascar to international conservation intervention, the proximate factors do more to explain the timing of the boom, and the facilitators include several factors that aided the process. While models can be difficult to create and necessarily eliminate certain elements of detail, the model presented in Figure 4 has sufficient explanatory power to warrant its use, given the research question and the current situation. The ensuing sections discuss the factors presented in the model.

Environmental context

Both the unique ecology of the island and the appalling rates of degradation give Madagascar an environmental context that is a linchpin for the whole conservation effort. Thus, the history and character of Malagasy flora, fauna, and land must be seen as ultimate factors for conservation action. The first element in this environmental context is the fascinating natural heritage of biological diversity and endemism—which is amply discussed elsewhere. The arguments used by conservationists to conserve such a natural heritage also need no further elaboration here.

The second element is the endangerment of the Malagasy natural heritage through erosion, deforestation, and extinctions. Land degradation has reached such a magnitude that the island is labeled the "world champion of erosion." This soil erosion is most dramatically seen in the large areas of the highlands where great erosion gullies, or lavaka, dominate the landscape. Less visually

dramatic is sheet and rill erosion, which reaches an incredible 400 metric tons/hectare/year. Erosion is caused by pasture burning and overgrazing on highly erosive soils and exacerbated by the aggressive rainfall regime. The consequences of this erosion include reduced soil fertility, siltation of irrigation works and ports, increased flood danger, and infrastructure damage.³⁴ In the East, the primary concern is not land degradation but deforestation. Expanding slash-and-burn cultivation threatens the small portion (34 percent) of the original forest that remains. At current deforestation rates, it is estimated that only the forests on the steepest slopes will remain by the year 2025.³⁵

This degradation of natural habitats is of special concern because several species have become extinct or are currently threatened. Humans may have contributed to the extinction of at least 14 large primates, 8 flightless birds, and a pygmy hippopotamus during the last 1,000 years,³⁶ and are endangering many more species today. Currently threatened species include tree ferns (*Cyatheaceae*) used as containers for potted plants, Malagasy ebony (*Diospyros perrieri*, *D. microrhombus*), and palissandre (*Dalbergia*).³⁷ Of 50 lemur taxa, 12 are endangered and an additional 18 are considered of conservation concern.³⁸ The environmental context of sediment-laden rivers, denuded lands, and species extinctions leaves little doubt to conservationists that Madagascar is a critical location for conservation action. Indeed, Russell Mittermeier labels Madagascar as one of six megadiversity countries needing special attention, the World Conservation Strategy lists the island as a priority area for genetic resource conservation, and Norman Myers calls the nation's rainforest a hot spot for action.³⁹ These evaluations rest on ecological principles of endemism, biodiversity, and environmental criticality. The World Bank, in adding an economic perspective, found that degradation costs the country \$100 to \$290 million annually, or 5 to 15 percent of the gross domestic product. No matter what evaluation is used, the environment is a critical predisposing condition to conservation action in Madagascar, and the reason most frequently cited by conservation and development officials.

As Figure 4 indicates, the environmental context as ultimate factor is related to the proximate factor of the discovery of threatened species and habitats. There is no sharp distinction between these factors as predisposing conditions versus immediate forces; much of the discussion above applies here. It was in the 1980s, however, that much of the literature documenting the nation's state of degradation began to appear through the efforts and publications of concerned scientists (anon-a).⁴⁰

The boom in conservation was thus facilitated by the dissemination of information regarding the Malagasy environment and the accompanying social "construction" of an environmental crisis. Madagascar returned to the world map after a decade of isolation largely through the lens of conservation—perhaps literally through the camera lens, as images and stories of lemurs, chameleons, orchids, erosion, and deforestation made it to television documentaries and popular publications.⁴¹ Scientists such as Russell Mittermeier,

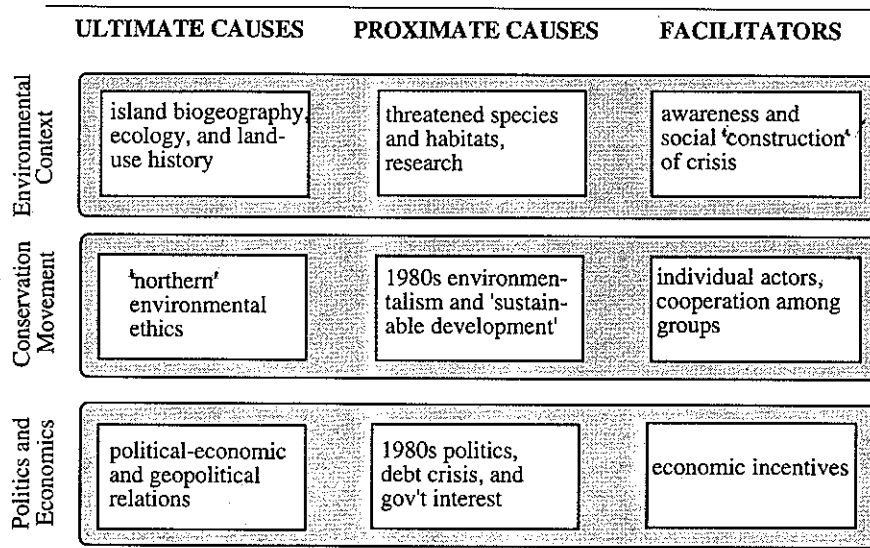


Fig. 4. Conceptual model to explain the surge in conservation activity in Madagascar since the 1980s.

Peter Raven, and Alison Jolly, as well as photographer Frans Lanting brought Madagascar to the attention of conservation organizations and the public, and the timing with the "save the rainforest" momentum and contemporary Malagasy politics, both discussed below, proved to be critical factors in accelerating conservation activity.

The effect of the publicity, scientific publications, and the general environmental discourse of the time was the social construction of a "crisis" situation that needed to be solved. Crises are contextual in that there is no deforestation crisis if nobody perceives it that way.⁴² The environmental literature of the past decade, such as the widely read Brundtland Report, *World Resources*, and *State of the World*, unabashedly contribute to the notion of crisis that dominates discourse about environment and development.⁴³ Prince Philip's warning of environmental suicide at the 1985 conference, and the World Bank's depiction of a spiral of environmental degradation helped bring crisis discourse to Madagascar. In sum, it is based on the socially constructed environmental crisis⁴⁴—grounded in evidence of habitat loss, extinctions, and erosion—that conservation efforts unfolded in Madagascar.

The international conservation movement

It is safe to assume that without an interest in biological conservation in the developed world, the type of conservation activities occurring currently would not exist. The phenomenon of northern environmental ethics must then be

considered a second ultimate factor. In relation to Madagascar there are two main facets of the northern conservation mind-set: an interest in species and habitat conservation, and a culturally constructed image of Africa. First, northern concerns with conservation have a long history, represented in the United States in the writings of George Perkins Marsh, John Muir, and Aldo Leopold, for example. Now, nature documentaries, nature magazines, and nature reserves cater to our aesthetic interest in plants, animals, and landscapes. This character of Euro-American societies, attributable in part to affluence and leisure time, is critical to the northern interest in conservation—witness the conservation organizations' fundraising tactics based on photographs on pandas, tigers, and lemurs.

Second, the northern environmental ethic is molded by our conceptions of Africa and its outlying islands, a conception that has evolved over time from that of a dark, steamy jungle, to a savanna wildlife paradise, to a continent in crisis of hunger and civil strife, to the bountiful rainforest.⁴⁵ J. S. Adams and T. O. McShane have argued quite well in their book, *The Myth of Wild Africa*, that these perceptions form part of our environmental ethic and that they guide the activities of international conservation groups. With the recent advent of conservation-with-development projects, discussed below, the northern environmental tradition is finally being combined with the long-standing commitment—especially among religious organizations—to humanitarian aid for the world's poor. This heartening development, where protecting natural ecosystems is no longer done without concern for the welfare of the local people, will hopefully become strongly incorporated into the global environmental ethic of the future. The simple species-oriented conservation ethic of the North, however, was and arguably still is a prime motivator for the Malagasy conservation boom.

The environmental movement returned to the forefront of politics in the 1980s with the rallying buzzwords of *sustainable development*, *rainforests*, and *global change*. This surge in conservation interest arising from the northern environmental ethic is certainly a proximate factor for the conservation boom in Madagascar. The public concern for tropical deforestation and biodiversity manifested itself in policy, with the U.S. Congress adding biodiversity and tropical forest conservation to the mandate of USAID in 1983. WWF for its part more than quintupled its fundraising income during the 1980s due to increased public interest in global efforts at nature conservation. Even the World Bank reacted to environmental pressures under its new president, Barber Conable, creating a large environmental department and involving itself in environmental action plans. This greening of aid⁴⁶ is a critical element in the Malagasy conservation boom, as it led to a dramatic increase in available funding. Madagascar specifically was an "object of prestige" for environmentally minded donors, for it had become well known for its environmental problems (anon-n).

A significant contribution arising from 1980s environmentalism is the link-

ing of environment and development, as manifested in the 1992 United Nations Conference on the Environment and Development in Rio de Janeiro. The integration of habitat and species conservation with development is now seen as the best way forward, reflected in the recent swell of literature on "integrated conservation and development," "people and parks," or "local participation."⁴⁷ Madagascar now hosts at least fourteen integrated conservation and development projects (ICDPs), beginning with the Mananara Biosphere Reserve project in 1987. The conservation effort has come a long way from its initial fascination with the wide-eyed lemurs and dependence on protected areas as a single solution.⁴⁸

This new focus on conservation-with-development has played a key role in gaining government interest and support for environmental action. The contrast is evident in the statement of Rakotomaria at the 1970 conference versus that of Randrianasolo at the 1985 conference, quoted earlier. Rakotomaria complained that foreigners did not realize that Malagasy nature was the heritage of the people of Madagascar, while Randrianasolo commended the interest in the conservation community to speak about the people and their well-being.⁴⁹ Thus, not only is the incorporation of local people into conservation planning critical to long-term success, but it has facilitated the growth of conservation action.

The momentum of the conservation movement was facilitated by the guiding influence and persistent efforts of many individuals. Among noteworthy people, Henri Humbert, who guided the development of the original nature reserves, is certainly the prime historical example. More recently, in the formation of the Environmental Action Plan, one might mention Leon Rajao-belina, then the Minister of Finance and now on the board of Conservation International, or François Falloux of the World Bank (anon-i). Other strong supporters included Victor Ramahatra, prime minister from 1989 to 1991 (anon-a), and Joseph Andriamampianina, now Director of the Office National de l'Environnement. Many others certainly deserve mention, including, for example, Alison Jolly, Alison Richard, Roland Albignac, Georges Randrianasolo, Martin Nicoll, Olivier Langrand, Sheila O'Connor, Alfred Randriamoelirivarony, Guy Suzon Ramangason, Robert Sussman, Jean Jacques Peter, Barthélemy Vaohita, and Patricia Wright. The point here, however, is not to list the individuals, as I do not want to judge varying contributions, but to make the point that individual initiatives often catalyzed action as a whole.

The beginning of the conservation boom was also facilitated by the degree of cooperation among international donor groups and with the Malagasy government. Table 2 presents a categorization of the major stakeholders active in Malagasy conservation. While their mandates may differ, these groups have worked together to promote conservation. During the early days, or "golden age" of the boom, say 1983 to 1988, conservation truly blossomed in a spirit of cooperative and collaborative efforts (anon-h). The Environmental Action Plan, for example, involved the collaboration of the Malagasy government

with the World Bank, USAID, Coopération Suisse, UNESCO, UNDP, and WWF. As the monetary and prestige stakes have mounted in recent years, cooperation has taken a back seat (anon-h); however, during the nascence of conservation in Madagascar the collegial atmosphere among individual promoters and their institutions set the foundations for the boom.

Politics and economics

The third ultimate factor centers around the political-economic implications of Madagascar's colonization, development strategies, and incorporation into the global economy and power structures. Without such a condition, the scope and character of foreign actions on Malagasy terrain would likely be quite different—no French or Ecuadorian environmental groups are working to save the spotted owl in the American Northwest! This global political-economic power structure is seen historically, as the French colonizers established the first nature reserves on Malagasy land, and is seen most drastically today, as the debt crisis, structural adjustment, and conditionality bring the nation into the fold of the World Bank and its supporters. Currently one of the world's poorest nations, Madagascar is burdened with a stifling foreign debt and an ineffective economy. In this situation, the country is wholly dependent on external help such as the World Bank. As Alison Jolly states, "the country depends on Bank-funded projects . . . Madagascar is too poor and too much in debt to do otherwise."⁵⁰

To some extent, then, the political-economic situation gives little choice to the nation but to accept the conditions of aid presented by often environmentally minded donors (anon-a; anon-d; anon-k; anon-o).⁵¹ The World Bank, criticized heavily for its environmental blunders, found Madagascar to be a wonderful opportunity to demonstrate its own environmental commitments, and thus played a major role in the formation of the Environmental Action Plan. The Bank chose Madagascar as an environmental showcase due to the government's commitment to conservation and the island's status as a conservation priority, as well as because the nation is so poor and has a record as a "good pupil" of structural adjustment. In this perspective, it is the Malagasy debt burden that allows the northern countries to impose their environmental ideals on a desperate, but quite accepting, nation.⁵² When northern aid donors and lenders have an environmental bent, as they certainly gained in the 1980s, the result could be termed a *green dividend* for recipient nations. But environmental concerns are only one of many factors influencing aid policy; U.S. aid to Madagascar increased substantially when strategic mineral supplies were threatened by instability in South Africa.⁵³ As environmentalism is challenged by the Republican U. S. Congress in the mid-1990s, the character of aid may change, yet the fundamental political-economic relations allowing for northern influence in Madagascar are likely to be in place for some time.

While the political-economic structure is semi-permanent as a predisposing

condition, the events and politics of the 1980s in Madagascar do more to explain the timing and occurrence of the conservation boom, and are thus proximate factors. Three main political factors, including the debt crisis and ensuing structural adjustment, the political transition to a market-based democracy, and the government's environmental concern, all have implications for conservation.

First, the implications of the debt crisis and the resulting domination by the Bretton Woods institutions (the International Monetary Fund [IMF] and the World Bank) have already been discussed. Here they are used, however, to explain the timing of the boom instead of as indicators of the predisposing political economic conditions. Thus the convergence in time of increased World Bank domination with the greening of aid are immediate causes of the boom.

Second, the last decade was a period of significant transition from isolationist, socialist policies to resumed connections with the West. The reopening of Madagascar to science and aid meant that newly established NGOs such as Conservation International could have more and more influence on Malagasy politics. The transition to democracy, exemplified in the multiparty elections of 1993, has helped attract aid from the United States. Despite some periods of unrest, the IMF and the World Bank actually consider Madagascar one of the few African countries where financial investments are safe.⁵⁴ All of these factors of political change have served directly to aid the surge in conservation.

Third, a key element of Malagasy politics is the renewed interest by the government in conservation after the decidedly nonenvironmental 1970s. It was the government that presented a National Nonconservation Strategy in 1984, sponsored the 1985 conference, and asked for the Environmental Action Plan. The speeches of government officials at the various conferences reflect this concern.⁵⁵ Awareness and lobbying efforts by WWF have certainly contributed to this concern (anon-c). In addition, the influence of the small but dedicated Malagasy intellectual community, such as biologist Potain Rakotomanga, should not be underestimated. The government's concern for the island's natural heritage is critical in facilitating action, for while it is not characteristic for the Malagasy to criticize foreign actions openly, it is very easy for the government to make it more difficult for foreign groups to implement desired activities, even those developed in conjunction with Malagasy partners (anon-j). As a result, the evolution of the entire conservation boom has hinged on the open door provided by the government.

The receptivity of recent governments to outside action and influence has been conditioned by several of the previously mentioned factors, including recognition of the environmental degradation and its costs and pressures from environmentally minded donors. Economic incentives also help to facilitate government initiative in seeking funding and receptivity to conservation activities. At the national level, the financial benefits expected from the Environmental Action Plan and donor funding are prime government motivators

(anon-d), including the potentials for ecotourism income.⁵⁶ As one respondent cynically wrote,

The Malagasy are very smart when it comes to questions of money. As little coordination as possible, getting as many partners as possible for each project, selling each idea as new, etc. This certainly helps explain the number of organizations and magnitude of funding today. In this way, they can present the donors with more funding opportunities, and work towards their goal of attracting as much money as possible to the country. (anon-a)

Economic forces to conservation action can also be seen at the scale of individual politicians. To retain a seat in the government, politicians must prove their value to the country, which in the current financial situation means the ability to procure money. Due to the greening of aid, the politicians must show that their project at a minimum does no environmental harm. The following quotation from a development aid employee sums up the previous arguments:

The driving forces are the World Bank, IMF, WWF, USAID, Swiss Aid, GTZ, etc. Under their influence, [President] Zafy and [Prime Minister] Ravony had to show their influence in environmental protection because those two are carried by their people and have to prove to them that they can attract money. (anon-k)

Finally, the free reign of conservation organizations has also been facilitated by the lack of any significant logging or mineral lobby (anon-g). Madagascar is in dire need of money; this situation has proven to be a major factor in the expansion of conservation efforts.

Synthesis of the causes

The model presented in Figure 4 suggests that the environmental context of megadiversity and severe degradation, the developed world's environmental ethic, and the Malagasy political and economic context are the ultimate factors for international conservation action in the last decade or so. The particular timing of the event can be explained by the proximate factors of environmental research, 1980s environmentalism, and 1980s politics, facilitated by awareness, individual actors, group cooperation, and economic incentives.

With this model we can perhaps better understand why the international conservation community is so active and present in nations like Madagascar, Ecuador, Costa Rica, Indonesia, and Zimbabwe, among others. These are countries where many of the factors in Figure 4 are operating: burdensome foreign debts with associated economic incentives, centers of ecological interest, high biodiversity, as well as environmental degradation, and so on. On the other hand, a generalized version of the causal model could show why conservation has not taken off elsewhere. While conservation groups are very interested in Angola, for example, the political situation has precluded much action. On the other hand, while Tunisia may be politically receptive, it does not

make the conservation priority lists. Further comparative study could delve deeper into the success and growth of the international conservation movement, illuminating the factors, such as biodiversity-based priorities and political context, that govern the evolving conservation landscape.

Results of Conservation Action

The conservation boom felt in Madagascar since the late 1980s has begun to have visible impacts on the nation's rural environments and people. This section attempts to complement the above historical analysis of Malagasy conservation with a review of the results of recent conservation action for the island's ecosystems, species, and soils. This analysis shows that the political maneuvering, the economic forces, and the environmental ethic have led to relevant outcomes, yet also that few projects have escaped criticism. By reviewing the status of the protected areas program, of forests in general, and of soil erosion, this section helps to establish what has been accomplished and which players and forces have been successful at conservation.

Protected areas

The Malagasy protected areas system, founded in the 1920s and strengthened in the years around its independence, suffered from neglect after the socialist revolution and during the 1980s financial crisis. In 1987, the investment budget for the entire protected areas system was less than \$1,000; a typical forest agent was poorly equipped, underpaid, and responsible for the surveillance of more than 25,000 hectares.⁵⁷ Relaxed control meant that landless farmers began to cultivate and even establish homesteads within reserves such as Marojejy and Anjanaharibe-Sud (anon-r). The review of protected areas performed in the late 1980s by Nicoll and Langrand showed that all existing reserves were threatened to some extent by factors including fire, slash-and-burn cultivation, illegal commercial forestry, uncontrolled grazing, subsistence hunting, and collection of useful or decorative plants.⁵⁸

Protected areas conservation action in recent years, including the Environmental Action Plan, has largely followed the blueprint provided by Nicoll and Langrand's review. They recommended expanding the protected areas network by fourteen reserves, and completing the representation of all types of ecological zones within the system, including specific forest communities, mangroves, inland wetlands, coral reefs, the southwestern biome, the center-east biome, and certain species. They also recommended eleven existing protected area complexes for the establishment of integrated conservation and development projects (ICDPs). Currently there are major such ICDPs under way in at least fourteen protected area complexes, and three new reserves have

been gazetted as national parks: Ranomafana in the Southeast, Mantady in the Center-East, and two parcels—representing forest and coral reefs—within the Mananara Biosphere Reserve in the Northeast. This increases the coverage of protected areas to 1,121,465 hectares, or about 2 percent of the national land surface. The fourteen major ICDP are reviewed below.

MANANARA-NORD BIOSPHERE RESERVE (VEREZANANTSORO NATIONAL PARK AND NOSY ATAFANA NATIONAL PARK). Located along the northeastern coast, the Mananara-Nord Biosphere Reserve project was initiated in 1987 by UNESCO's Man and the Biosphere program, and is financed by UNDP and the World Bank. Without the project, remaining lowland rainforests would have disappeared by the mid-1990s. However, the demarcation of reserve boundaries provoked rapid deforestation as locals attempted to claim land before survey crews arrived. The three remaining parcels of non-degraded forest cover 23,000 ha, and were gazetted as a national park together with 1000 ha of islands and reefs in 1989. These park parcels are surrounded by a 115,000 ha multiple use area, where project officials are focusing on agricultural development. While the project has conserved some rainforest, its effects on marginalized poor peasants have been criticized. The poor, displaced up the forest valleys in colonial times, are dependent upon swidden agriculture and forest products for their livelihood and suffer when forest access is restricted.⁵⁹

MANTADY NATIONAL PARK AND ANALAMAZAOTRA SPECIAL RESERVE. Conservation action in these reserves, located east of the capital near the town of Andasibe (Perinet), is being coordinated by UNESCO and has been funded by UNDP, the World Bank, Japan, and Norway. As at Mananara-Nord, the demarcation of the new national park boundary and of local land tenure rights led to a period of instability and unsustainable resource use. Also, locals were found to bear a significant economic burden due to the establishment of the park. However, the 10,000 ha of Mantady National Park have significantly increased the amount of protected forest for at least 10 lemur species.⁶⁰

ANDOHAHELA STRICT NATURE RESERVE. In 1994 this project received a \$2.1 million, three-year grant from USAID, complementing funding by WWF. The project is executed by WWF in conjunction with the local forest service and local NGOs. With work under way since 1987, and an ICDP since 1990, the early results from this project look positive. The 76,020 ha reserve lies on the frontier between the eastern rainforest and the southern spiny bush at the southern end of the island, and is one of the most biodiverse protected areas.⁶¹

BEZA-MAHAFAHY SPECIAL RESERVE. The universities of Yale, Antananarivo, and Washington (Missouri) began a research and training program in this area of southwestern Madagascar in 1977; and a special reserve was officially established in 1986. The small 580-ha reserve contains two parcels that protect a semi-arid spiny bush forest as well as a riverine gallery forest. Projects have been financed by WWF since 1980 and by USAID since 1987, under the

management of WWF. Rural development efforts began in 1987, including a school and irrigation canals, yet success has been mixed as some projects were poorly planned and as locals have protested the reserve.⁶²

MORONDAVA/CÔTE OUEST (ADRANOMENA SPECIAL RESERVE, CLASSIFIED FOREST OF AMPATAKA, PRIVATE RESERVE OF ANALABE, AND FORESTRY CONCESSION OF CFPF AT KIRINDY). The area between the Tsiribihana and Andranomena rivers north of the West Coast town of Morondava is a plain with a species-rich dry forest and woodland, and is suspected to be a center of regional endemism. The forests are threatened by illegal logging and by clearance for export maize production. Conservation work in this area is financed by Switzerland and coordinated by Coopération Suisse and the DEF. In 1979, the Swiss and Malagasy governments began a sustainable forestry training project (CFPF) on a 10,000 ha concession. A second project, SAF-Côte Ouest, was initiated in 1987 and aimed to slow the degradation of natural resources. This project focused on creating permanent, diversified agriculture, on public awareness, and on active forest protection. In collaboration with the DEF, SAF-Côte Ouest succeeded in dramatically slowing new clearings and burns in the forest. Plans for the combined management of regional forests (including the forestry concession, the private reserve, the Classified Forest, and the Special Reserve) are being drafted under the auspices of Coopération Suisse.⁶³

ANKARAFANTSIKA STRICT NATURE RESERVE AND AMPIJOROA CLASSIFIED FOREST. Like the first two projects, this young ICDP is coordinated by UNESCO under its Man and the Biosphere program, as well as by Conservation International, with UNDP, World Bank, and German funding. The primary dry forests of the reserve, located near Mahajunga in the Northwest, are threatened by pasture burning, charcoal production, and feral cattle, and besides their biological value perform a valuable role as the watershed for the Marovoay rice-cultivating region.⁶⁴

BETAMPONA STRICT NATURE RESERVE, MANGERIVOLA SPECIAL RESERVE. These reserves cover 14,000 ha near the port of Toamasina on the East Coast, and harbor 11 lemur species in humid forests under heavy human pressure. Betampona reserve has less than half of its forest cover remaining. Development work is underway through the support of the Church of Wales and is being implemented by SAF/FJKM, the development arm of the Malagasy Lutheran Church.⁶⁵

RANOMAFANA NATIONAL PARK. The 41,500-ha national park at Ranomafana was inaugurated in 1991. This park, located in the humid forests east of Fianarantsoa, preserves a diversity of flora and fauna including twelve lemur species and a third of the island's bird species. Inspired after the discovery of a new lemur in 1986, this project was initiated by Duke University, and the ICDP is currently being implemented by a consortium including a variety of American and Malagasy universities, the Missouri Botanical Garden, and local NGOs. Funding has come from USAID and many other sources. Project aspects including long-term management planning, biological moni-

toring and research, training, community awareness, applied forestry, aquaculture, ecotourism, agricultural extension, education, and health services. Fifty percent of park revenues are returned to local committees for development projects. The project has been criticized strongly for its adverse effects on child nutrition (as forest access is restricted) and for general difficulties in harmonizing conservation and development. However, with respect to the local fauna and flora, significant conservation progress has been made.⁶⁶

AMBER MOUNTAIN COMPLEX (MT. D'AMBRE NATIONAL PARK, FORET D'AMBRE SPECIAL RESERVE, ANKARANA SPECIAL RESERVE, ANALAMERA SPECIAL RESERVE). Arising from an older WWF project and Nicoll and Langrand's review, the Amber Mountain ICDP was initiated from 1989 to 1993 with \$795,000 from USAID. In 1994 USAID provided follow-up funding with a three-year \$2.7 million grant. The project is coordinated by WWF in cooperation with CARE-International and Veterinaires Sans Frontiers. Located in the northern tip of the island, this complex of separate protected areas hosts humid forests, dry forests, transition forests, interesting landscapes of volcanic lakes, karstic pinnacles, and caves, and at least thirteen lemur species. The project has had its difficulties, as local expectations for development efforts were not met and two successive project leaders produced poor results (anon-e).⁶⁷

MASOALA PENINSULA (PROPOSED MASOALA NATIONAL PARK, NOSY MANGABE SPECIAL RESERVE). The Masoala peninsula was the site of one of the original reserves established in 1927, but was de-gazetted for logging in 1964. Located in the Northeast, the proposed park would protect the largest single block of lowland rainforest remaining in Madagascar, covering 210,009 ha. Development of a national park is funded by USAID and coordinated by CARE, the Wildlife Conservation Society, the Peregrine Fund, and several other organizations under an ICDP formed in 1993. Progress is being made, as biological inventory and park planning teams are working in the area, and the general plan for the national park was approved by the DEF in February 1995. Nosy Mangabe, a nearby 520-ha island reserve in the Bay of Antongil, protects several lemur species (some introduced) and lowland rainforest and will be included in the National Park.⁶⁸

BEMARAHA COMPLEX (TSINGY DE BEMARAHA STRICT NATURE RESERVE, TSIMEMBO CLASSIFIED FOREST, AND OTHER AREAS). Located in the West, these areas form a proposed World Heritage Site under the auspices of UNESCO, with German funding. The Bemaraha reserve, established in 1927, contains a spectacular formation of karstic pinnacles, river gorges, as well as extensive dry forests. Between the Bemaraha reserve, the coast, the town of Maintirano and the Tsiribihina river one finds classified and unprotected forests, mangroves, and significant wetlands and lakes. Conservation and development activities in this isolated region are very young, and are challenged by pasture burning, logging, and hunting.⁶⁹

MAROJEJY STRICT NATURE RESERVE AND ANJANAHARIBE-SUD SPECIAL

RESERVE. Germany is also funding a large ICDP run by WWF out of the town of Andapa in the Northeast. The rice-cultivating basin of Andapa is surrounded by mountains, including the Marojejy massif that rises to 2,133 meters. Two reserves exist here, containing exceptionally diverse rainforest ecosystems, from eastern lowland forests to highland forests to montane heath, with more than 2,000 plant species and 10 lemur species. Expanding slash-and-burn cultivation threatens the steep slopes and even interior areas of these reserves. Project planning began in 1991; activities have included strengthened enforcement of reserve boundaries and undertaking a variety of agricultural development and public awareness projects.⁷⁰

ANDRINGITRA STRICT NATURE RESERVE AND PIC D'IVOHIBE SPECIAL RESERVE. Run under the same Germany/WWF program as Marojejy, the Andringitra project focuses on the spectacular Andringitra range (reaching 2,658 meters) at the southern extreme of the central highlands, as well as an outlying massif to the south, Pic d'Ivohibe. Ecosystems represented include eastern rainforests, highland forests, montane heath and grasslands, and western grasslands. Aside from problems of illegal pasture burning, this area is less threatened than others. The Andringitra ICDP has begun work on rural development and intends to turn the northern portion of reserve into a national park, accessible to tourists for mountain hiking.⁷¹

ZAHAMENA STRICT NATURE RESERVE. Located in the East between Toamasina and Lac Alaotra, the Zahamena reserve preserves 73,000 ha of lowland and highland rainforest. The forest, home to eleven lemur species, is threatened by slash-and-burn cultivation due to heavy population pressure. A recent ICDP funded and implemented by Conservation International aims to protect the reserve and develop surrounding areas.⁷²

Other protected areas projects include, for example, a small ICDP at Zombitse and Vohibasia Classified Forests in the Southwest, funded by Norway and implemented by WWF. Due to its small scale, the purely Malagasy staff, and supportive locals, this project is progressing quite smoothly in its goals of preserving the regional dry forests (anon-j).

In summary, this collection of projects underway around the island is working hard—with many severe obstacles—toward the goal of ending natural habitat degradation. These ICDPs aim to reach a point where park management structures are self-sufficient and foreign control is no longer required. With a future network of 50 protected areas representing all native Malagasy biomes, the future of the island's flora and fauna will hopefully be assured.

Other forests

The effect of the conservation boom is clearly visible in the protected areas. However, this nearly exclusive focus on protected areas for conservation activities has been criticized, for it ignores the 98 percent of the nation outside the protected areas network. David Western and Mary C. Pearl argue that if

conservation is to succeed, one must not ignore the vast degraded or threatened lands outside parks and reserves.⁷³ Conservation International has begun to address this issue by looking at the 4 million ha of gazetted national forests (8 percent of the national area).⁷⁴ These forests are weakly protected, if at all, and aside from those pinpointed by Nicoll and Langrand, they are mostly ignored by the conservation community. The Conservation International project has mapped the forests and established management plans for conservation and sustainable forestry in at least two of the 267 forests (anon-t).

Soil erosion

Another area of significant environmental action outside the protected areas is in the arena of soil erosion, reforestation, and watershed management. In the intensively cultivated highlands, and in the vast surrounding pasturelands, the key environmental question is not the preservation of native ecosystems but of soil conservation and woodfuel supply. Bushfires and overgrazing lead to dramatic erosion, and even the most optimistic estimates predict a woodfuel shortage. Long-term government and foreign programs have sought to improve land management in these areas. Government statistics show that bush fires have decreased in the past decade, and that significant quantities of trees have been planted (Table 5).

Coopération Suisse has been a major contributor for many years towards village reforestation and soil conservation projects in the highlands. Contributions include support to FAFIALA, a Malagasy nonprofit organization that promotes protection of non-rice areas (tanety) in the highlands; to the LOVA SOA project, which supports sustainable agriculture on tanety; and the Ter-

Table 5. Hectares of Bushfires* and Numbers of Trees Planted, 1983–1991

Year	Bushfires (ha)	Trees planted (number)
1983	3,420,144	
1984	1,108,947	11,140,520
1985	735,397	11,763,875
1986		
1987		
1988		
1989	329,662	13,131,918
1990	231,001	6,070,713
1991	107,455	9,226,247

Source: Ministère de l'Agriculture, *Annuaire des Statistiques Agricoles*, 1987, 1991. Other estimates suggest that up to one-third of the island, e.g., 20,000,000 ha, is burned annually. IUCN/UNEP/WWF, *Madagascar, an Environmental Profile* (Gland: IUCN, 1987).

*Includes forests but represents mainly grasslands.

ry-Tany project, an effort to research and promote soil conservation and sustainable land management.⁷⁵

The EAP includes as one of its priority goals environmental improvement in rural and urban communities. Much of this sector of the EAP is coordinated by ANAE with Swiss and Norwegian aid. To date, ANAE has coordinated 464 miniprojects for soil conservation affecting over 100,000 people. Hopefully the renewed efforts under the EAP will lead to improved soil resource management and avert the predicted fuelwood crisis.

Evaluation

The above review of conservation efforts for biodiversity, forests, and soils shows that despite the explosion of efforts and money, evidence is only slightly positive about actual progress. At the International Symposium on Madagascar held at Chicago's Field Museum in June 1995, the capstone address delivered by Alison Richard of Yale University and co-authored by Sheila O'Connor of WWF addressed these questions and ambiguities. They began by stating that to evaluate conservation progress, the data do not exist in any systematic way, and that the data would be discouraging. However, their assessment was that the conservation projects need more time before they are evaluated, and that with hard work, there is no reason to despair. Richard and O'Connor added that ICDPs are complex experiments, yet unproven, and should not be discounted based on recent criticisms. The conservation boom is extending across Madagascar, particularly in the ring of forests and protected areas along the edges of the island, but also in the agricultural and pastoral lands of the populous central highlands. Hopefully all of this well-intentioned effort will come to fruition and achieve the goals set forth in the EAP.

Conclusion

Conservation in Madagascar has come a long way since King Andrianampoinimerina called for the protection of certain forests 200 years ago. Especially since the mid-1980s, international and national conservation groups on the island have worked at a feverish pace to slow the degradation of the nation's environment. This boom in conservation was ultimately caused by a combination of the island's special biological characteristics, the severe threat of degradation, the expanding global environmental movement, and the political-economic influence of northern institutions such as the World Bank. The timing of this boom in the mid-1980s is due to the dissemination of information about the nation's environmental problems during this period, the 1980s boom of rainforest-oriented activism, and Madagascar's financial crisis and political reopening to the West. Contributing factors include awareness

and concern among leading Malagasy government officials and academics, individual efforts, early collaboration between concerned groups, and economic incentives.

The activities of the various donors, implementing organizations, coordinating agencies, and government institutions have become increasingly complex and interlinked under the EAP. A lot of money and agencies have arrived in Madagascar, resulting in a surging cash flow, burgeoning donor agency offices in Antananarivo, and the growth of "NGO-landscapes" of panda symbols, Land Rovers, and protected areas.⁷⁶ Some laud the progress being made; others contend that there is much too much money arriving in Madagascar, and that this money is not well invested, lost to corruption, and not showing results (anon-a; anon-g).

A quick review of conservation actions demonstrates many examples of progress as well as significant stumbling blocks. A particularly difficult problem to solve has been the interaction of conservation action with local people's lives and goals. While the Malagasy are largely to blame for today's threatened ecosystems, ignoring their current needs would severely endanger the sustainability of conservation action. The proliferation of ICDPs shows across-the-board concern with involving the local people in conservation; in fact, Madagascar has been touted as the best example of a nation linking people and parks.⁷⁷ However, these projects are often challenged by fundamental contradictions in purpose. The goal of balancing local development goals such as secure food, improved transportation, and better health care with conservation aims has proved elusive, and has led to misunderstandings between local people and project leaders, as well as between biologists and social scientists on project staffs. The review of current ICDPs presented above shows several cases where balancing conservation and development has been problematic, as the benefits of conservation are distributed inequitably, as loss of resource access causes hardships, as development efforts exacerbate degradation, or as exaggerated local expectations hinder progress. Evidently it is too early to conclude on the success of the conservation boom for the people, fauna, flora, and ecosystems of Madagascar. Through continued efforts—with careful attention to the needs, expectations, and participation of the local people—one can hope for a socially and environmentally sustainable future.

Notes

1. Russell A. Mittermeier, Lala H. Rakotovo, Voara Randrianasolo, Eleanor J. Sterling, and Danièle Devitre, "Priorités en Matière de Conservation des Espèces à Madagascar," *Occasional Papers of the IUCN Species Survival Commission*, no. 2 (1987).
2. David A. Burney and Ross D. E. MacPhee, "Mysterious island," *Natural History*, 97, no. 7 (July 1988): 46–55; Robert E. Dewar and Henry T. Wright, "The culture history of Madagascar," *Journal of World Prehistory* 7, no. 4 (1993): 417–466.

3. Nigel Heseltine, *Madagascar* (New York: Praeger Publishers, 1971).
4. Jonathan S. Adams and Thomas O. McShane, *The Myth of Wild Africa* (New York: W. W. Norton and Co., 1992).
5. M. Fulgence Fanony, "Un modèle de stratégie de conservation de la forêt à Madagascar. L'exemple d'Andrianampoinimerina," in Michel Maldague, Kabala Matuka, Roland Albignac, *Environnement et Gestion des Ressources Naturelles dans la Zone Africaine de l'Océan Indien, Rapport du séminaire international, Toamasina*, 25 Sept.-3 Oct. 1988 (Paris: UNESCO, 1989), pp. 349-352; S. H. B. Hardenbergh, "Historic and recent natural resource use, deforestation, and human health in Madagascar, and assumptions in conservation-development," unpublished manuscript; M. G. Julien, *Le Code des 305 Articles* (Tananarive: Imprimerie Officielle, 1900).
6. Lucy Jarosz, "Defining and explaining tropical deforestation: shifting cultivation and population growth in colonial Madagascar (1896-1940)," *Economic Geography* 69, no. 4 (1993): 366-379.
7. Daniel W. Gade and A. N. Perkins-Belgram, "Woodfuels, reforestation, and eco-development in highland Madagascar," *GeoJournal* 12, no. 4 (1986): 365-374.
8. Lucie C. Phillips, "Madagascar: the Central Highlands," in Peter C. Bloch, "Land tenure issues in river basin development in sub-Saharan Africa," *University of Wisconsin-Madison Land Tenure Center Research Paper*, no. 90 (1986); P. Randrianarijaona, "The erosion of Madagascar," *Ambio* 12 (1983): 308-311; Daniel W. Gade and A. N. Perkins-Belgram, "Woodfuels"; Joseph Andriampianina, "Nature reserves and nature conservation in Madagascar," in Alison Jolly, Philippe Oberlé, and Roland Albignac, *Key Environments: Madagascar* (Oxford: Pergamon Press, 1984): 219-227.
9. As the national herd consists of approximately 10 million cattle, this rule sanctions the yearly burning of 17 percent of the land area. Estimates suggest that one-third of the rangelands are actually burned yearly: IUCN/UNEP/WWF, *Madagascar, an Environmental Profile* (Gland, Switzerland: IUCN, 1987.)
10. Barthélémy Vaohita, "Ecole et protection de la nature," in IUCN, "Comptes rendus de la Conférence internationale sur la Conservation de la Nature et de ses Ressources à Madagascar, Tananarive 7-11 Octobre, 1970," *Publications IUCN Nouvelle Série, Document Supplémentaire*, no. 36 (Morges, Switzerland: IUCN, 197), pp. 230-231.
11. IUCN, "Comptes rendus," p. 29.
12. Quoted in Alison Jolly, *A World Like Our Own—Man and Nature in Madagascar* (New Haven: Yale University Press, 1980), p. 7. However, no mention of Rakotomaria, nor these comments, are found in the published proceedings (IUCN, "Comptes rendus").
13. Dominique Desjeux, *La Question Agraire à Madagascar* (Paris: Harmattan, 1979); Maureen Ann Covell, *Madagascar: Politics, Economics, and Society* (New York: Frances Pinter Publishers, 1987).
14. Maureen Ann Covell, *Madagascar*; Alison Jolly, "On the edge of survival," in F. Lanting, *Madagascar: A World Out of Time* (New York: Aperture, 1990), pp. 110-121.
15. Maureen Ann Covell, *Madagascar*; Gilles Duruflé, "Structural disequilibria and adjustment programmes in Madagascar," in Bonnie K. Campbell and John Loxly, *Structural Adjustment in Africa* (New York: St. Martin's Press, 1989), pp. 169-201; Frederick L. Pryor, *The Political Economy of Poverty, Equity, and Growth: Malawi and Madagascar* (New York: Oxford University Press, 1991); Eliphaz G. Mukonoweshuro, "Madagascar: the collapse of an experiment," *Journal of Third World Studies* 11, no. 1 (1994): 336-368.

16. WWF, Madagascar Country Plan: FY 92/93-FY 96/97, Third Draft, September 1992 (Gland, Switzerland: unpublished document).
17. Alison Jolly, "On the edge," p. 121.
18. IUCN/UNEP/WWF, *World Conservation Strategy* (Gland, Switzerland: IUCN, 1980).
19. Michel Maldague et al., *Environnement et Gestion*, p. 25.
20. Alison Jolly, "On the edge," pp. 119-120.
21. *Ibid.*, p. 120.
22. World Bank, *Madagascar Environmental Action Plan, preliminary version, volume I: general synthesis and proposed actions*, World Bank, USAID, Coop. Suisse, UNESCO, UNDP, WWF, 1988; WWF, Madagascar Country Plan.
23. Martin Nicoll and Olivier Langrand, *Madagascar. Revue de la Conservation et des Aires Protégées* (Gland: WWF, 1989); Lee Hannah, *African People, African Parks: An Evaluation of Development Initiatives as a Means of Improving Protected Area Conservation in Africa*, USAID report number PN-ABL-482, 1992; anon-j.
24. Stefan Schmid, "Sauvegarde des forêts naturelles et développement rural à Madagascar: un premier bilan des actions en cours," *Cahiers d'Outre-mer* 46, no. 181 (1993): 35-60.
25. World Bank, *Environmental Action Plan*; François Falloux, "Les orientations de la Banque Mondiale dans le domaine de l'environnement. Le cas de Madagascar," in Michel Maldague et al., *Environnement et Gestion*, pp. 103-110; Alison Jolly, "On the edge"; Raymond F. Mikesell and Larry Williams, *International Banks and the Environment* (San Francisco: Sierra Club Books, 1992); François Falloux and Lee M. Talbot, *Crisis and Opportunity* (London: Earthscan, 1993).
26. François Falloux and Lee M. Talbot, *Crisis and Opportunity*, pp. 34-35.
27. "Loi no. 90-033 du 21 décembre 1990, relative à la Charte de l'Environnement malgache," *Journal Officiel de la République Démocratique de Madagascar*, no. 2035 (1990), pp. 2540-2589; World Bank, *Environmental Action Plan*; Office National de l'Environnement, *Rapport National sur l'Environnement et le Développement* (Antananarivo: ONE, 1992).
28. Session on "Environmental monitoring and management plans," Field Museum Symposium on Madagascar, Chicago, June 2-4, 1995.
29. This may be aided by the fact that the *Chargé de Programme* at WWF, Sheila O'Connor, is reputed to have direct access to Prime Minister Ravony (anon-c).
30. John L. Hough, "Institutional constraints to the integration of conservation and development: a case study from Madagascar," *Society and Natural Resources* 7 (1994): 119-124.
31. Piers M. Blaikie and Harold C. Brookfield, *Land Degradation and Society* (London: Methuen, 1987), p. 16.
32. Lori A. Thrupp, "Environmental initiatives in Costa Rica: A political ecology perspective," *Society and Natural Resources* 3 (1990): 243-256.
33. This framework is inspired by Thomas J. Bassett, "The political ecology of peasant-herder conflicts in the northern Ivory Coast," *Annals of the Association of American Geographers* 78, no. 3 (1988): 453-472.
34. Philemon Randrianarijaona, "The erosion of Madagascar"; Henri Finoana, "The valorization and the protection of biodiversity in Madagascar," paper presented at the Field Museum Symposium on Madagascar, Chicago, June 2-4, 1995.
35. Glen M. Green and Robert W. Sussman, "Deforestation history of the eastern rain forests of Madagascar from satellite images," *Science*, 248 (1990): 212-215.
36. These prehistoric extinctions are not yet explained; proposed causes include habitat or climate change, hunting, feral cattle, and anthropogenic hypervirulent diseases: Robert E. Dewar and Henry T. Wright, "The culture history of Madagas-

- car"; Ross D. E. MacPhee, "The 40,000 year plague: humans, hypervirulent diseases, and first-contact extinctions," and R. E. Dewar, "Were people responsible for the Holocene extinctions in Madagascar and how will we ever know?" Papers presented at the Field Museum Symposium on Madagascar, Chicago, June 2-4, 1995.
37. Jeffrey A. Sayer, Caroline S. Harcourt, and N. Mark Collins, eds., *The Conservation Atlas of Tropical Forests: Africa* (London: Macmillan, 1992).
 38. Russell A. Mittermeier, William R. Konstant, Martin E. Nicoll, Olivier Langrand, *Lemurs of Madagascar, an Action Plan for their Conservation, 1993-1999* (Gland, Switzerland: IUCN/SSC Primate Specialist Group, 1992).
 39. Russell A. Mittermeier, "Primate diversity and the tropical forest: case studies from Brazil and Madagascar and the importance of megadiversity countries," in Edward O. Wilson, ed., *Biodiversity* (Washington, D.C.: National Academy Press, 1988), pp. 145-154; World Bank, *World Development Report 1992* (Oxford: Oxford University Press, 1992).
 40. These include publications such as: Martin Nicoll and Olivier Langrand, *Madagascar: Revue de la Conservation*; IUCN/UNEP/WWF, *Madagascar: an Environmental Profile*; Lala Rakotovo, Véronique Barre, and Jeffrey Sayer, *L'Equilibre des Ecosystèmes Forestiers à Madagascar* (Gland, Switzerland: IUCN, 1988); Alison Jolly et al., *Key Environments*.
 41. For example: Ken Preston-Mafham, *Madagascar: A Natural History* (New York: Facts on File, 1991); Alison Jolly, *A World Like Our Own*; Alison Jolly, "Madagascar: a world apart," *National Geographic*, 171, no. 2 (Feb. 1987): 148-183; Alison Jolly, "Lemurs on the edge of survival," *National Geographic* 174, no. 2 (Aug. 1988): 132-161; Alison Jolly, "A necklace of pearls: saving Madagascar," *Orion* (Autumn 1990): 36-49; Frans Lanting, *A World Out of Time*; Gerald Malcolm Durrell, *The Aye-Aye and I* (New York: Arcade, 1993).
 42. Piers M. Blaikie, "The use of natural resources in developing and developed countries," in Ronald J. Johnston and Peter J. Taylor, eds., *A World in Crisis?* (Cambridge, Mass.: Basil Blackwell, 1989).
 43. William M. Adams, *Green Development* (New York: Routledge, 1990); David Anderson and Richard Grove, eds., *Conservation in Africa: People, Policies, and Practice* (Cambridge: Cambridge University Press, 1987).
 44. Several authors have recently argued that natural resource issues, such as Malagasy conservation, can be dominated by politically determined and constructed ideas: Lucy Jarosz, "Defining and explaining," Karl S. Zimmerer, "Soil erosion and social (dis)courses in Cochabamba, Bolivia: perceiving the nature of environmental degradation," *Economic Geography* 63, no. 3 (1993): 312-327; Richard Symanski, "Contested realities: feral horses in outback Australia," *Annals of the Association of American Geographers* 84, no. 2 (1994): 251-269.
 45. Donna Haraway, *Primate Visions* (New York: Routledge, 1989); William M. Adams, *Green Development*; Jonathan S. Adams and Thomas O. McShane, *Myth of Wild Africa*.
 46. W. M. Adams, *Green Development*.
 47. For example: Michael P. Wells and Katrina Brandon, with Lee Hannah, *People and Parks: Linking Protected Area Management with Local Communities* (Washington, D.C.: World Bank/WWF/USAID, 1992); Michael P. Wells and Katrina Brandon, "The principles and practice of buffer zones and local participation in biodiversity conservation," *Ambio* 22, no. 2-3 (1993): 157-162; Michael Brown and Barbara Wyckoff-Baird, *Designing Integrated Conservation and Development Projects*. Biodiversity Support Program of WWF, the Nature Conservancy, and World Resources Institute, funded by USAID, 1992; Lee Hannah, *African People and African Parks*.

48. See, for example, Alison Jolly, "The study of lemur social behaviour," in IUCN, "Comptes rendus," p. 166, who concludes that "Malagasy lemurs are fascinating" and that "an appreciation of the real complexity of animal behavior depends on the existence of protected natural reserves."
49. Alison Jolly, "On the edge"; A. Jolly, *A World Out of Time*.
50. Alison Jolly, "On the edge," p. 121.
51. William M. Adams, *Green Development*.
52. Alison Jolly, "The Madagascar challenge: human needs and fragile ecosystems," in H. Jeffrey Leonard, *Environment and the Poor* (New Brunswick: Transaction Books, 1989), pp. 189-215; Alison Jolly, "On the edge."
53. Lee Hannah, *African People, African Parks*.
54. Senne Andriamirado, "Les atouts de Zafy," *Jeune Afrique* 1680 (18-24 March 1993): 32-33.
55. See, for example: IUCN, "Comptes rendus"; Rakotovo et al., *Equilibre des Ecosystèmes*; Mittermeier et al., "Priorités en matière de conservation"; Maldague et al., *Environnement et Gestion*.
56. François Falloux and Lee M. Talbot, *Crisis and Opportunity*, "Des mesures d'accompagnement souhaitées," *ROI Madagascar* (July 1994), p. 31; "10.000 nouveaux touristes pour une recette de 21 millions de dollars par an," *Midi Madagascarikara* (12 Aug. 1994), p. 3.
57. Stefan Schmid, "Sauvegarde des forêts"; Lee Hannah, *African People, African Parks*.
58. Martin Nicoll and Olivier Langrand, *Madagascar, Revue de la Conservation*.
59. Stefan Schmid, "Sauvegarde des forêts"; Krishna G. Ghimire, "Parks and people: livelihood issues in national parks management in Thailand and Madagascar," *Development and Change* 25, No. 1 (1994): 195-229.
60. Russell A. Mittermeier et al., *Lemurs of Madagascar*; Stephen Leisz, Andrea Robles, and James Gage, "Land and natural resource tenure security in Madagascar," prepared for the Land Tenure Center, University of Wisconsin-Madison, 1994; Priya Shyamsundar, "Economic implications of tropical forest protection for local residents: The case of Mantadia National Park in Madagascar," Ph.D. dissertation, Duke University, 1993; Stefan Schmid, "Sauvegarde des forêts."
61. J. Webster, "The Andohahela integrated conservation and development project," poster presented at the Field Museum Symposium on Madagascar, Chicago, June 2-4, 1995; Russell A. Mittermeier et al., *Lemurs of Madagascar*; Lee Hannah, *African People, African Parks*, anon-e; Russell A. Mittermeier et al., "Priorités en matière de conservation"; Sheila O'Connor, "Madagascar: Beza Mahafaly and Andohahela," in Alexander Kiss, ed. "Living with wildlife: wildlife resource management with local participation in Africa," *World Bank Technical Paper*, no. 130 (1990).
62. See Lee Hannah, *African People, African Parks*; Stefan Schmid, "Sauvegarde des forêts"; Martin Nicoll and Olivier Langrand, *Madagascar, Revue de la Conservation*; Russell A. Mittermeier, et al., "Priorités en matière de conservation"; Sheila O'Connor, "Madagascar: Beza Mahafaly and Andohahela."
63. Stefan Schmid, "Sauvegarde des forêts"; Martin Nicoll and Olivier Langrand, *Madagascar, Revue de la Conservation*; Russell A. Mittermeier et al., *Lemurs of Madagascar*.
64. Martin Nicoll and Olivier Langrand, *Madagascar, Revue de la Conservation*; Russell A. Mittermeier et al., *Lemurs of Madagascar*, anon-s.
65. Russell A. Mittermeier et al., *Lemurs of Madagascar*; Lee Hannah, *African People, African Parks*.
66. William J. Peters, "Attempting to integrate conservation and development among

- resident peoples of the Ranomafana National Park, Madagascar." Ph.D. dissertation, North Carolina State University, 1994; Sabrina H. B. Hardenbergh, "Undernutrition, illness, and children's work in an agricultural rain forest community of Madagascar," Ph.D. dissertation, University of Massachusetts-Amherst, 1993; Patricia Wright, "Primate ecology, rainforest conservation, and economic development: building a national park in Madagascar," *Evolutionary Anthropology* 1, no. 1 (1992): 25-33; Ranomafana National Park Project, brochure, ca. 1995.
67. Jim Webster, "The Amber Mountain integrated conservation and development project," poster presented at the Field Museum Symposium on Madagascar, Chicago, June 2-4, 1995; M. Nicoll and Olivier Langrand, Madagascar, *Revue de la Conservation*; Krishna G. Ghimire, "Parks and people: livelihood issues."
 68. Russell A. Mittermeier et al., *Lemurs of Madagascar*, The Peregrine Fund, Wildlife Conservation Society, and CARE-International, Press conference at the Field Museum, Chicago, June 2, 1995. Projet Masoala, "Proposition des Limites du Parc National Masoala" (Antananarivo: CARE, WCS, and the Peregrine Fund, 1985).
 69. Bernard Bousquet and H. Rabetaliana, *Site du Patrimoine Mondial des Tsingy de Bemaraha et Autres Sites d'Intérêt Biologique et Ecologique du Fivondronana d'Antsalova. Evaluation et Plan d'Aménagement* (Paris: UNESCO, 1992); Martin Nicoll and Olivier Langrand, Madagascar, *Revue de la Conservation*; Russell A. Mittermeier et al., *Lemurs of Madagascar*.
 70. Martin Nicoll and Olivier Langrand, *Madagascar, Revue de la Conservation*, anon-r.
 71. Ibid.
 72. Ibid.
 73. David Western and Mary C. Pearl, *Conservation for the Twenty-first Century* (New York: Oxford University Press, 1989).
 74. Projet COEFOR, *Répertoire et Carte de Distribution, Domaine Forestier National de Madagascar* (Antananarivo: Direction des Eaux et Forêts en collaboration avec Conservation International, 1993).
 75. Coopération Suisse, *Coopération Madagascar-Suisse 1993* (Antananarivo: FTM, 1993).
 76. Gregory W. Knapp, "Endangered cultural landscapes of the equatorial Andes," paper presented at the Annual Meeting of the Association of American Geographers, San Francisco, 29 March-2 April 1994.
 77. Lee Hannah, *African People, African Parks*.

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