*Banwa*. 2007. 4(1):83-97.

# Community-Based Wetland Conservation Protects Endangered Species in Madagascar: Lessons from Science and Conservation

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**Abstract**

Survival of the Madagascar fish eagle (*Haliaeetus vociferoides*) is threatened by habitat loss. Of a population estimated at 100-120 breeding pairs, 10 pairs breed on three adjacent lakes in western Madagascar. Fishing on the lakes is the main livelihood of local Sakalava people. From 1991 through 1995 we documented a massive influx of migrant fishermen who abused local traditional resource extraction rules and threatened the livelihood of local inhabitants, as well as the survival of one of the world's most endangered eagles. Migrants' economic incentive was strong. In 1995 per capita income from fishing was about USD1500 for the six-month season, about 7.5 times the national annual average. Fish stocks were rapidly diminished through the fishing season as catches diminished to the point where fishermen gave up fishing before the end of the season. Fish stocks were lowest when Madagascar fish eagle nestlings fledged, affecting annual productivity. The most serious impact of fishermen may be on the lake-side forest, which was used as a source of dugout canoes and wood to fuel fish-drying fires. To conserve this important breeding site we worked with the local community to enhance and enforce traditional resource utilization rules that helped prevent loss of fish eagle breeding habitat, reduce nest site disturbance, and sustain prey availability. We used a 1996 law to empower communities to control natural resource use by creating two community associations with authority to enforce local rules. We helped the associations become effective through training, advice, logistical, and scientific support.

Keywords: Community, conservation, habitat, law, Madagascar fish eagle, persecution, raptors, Sakalava.

## Introduction

The island endemic Madagascar fish eagle (*Haliaeetus vociferoides*) is critically endangered (Stattersfield and Capper, 2000) with a small population limited to wetland habitats on Madagascar's western seaboard (Rabarisoa et al., 1997). Habitat degradation and human persecution are the most likely causes for the species rarity (Watson et al., 2000a; Watson and Rabarisoa, 2000). Survival of the Madagascar fish eagle requires conservation of remaining suitable habitat and the natural resources on which the eagle depends, and control of human persecution. This paper describes The Peregrine Fund's (TPF) efforts to conserve critical fish eagle habitat and reduce persecution of eagles by empowering the local Sakalava community of the Manambolomaty Lakes complex, western Madagascar, to manage and sustainably harvest the lakes and forest on which they depend, and which they share with about 10% of the Madagascar fish eagle breeding population.

## Materials and Methods

We studied the ecology and natural history of the Madagascar fish eagle, the impact of humans on key natural resources that people shared with the Madagascar fish eagle, and we developed and applied new conservation methods to effect a change in human behavior to benefit fish eagles and their habitat. Each of these methods will be briefly described.

### Madagascar Fish Eagle studies

Studies on the Madagascar fish eagle were designed to measure the species' distribution and abundance, and determine what factors affect them. We began with surveys within the species' known range in Madagascar. Surveys were completed on foot, and by car and boat, in all suitable habitats along the coast and on lakes and rivers within about 100 km inland of the west coast of Madagascar. Surveys were conducted annually during the breeding season over at least five years from 1991 through 1995 (Rabarisoa et al., 1997), and every fifth year since then to detect change in the distribution and abundance of the species.

To understand what factors affect the species' distribution and abundance, we measured population parameters in a sample of breeding pairs located in and around the Manabolomaty Lakes complex, about 300 km due west of the capital (Antananarivo). Parameters measured included nesting density, annual nest occupancy, breeding productivity, survival, and turn-over at the nest. Causes of breeding failure and mortality were determined whenever possible (Watson et al., 1999; Watson and Razafindramanana, 1999; Watson et al., 2000a).

Behaviors, such as breeding behavior, dispersal, habitat selection, and migration, can have a significant impact on a species' distribution and abundance. Behavior was observed, documented, and interpreted in the context of when and where it occurred, and which individuals were involved (Berkelman et al., 1999a, 1999b, 2002; Rafanomezantsoa et al., 2002; Tingay et al., 2002, 2004).

Studies on the genetic relationship between individuals of a pair, their progeny, and extra-pair adults at the nest were used to interpret behavior which included the unusual participation of more than two adults at the nest. Molecular genetics were also used to understand the species phylogeography and the genetic consequences of its rarity (Tingay et al., 2002, 2004).

**Studies of the impact of humans on natural resources**

Studies to measure human use of natural resources which people share with the Madagascar fish eagle and its impact on the fish eagles, were initiated in 1993 with a major study concluded in 1996 and annual monitoring occurring since then. Observations of increasing numbers of fishermen active on the three main lakes of the Manambolomaty complex occurred annually from 1991 through 1993. Systematic counts began in 1996 of the number of fishermen fishing, the number of dug-out canoes in use, the number and location of fishermen camps, the number of fish-drying fires, and the number, size, and distance to shore of cut trees (for either firewood or dug-out canoe construction). Counts were done simultaneously by three teams of two observers working around the perimeter of each lake, and were repeated at the beginning, middle and end of the fishing season. Fishermen dialogue surveys were done by one team of two people who answered 22 questions from dialogue with the head of household and from direct observation in each fisherman camp. Questions provided data on fishing effort and success, fishing nets (type, length, mesh size), income from fishing and market forces, and utilization of wood from the surrounding forest (Kalavah and Razanrizanakanirina, 1997; Razanrizanakanirina and Watson, 1997; Watson and Rabarisoa, 2000; Watson et al., 2000b).

Measuring the human impact on Madagascar fish eagle productivity has been accomplished annually since 1993 by observing territory and nest occupancy of banded, individually recognizable, fish eagles at all 10 territories that exist on the Manambolomaty lakes complex. Breeding success was measured as the proportion of eggs laid that hatched and fledged young (Watson et al., 1999).

**Conservation implementation methods**

Conservation centered on the premise that, first, local residents who were indigenous to the area and who depend upon the availability of fish in the lakes and wood in the forest for their livelihood would have an incentive to control the use of these natural resources to guarantee their future, and second, that if there were enough fish in the lakes and trees in the forest for people then there would be enough for Madagascar fish eagles. We utilized a new (in 1996) law that was designed to decentralize the control of natural resources away from government by empowering local communities to be responsible. The local community was unaware of this law when we began work in 1996, and had insufficient funding, transport, or communication to learn about the law or follow the process for implementing it. The Peregrine Fund's primary role was to gather the information needed, share it with the local community, and provide the logistical resources needed to implement the law, mainly transport, communication, and a small amount of funding.

In 1996 the government of Madagascar, in compliance with the second phase of Madagascar's Environmental Action Plan (PE-II), approved Law No. 96-025 to decentralize natural resource management by encouraging local communities to manage their own natural resources under a "management charter" with the government, known as Gestion Locale Securisée (GELOSE). The process adopted by the local communities to achieve the GELOSE charter was as follows:

(1) The local population made a request to transfer authority for management of one or more natural resources to the mayor of the community, which was eventually agreed under written contract.

(2) With expert services provided by TPF and others, the community demonstrated the technical foundation for this request.

(3) With TPF's help, the community selected an "environmental mediator" to facilitate discussions and negotiations to:

  (a) understand the respective points of view of stakeholders on the natural resources to be managed,

  (b) elaborate a common vision of the long-term future for natural resource management, and

(c) define the procedure to permit the effective management of natural resources.

(4) With the mediator's help the community established the requirements of an adequate system of management that responds to the "Management Contract" with goals of conservation, sustainable development, and development of resources.

(5) The community finalized the contract by an authorized method.

## Results and Discussion

### Madagascar fish eagle ecology

Surveys for breeding Madagascar fish eagles at their nests from 1991 through 1995 detected at least 222 adult individuals including 63 pairs, 36 probable pairs, 24 single adults, and 18 immature birds (Rabarisoa et al., 1997). Assuming that all probable pairs were breeding, we estimated the fish eagle breeding population was 99 pairs (95% confidence interval = 78 to 120 pairs) in the area searched. This estimate was about twice the number previously estimated in the period 1980-1985 (Langrand and Meyburg, 1989), due mainly to our greater search effort. The number of breeding pairs in some localities had declined since 1985, suggesting either a general population decline or movement of these pairs to other sites. Three major areas of concentration of the species were located: (1) Tsiribihina River near the southern extent of the species' range, (2) Manambolomaty Lakes complex (Antsalova region) to the north of the Tsiribihina River, and (3) the northernmost coastal and estuarine region between Mahajamba Bay and Nosy Hara (an island) near Madagascar's northern tip (Rabarisoa et al., 1997). Our best guess of the total population size, including the area of the species' range that we had not thoroughly searched, was about 120 pairs. Monitoring samples of known nest sites from 1996 through 2006 suggests little or no change in the species' distribution and abundance in the following decade. During the study period from 1996 through 2006, the number of territorial pairs of fish eagles around the Manambolomaty lakes complex varied from eight to 11, with generally higher numbers active (laying eggs), and significantly higher numbers successful (fledging young) since community-based conservation took effect in 2001 (mean number of young fledged per occupied nest 1996 to 2000 = $4.4 \pm 0.55$ young/pair; mean number of young fledged per occupied nest 2001 to 2006 = $6.5 \pm 1.22$ young/pair; $t = 3.53$, $df = 9$, $P=0.006$).

Fish eagles nesting in the Manambolomaty Lakes complex utilized alternate nests, some building new nests annually while others occupied the same nest, averaging a 78% annual relocation rate. Despite the use of alternate nests within their territory, nest spacing between adjacent pairs was fairly constant at 1.68 ± 0.66 km (n = 49). Home range areas ranged from 244 to 487 ha, with a mean of 350 ha ± 119 ha. Pairs with the smallest home range were located on islands in the lakes, where ranging behavior was probably reduced by abundant shoreline foraging habitat and/or the easier defense of territories surrounded by exposed water (Watson and Razafindramanana, 1999).

Madagascar fish eagle nesting and foraging habitat parameters including nest, nest tree, surrounding vegetation, and adjacent water parameters, were measured at 56 nests found along the western seaboard of Madagascar. Descriptive statistics were used to look for consistent patterns among habitat parameters. While certain trends were apparent, such as always nesting within sight of water and in the largest trees, there was little evidence that would suggest a negative human impact on nest site or foraging habitat availability exists wherever large trees and water-woodland ecotone remain, yet many such apparently suitable sites were unoccupied (Watson et al., 2000a; Berkelman et al., 1999a, 1999b, 2002). Fish eagles nested further from water than the African fish eagle *Haliaeetus vocifer* (Brown, 1980) and bald eagles *H. leucogaster* in north America (Corr, 1974; Grubb, 1976; Kralovec et al., 1992), probably reflecting the effect of harvesting by fishermen of tall trees close to water for construction of dug-out canoes (Watson et al., 2000a; Watson and Rabarisoa, 2000). Cutting of trees for canoe construction may limit availability of suitable nest sites if all large trees within sight of water are removed. Introduced *Tilapia* spp. were the most common fish species available to fish eagles, and were the dominant prey species selected. Introduction of *Tilapia* may have benefited the Madagascar fish eagle by providing abundant and easily captured prey (Berkelman, 1999a).

Direct human persecution (collecting chicks from the nest and trapping adults) was observed to occur with regularity in the Manambolomaty area. Chicks were either eaten or were sold as pets, rarely surviving long. Adults were trapped, a foot removed, and then released. Only one adult has been seen to survive this abuse (Tingay et al., 2004), while about ten adults with a single foot missing have been found dead. The persecution of adult fish eagles stems from a local superstitious belief that the foot of a living eagle can act as a powerful talisman (Kalavah and Razanrizanakanirina, 1997). The population effect of increased adult mortality from this persecution is more significant than an equivalent level of persecution of nestlings, but the combined increased adult mortality and reduced recruitment is harmful to the species' survival and contributes to its rarity and absence from suitable habitat.

**Natural resource use by humans**

*Tree cutting for canoes and firewood*

In 1991, when we began studying Madagascar fish eagles, there were about 30 fishermen active on the lakes. By 1996 when we did the first quantitative survey of fishermen, we counted 300 fishermen and 275 dug-out canoes active on the lakes. There were 42 temporary fishermen camps and five permanent fishing villages. At night we counted a minimum of 32 fish-drying fires burning after 2200 hours. The density of cut trees in the forest ranged from 15 to 290 trees/ha. Trees used for canoe construction were large in diameter (mean = 61.3 cm in diameter) and averaged 140 m from the shore. Trees used for firewood were 18.4 cm in diameter and averaged 65 m from shore. A significant increase in the number of trees cut since fishermen numbers began to increase after 1991 was evident from estimated cut date, based on decomposition since cutting (Watson and Rabarisoa, 2000).

*Fishermen and fishing*

Fisherman dialogue surveys at a sample of 18 temporary fishing camps and one village revealed that fishermen came from 14 villages, the most distant of which was 50 km from the lakes. Extrapolating numbers, we estimated there were around 300 fishermen and 600 family members, totaling 900 people, about ten times the number present at the lakes when we first began in 1991. Migrants arrived at the lakes in June when the fishing season opened, and left again in November when fish catch was almost nil or December when the season officially closed. All fishermen agreed that fish catch diminished through the season, indicating a major impact on fish numbers. On average, each fisherman's camp burned five fish-drying fires and we estimated by extrapolation that 200 fish-drying fires existed around the lakes. Fish were dried in front of fires on sticks holding three fish. Fishermen's estimates of time needed to dry fish averaged 1.12 h, and each fire dried an average of 23 sticks of fish at a time. Fish were sold for cash or bartered for goods, such as rice, coffee, oil, and batteries. Fish buyers came from 11 villages, mostly within 100 km of the lakes, and carried fish to commercial centers for resale (Watson and Rabarisoa, 2000).

*Fish harvest*

Using the data above and making several assumptions, we estimated the number and weight of fish extracted from the lakes each season, the income derived from fishing, and the amount of time fires must burn to smoke and dry all the fish. The last estimate was used to gauge the impact of wood collecting on the surrounding forest and availability of nesting sites for Madagascar fish eagles. Assuming the number of fishermen was constant through the season, and there was a linear change in catch rates through the season, we modeled the relationship between time (days) from the beginning of the season and daily fish catch (fish per day) with the equation: daily fish catch = 84,578 - 460.5 x time ($r^2 = 0.92$, $P<0.05$, df=2). Using this equation, we estimated total catch from the three lakes during an average 5.6 month fishing season to be 7,671,930 fish, or about 1,918 metric tons assuming each fish weighed an average of 250 g (Watson and Rabarisoa, 2000).

*Wood consumption*

The number of hours in front of a fire required to dry the daily catch (fish-hours/day) was estimated by dividing the reported daily catch by three (number of fish per stick) and again by 23 (number of sticks per fire) and multiplying by the average time to dry the fish of 1.12 h. Using reported daily catch of fish at the beginning, middle and end of the season, and assuming a linear relationship through the season, then total number of fire-hours per day = 1,372.9 - 7.475 x time ($r^2 = 0.92$, $P<0.05$, df=2). Using this equation, we estimated 124,528 fire-hours to dry the entire seasons' catch. Based on local experience, we estimated that it would take about 83,000 m of 30 cm diameter log to fuel these fires, all of which was collected from the forest surrounding the lakes (Watson and Rabarisoa, 2000).

*Economic incentive*

The price of fish varied with demand from 500 to 1000 Francs Malgache (Fmg) in 1996. Assuming the price averaged 750 Fmg then the total catch for the season was about 1,917,982,500 Fmg (then about USD479,495) and each fisherman made about USD1,562 for the season's work. Annual average per capita income in 1996 was USD225 to 250 in Madagascar, so fishing at these lakes provided an income about 7.5-times greater, a strong incentive to endure the hard work and hardship of camping on the lakes away from home for several months (Watson and Rabarisoa, 2000).

**Conservation results**

In 1993 TPF first proposed the idea of a community-based conservation project to protect wetlands and natural resources used by local Sakalava people living in the Manabolomaty Lakes complex around Lakes Befotaka, Soamalipo, and Ankerika and shared with endangered Madagascar fish eagles (Watson and Rabarisoa, 2000; Watson et al., 2000b). Discussions with the *tompondrano* (traditional keeper of the lakes) of Lakes Soamalipo and Befotaka began at that time to better understand the existing traditional fisheries rules. The idea was based on the simple concept that, provided people left fish eagles alone, then if there were enough fish in the lakes for people to catch and enough trees in the forest for people to use, there should be enough of both these limiting resources for Madagascar fish eagles to survive also. Nest sites (trees) and food (in this case, fish) are the two main ecological resources that limit raptor population density and distribution (Newton 1979).

By 1996 the local population and authorities at the villages of Soatana and Masoarivo (*tompondrano*, mayors, and elders) agreed that there were problems of over-fishing the three lakes and over-use of forest resources around the lakes, and wanted to do something about them by enforcing existing laws, traditional edicts, and *dina* (taboos). In June 1996, TPF helped the community leaders to write these existing traditional laws and *dina*, and announce them at public meetings on 29 June 1996. However, the writing and announcing of the laws proved insufficient to alter the behavior of immigrant fishermen from other parts of Madagascar who were the main cause of over-exploitation of fish and forest resources for profit. It didn't help that the authorities and local elders avoided their responsibilities, did not communicate among themselves, and participated in the fisheries exploitation for profit. In response to these problems TPF selected Mr. Ravo as a mediator to begin the GELOSE process with assistance from TPF sociologist Daurette Razandrizananakanirina, local technicians Loukman Kalavah and Jules Mampiandra, and biologist Rivo Rabarisoa. Their acceptance in the local community was extremely important to be able to communicate with, and collect and pass on comments and information to the local people, stakeholders, and communities. Meetings and presentations were held to identify local and regional authorities and other stakeholders. These were followed by informing the local authorities and stakeholders of the existence of Law 96-025, what it could do to help solve the problems they faced, and how to proceed with establishing the community charter (GELOSE). Two community associations (FIZAMA for Lakes Soamalipo and Befotoka, and FIFAMA for Lake Ankerika) were established with the help of TPF staff to take responsibility for natural resource management and control, and following through the GELOSE process. A mission statement was written by the associations with TPF's guidance, and general agreement by all authorities and parties to proceed with developing the GELOSE was gained at public meetings and workshops, after which the authorities publicly announced the start of the GELOSE process during the ceremonies to open the fishing season. The GELOSE community management charter was developed by community leaders, written down by TPF staff, and then revised several times until a consensus by all authorities and stakeholders was met and finally voted-on in public. The community, represented by the associations, then applied to the Malagasy government for official recognition of the GELOSE under Law 96-025.

An important element in managing the natural resources, and in obtaining the acceptance of the associations by the Malagasy government, was to establish methods for measuring and monitoring change in resource use and availability. Fishing and tree harvest surveys were established with TPF expertise to document fishing and tree harvesting impacts, origin of fish buyers and their markets, fishing camp locations on the three lakes, and land-use around the lakes. In 1997, TPF also supported student studies on fish, lemurs, and botanical resource-use to gain a better understanding of the effects of resource use on other fauna and flora in the area for support of the conservation effort on fish eagles, their habitat and other biodiversity. Throughout 1997 local community dialogues, meetings, and presentations continued in collaboration with other non-governmental organizations to provide information and help resolve problems related to the GELOSE process.

During this period, TPF and other NGOs had been working with the Malagasy government to designate the three lakes as one of the country's first Ramsar wetland sites of international importance. On 2 March 1998, the Manambolomaty Lakes Complex, which includes the three lakes (Befotaka, Soamalipo, and Ankerika), the smaller Antsamaka Lake, and a 500 m band of the Tsimembo forest around the lakes, were designated as one of the first two Ramsar sites in

Madagascar. This international designation gave more importance to the protection of this area under a strategy aimed at management of resource use and conservation of the wetlands, maintenance of the ecological value of the site, continued research, and local capacity building in research, monitoring, and management of natural resources. The designation of the three lakes as a Ramsar site gave more importance and value to the GELOSE process, and for supporting management and resource control by the two community associations, FIZAMA and FIFAMA.

From 1999 to 2001, TPF continued supporting the GELOSE process by resolving problems and other issues with FIZAMI and FIFAMA, and helping them to enforce their own management guidelines and policies on persons who disobeyed the rules. TPF also assisted the associations' requests to transfer natural resource management from central government to the local community. On 29 September 2001 the two associations, FIZAMI and FIFAMA, were given a three-year probationary period to prove to the government that they could manage their natural resources and enforce resource use policies.

In 2002 community meetings continued and TPF continued supporting the associations financially, logistically, and with training and equipment. The associations opened bank accounts in Morondava by depositing money they collected from issuing fishing and fish-buyer permits. Fishing limits and tree harvest limits were successfully enforced and limited to sustainable rates for the first time in over ten years.

In 2003, the community associations continued their work with financial and logistical support from TPF by demarking the GELOSE management boundary, a community effort that took three months (August to October) of hard work to accomplish. The boundary was marked and labeled with cement blocks at trail and road crossings and the line was a cut swath of 1.5 to 2 m in width. TPF paid for the work associated with this boundary delimitation. A tree nursery was established and operated by TPF technicians. About 1,214 tree seedlings were raised, of which 1,184 were transplanted to several denuded forest areas around the three lakes. The two local associations made marked progress in their control and management of the fishery and forest resources.

In 2004 the associations completed their three-year probationary period and applied for approval and authorization by the Malagasy government. Offices were built for each association in the village of Ankiranagato for FIZAMI and the village of Bejea for FIFAMA with funding from Ramsar and logistical assistance from TPF.

On 30 June 2005 the two associations received the official government authorization and contract for a 10-year period to manage their natural resources. In June 2005 the two associations also received the World Wildlife Fund "Gift to the Earth" award for their pioneering role in developing the GELOSE process for resource management and conservation. The bank accounts for both associations continued to grow from the issue of resource use permits and with some of this money the associations bought rice to sell to local community members at a reduced rate during the annual rice shortage period, thus providing another tangible benefit to the community for limiting the fishery. Local personnel received training in tree nursery operation. The associations continued to receive increasing support from local authorities: police, judicial, and forestry and fishery departments.

In 2006 a fishing permit covering a 4-year period (September 2006 to September 2010) was issued by the Regional Fishery Representative, which became another important milestone for the two associations. The community associations have successfully limited the number of fishermen on the lakes, both local and migrants, and limited the fish catch, fishing season, net mesh-size, fish-drying methods and fuel wood consumption, numbers of canoes built and trees cut for construction, and implemented reforestation to restore tree abundance on the lakeshore.

## Conclusions

This paper describes a conservation process that began with research to measure the distribution and abundance of the Madagascar Fish Eagle and understand what factors limit them, and expanded into a community-based wetland conservation project to protect fish eagles in their stronghold, the Manambolomaty Lakes complex, which supports about 10% of the species' global population. In the first three years of work, the research documented the low fish-eagle population size (about 120 breeding pairs globally), its distribution along the western seaboard of Madagascar, the population's largest stronghold, and the occurrence of human persecution. This knowledge was enough to justify conservation effort focused on the species' stronghold, but studies since then have been important for improving and refining our understanding of the species' behavior and its population and genetic consequences, and for detecting change in population size, density, distribution and productivity in response to conservation interventions.

The community-based wetland conservation project was based on the simple premise that if there were enough fish in the lakes and trees in the forest to sustain the fishing community, then there should be enough of both resources to sustain fish eagles, provided people stopped persecuting fish eagles. Local residents had a traditional "keeper of the lakes," the *tompondrano*, who established rules and taboos that limited fishing. Following his death in 1991, by 1993 his heir faced overwhelming numbers of migrant fishermen invading the lakes, and fishing, camping, and using the forest in disregard for local traditions. The *tompondrano*, mayors, and elders felt powerless to protect their livelihood. The intervention by TPF began by rallying community leaders to work together to take action, and by providing information on a new (1996) law designed to decentralize control of natural resources from government to village level. With awareness, strength in numbers, and logistical and moral support from TPF, the local community began a guided process to institutionalize mechanisms to control fishing and receive government authority through a "natural resource use charter" (GELOSE). The process required stakeholder participation, buy-in, and commitment which wavered at times but was always restored with encouragement and persistence of TPF staff. Over the decade-long process the community saw tangible results of their efforts, experienced the benefits of taking control, and underwent a transformation from helplessness to empowerment and success.

In addition to facilitating community-empowerment, TPF's intervention consistently explained the message that Madagascar fish eagles were exceptionally rare and unique to Madagascar, they were a valuable part of the community's cultural and natural heritage, and that persecution of eagles was harmful to the species. We made no attempt to strike bargains with the community to protect the eagles, but through awareness they came to accept that persecution was not acceptable and its prohibition should be included among their taboos.

Among the criteria for successful implementation of this community-based conservation strategy, we believe that employment and training of technician-level staff from the local community helped build important links and trust between TPF and the local community. Skepticism, fear, and distrust among the local community were most effectively handled by community members who worked for and got to know us and understand our motives. Second, although funding commitments tend to be offered in finite cycles of just two or three years during which measurable results are expected to be achieved, the success of this project depended on taking time (many years) to develop trust with and among community members, an outcome that can not be rushed or measured but we believe was critical.

## Acknowledgments

We are grateful to the Liz Claiborne and Art Ortenberg Foundation for their long-term support of this project, and also to the John D. and Catherine T. MacArthur Foundation, and other important donors. We are especially grateful to Loukman Kalavaha and other field technicians from the local communities whose knowledge, patience, and dedication of effort helped ensure this project's success.

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