

Elephant/Human Conflict Around Maputo Elephant Reserve, Mozambique

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Increased human demand for land has restricted the range of elephants in both Asia and Africa. Elephant populations have become isolated and traditional migration routes have been severed by human encroachment. This has caused conflict because elephants raid agricultural areas that occupy much of their former range.



Mozambican farmers discuss crop loss by elephants.

Since the ban on the trade in ivory in 1989, elephant populations in Africa have generally stabilised and in some areas are increasing. Africa's human population is growing at a continental rate of 2-4% per annum and is expected to maintain this growth rate into the next century. Increasingly, elephants and humans are coming into conflict as the traditional range of elephants is converted into farmland to feed this growing human population. It is generally recognised that resolving this problem is now the most pressing elephant conservation issue. This case study of a small population of elephants in Mozambique reflects a trend seen across Africa.

The Maputo Elephant Reserve is potentially one of Mozambique's most important natural assets. Its coastline, unique plant and animal life, and proximity to the capital give the area potential to generate substantial tourism revenue. After a long hiatus during which the large mammal population was greatly reduced, anti-poaching measures have been re-introduced, and the infrastructure is being restored. The Direcção Nacional de Florestas e Fauna Bravia (DNFFB), the government department responsible for environmental management in the area, assigned a warden to the Reserve in 1995.

As subsistence cultivation increases, elephants and farmers are increasingly experiencing conflict along the boundaries of the Reserve. The tolerance of communities for crop damage by elephants is low due to repeated losses and perceived lack of interest by Reserve staff. This report provides some background to the conflict environment and suggestions for the urgent elephant/human management priorities. The conflict between the Reserve and its surrounding communities is complex and solutions must address historical land tenure issues

human settlement patterns, local politics and a range of ecological issues.

Ecological Setting

The Reserve is situated some 70 km south of Maputo along the southern shore of the Bay of Maputo. The Reserve's northern boundary cuts across the Machangula peninsula and follows the coastline down the Mozambique Channel. The western boundary is drawn along the western shore of the Rio Futi at a distance of 50-100 metres from the river following the old fence line. The southern boundary's exact location is not clearly delineated.

The Reserve covers approximately 90 km², and rises from sea level to approximately 150 metres near the western border. The soils are mostly leached sands and are defined as generally poor in nutrients and relatively saline except for the clay riverine soils (Tello 1973). The three main vegetation types are grasslands dominated by *Hyperrenia spp.*, fire-restricted woodlands dominated by *Azelia quanzensis* (Pod mahogany), and riverine forests of *Acacia spp.* This area falls within an international centre of plant diversity and contains numerous endemic plant species (Van Wyk 1995).

Three large saline lakes support a wide variety of bird and fish life, including flamingos and crocodiles. Remnant mammal populations include elephant, hippopotamus, duiker, zebra, kudu, baboons and bushpigs. However, some of the lakes within the range of these elephants have dried up completely over the past few years. There are also said to be important nesting sites for sea turtles along the west coast.

The Reserve receives 400-800 mm of rainfall per annum. Water is available to animals from the Rio Futi and Rio Maputo as well as wet season pans scattered around the northwest of the Reserve. The rivers flow south to north from the northern Kwa-Zulu/Natal in South Africa to the Bay of Maputo. The Rio Maputo is fairly silty but flows freely throughout the year and occasionally floods flat plains as it approaches the bay. Tidal action increases the salinity upstream during the dry season. The Rio Futi, which historically flowed year round, now dries before reaching the Bay of Maputo and is increasingly filling with reeds. Cultivation along the banks upstream as well as the reduction of hippopotamus, which historically maintained drainage channels, both play a role in the river drying. Burning upstream also appears to have reduced the sponge-like properties of the peat along the river.

The Elephants

Estimates vary from 100 to 300 elephants resident in the Reserve and an unknown number in the forest area south of the Reserve and in the Futi corridor. Hall-Martin (1988) suggests that historically the Reserve was the core area for a coastal population of elephants and bulls that ranged south into the area of the Tembe Elephant Reserve in Northern Kwa-Zulu/Natal during the wet season. Reports indicate that most of the remaining elephants in the Maputo Elephant Reserve are found in cow/calf units and were recently sighted in two relatively

large groups (56 and 91) (Ostrosky 1995). Poaching in the 1980s and early 1990s may have reduced the number of bulls in the Reserve and also pushed the groups from the grasslands inside the Reserve into the thick forests near the western boundary (B. Soto pers. comm.).

The increased salinity in the Reserve's three major lakes may have also contributed to the concentration of elephants in the border area between the Rio Futi and Rio Maputo (B. Soto pers. comm.). It appears that elephants are not able to drink from the Rio Maputo because of steep muddy banks, but they can drink from surrounding wetlands after the river floods. Elephants seem to visit the Rio Maputo primarily to raid crops, but they also drink from irrigation ditches.

Opinions differ regarding the amount of damage the elephant are causing to the Reserve's vegetation and if the population is at "carrying capacity". The current level of tree damage in the sand forests may be evidence that the area cannot support more elephants without a decline in woodlands (M. Botha pers. comm.). Damage occurs to a number of associated woody species but *A. quanzensis* does not suffer the bark stripping noted in other areas of Africa. Poaching pressure has forced elephants from the grasslands, and browsing in the woodlands appears to have increased accordingly (A. Correia pers. comm.).

The People

When the Reserve was gazetted in the 1930s, people living inside the present boundaries that fished, hunted and gathered wild foods were forcibly relocated to Salamanga village and along the Rio Maputo. During the war of independence, people moved back to these lakes and were again forcibly removed before a large flood by DNFFB authorities in 1983/4, to the area between the two rivers. These people were encouraged to farm in the flood plains of the Rio Maputo and many were killed during the flood in 1984, causing increased resentment of the Reserve. During the civil war most cultivation ceased, but since the peace accord, refugees have been returning and farming along the park boundary and inside the Reserve along the Rio Futi.

Cultivation and Crop Damage

From discussions with farmers and field visits around the western boundary of the Reserve, it appears that the problem of damage to crops is extensive and increasing.

Due to a lack of draft animals, maize, cassava, groundnuts and pumpkin are planted in holes dug by farmers, rather than in furrows. Numerous mature mango and banana trees have recently been destroyed, which indicates that the presence of elephants in these areas is a new phenomenon. Reasons for this increase could be linked to the additional area under cultivation by



A cassava field destroyed by elephants.

returning people, proximity to fresh water, and wild food and elephant poaching in the Reserve (M. Chambal pers. comm.).

Futi Corridor

The DNFFB is interested in the possibility of creating a corridor along the Rio Futi between the Maputo Elephant Reserve and the Tembe Elephant Reserve. The proposed corridor stretches south following the Futi river to the border and is comprised of similar habitat to that of the western Maputo Reserve.

Hall-Martin (1988) maintains that the elephants in Maputo and Tembe were historically part of the same population. In the past, bulls would have moved from Tembe along the Rio Futi to the core area of cows in Maputo to mate, then range south at the beginning of the wet season. Ostrosky (1995) suggests that a corridor for elephants between Tembe and Maputo would be valuable for the long-term viability of both populations. The Rio Maputo and Rio Futi are still bordered by high-quality elephant habitat including pockets of riverine woodland dominated by *Acacia albedia*. Tembe Reserve officials would like to allow elephants across the border through the corridor, but are concerned about security because a number of elephants crossing from Tembe have been poached in the past.

The Futi Corridor would be valuable for biodiversity conservation and genetic transfer. It has been suggested that it be renamed the Futi Biodiversity Corridor (Ostrosky & Matthews 1995). The pressure to re-settle this area is growing, due in part to the high livestock potential. Before the civil war, families living in this area had an average of 20 cows each and the grassland was heavily overgrazed in the 1970s and 1980s. There is also pressure from commercial agriculture along the Rio Maputo. Although these areas are excluded from the proposed corridor, pressure on the Futi zone will increase if people are pushed off this land.

Fencing

A four-strand barbed wire fence was erected in the 1970s along a section of the western boundary of the Maputo Reserve. Local people insist that the fence kept the elephants within the Reserve in the past. It is more probable that this fence, designed to keep cattle out of the Reserve, was not challenged by elephants due to adequate food, water and protection in the Reserve. Elephants are now crossing this old fence line to drink and raid crops along the Rio Maputo and often do not return to the Reserve for several days.

Large-scale electric fencing along the borders of the Reserve is being considered by donors to control the movement of these elephants. However, these fencing schemes are complicated by contested natural boundaries such as the Rio Futi and the southwest of the Reserve. If the Rio Futi is fenced inside the Reserve, people cultivating along its western shore will be forced to move. With the Rio Futi drying, elephants may need to access the Rio Maputo during the dry season, which would put severe pressure on the fence. Experience in Zimbabwe suggests that small-scale enclosure fences are more effective than long barrier fences (Hoare & Mackie 1993). Boundary fences such as the fence around Tembe are

effective due to large budgets and continuous maintenance. A border fence may be an option for the Maputo Reserve in the future once it is self-sufficient and has its own sources of revenue.

Recommendations

Improvement of relations with local communities

In the short term, an agreement should be drawn up with the communities regarding their rights to exploit various resources within the Reserve, thus allowing controlled access to fish, grass, wild fruits, livestock grazing, etc. A "management advisory committee" of local elders and extension staff could meet regularly for the community to air grievances, and the Reserve could solicit suggestions on how to deal with various problems.

Problem animal reporting and control

The warden has begun a reporting scheme for the scouts that should be extended to the communities around the Reserve. Scaring elephants, while proven to be largely ineffective for reducing crop damage, is very important for relations with the local farmers. A guard with a motorcycle and a shotgun could move through fields at night and work with farmers to scare elephants and hippos. The negative feelings toward the DNFFB stem partly from the perception that Reserve staff does not care enough to send a guard out to survey crop damage.

Fencing

Large-scale fencing projects have a high failure rate for a number of reasons, some of which have been discussed. One basic problem with all fencing schemes is the communities' perceived ownership of the fence and the resource that the fence is keeping out. If people see no benefits from living with these animals and perceive elephants as the government's responsibility, they will probably prefer to have the elephants shot rather than fenced out.

Small-scale fences owned by individuals or co-operatives encircling irrigated crops or cash crops such as cashews and bananas are most likely to succeed. The community could be encouraged to submit proposals for donations of equipment or low-interest loans for fences to encircle groups of fields. Communities should be allowed to decide on fence lines with guidance from the Reserve staff and extension officials. The local population previously expressed concern about enclosure-type fences which are seen as limiting future cultivation (Murphree, 1995). Most hope that electric water pumps and the means to plough anticipated in the future will enable considerable expansion.

Research

Considerable potential exists in the Reserve and the surrounding areas for a number of management-related research projects.

- Ecological study examining the reasons for the drying of the Rio Futi.
- EIA on potential long-term effects of long border fencing on this ecosystem.
- Settlement patterns of the returning people, their food needs and how they are fulfilling these needs.

- The extent of utilisation of wild resources and how much people depend on them.
- Elephant numbers, movement patterns, woodland utilisation patterns and water utilisation.

Management of settlement patterns and extension work

An effort should be made with the input of local government, extension workers and Reserve staff to monitor the returning settlers and where they plan to settle and farm.

Due to the history of the area, the question of moving people away from the Rio Futi was flatly rejected. However, schemes could be devised to encourage these settlers to move out. These might include some sort of incentive or inclusion of co-operative families in irrigation schemes along the Rio Maputo.

Farming techniques are generally very basic due to lack of resources, and yield could be substantially increased through basic agricultural education.

Consultation work with communities should use PRA-type methodologies to map patterns of resettlement, cultivation and other forms of resource use, as well as to discuss various fencing options and alternatives with local communities.

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