the Mpingo Conservation Project

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Summary Report of Tanzanian Mpingo 96

Tanzanian Mpingo 96 carried out 7 weeks of field investigations from the end of July to mid September 1996 based at Mchinga, 30km north of Lindi in south-east Tanzania. The core part of the expedition consisted of a detailed survey of a 1km² area rich in mpingo (*Dalbergia melanoxylon*) to the south of the village. This study site was located on the top of a small plateau and was less than 10km from the Indian Ocean. The habitat was coastal scrub comprising deciduous thickets and woodlands (approx. 50%) and a large central grassy area. For the most part the thicket was very dense – containing many small shrubs and lianas. The grassland especially, and also the thicket, exhibited signs of regular burning. A dry stream bed ran eastwards to the sea but there was no surface water present during our stay there, which was at the height of the dry season.

In the 7 weeks we surveyed a total of 25 plots each of 30m radius which together made up 7.1% of the study area. In our surveying we classified trees according to Circumference at Breast Height (CBH). Those with a CBH less than 10cm were classed as seedlings and investigated using point sampling within the plots. Those with a CBH between 10 and 30cm were classified as saplings, and those bigger as trees. The following table shows the mean density of trees and saplings in the study site:

Density per km²	Just *D. melanoxylon*	All tree species
Saplings	2,400	18,000
Trees	1,200	15,000
TOTAL	**3,400**	**33,000**

Mpingo was the third most common species seen in the area, and accounted for 11.9% of all trees and saplings counted. Despite over 300 trees remaining unidentified we recorded 32 different species of tree. The seven most common, which accounted for the bulk of the trees seen, in rank order are:

Spirostachys africana
Commiphora sp. (likely to be either *C. africana* or *C. confusa*)
Dalbergia melanoxylon
Fernandoa magnifica
Combretum apiculatum
Acacia nilotica
Combretum molle

No particular affinities or aversions were evident from the data available. The pH of soil samples taken from the plots ranged from 6.0 to 8.4 with an overall average of 7.6 – i.e. slightly alkaline soil.

A total of 242 mpingo trees and saplings were examined and measured. This is the largest data set on the tree available thus far. The CBH of mpingo trees ranged from 10cm (the minimum measured) to 138cm, with a mean of 25.8cm – at the lower end of the scale. Since CBH is the best estimator of age this implies that the age distribution of the species was heavily skewed towards younger trees. Overall mpingo specimens were less likely to have a CBH of greater than those of other species – an indicator of the species slow rate of growth. The average number of stems per tree was 2.5 (the range was 1 to 16), and single stemmed trees predominated, especially in the thicket areas. The mean height of mpingo was 6.6m, and the canopy area averaged at 15m².

Of those 242 trees and saplings, 21 were actually stumps and they accounted for a high proportion of the larger trees (45% of those with CBH > 50cm). This is somewhat worrying as we do not know the impact of such a large loss of the older trees on the ecology of the population as a whole. It could result in a dramatic reduction in the seed volume produced each year, but as yet there is too little known about the reproductive patterns of mpingo to draw reliable inferences. The older trees also provide more suitable habitats for a whole range of invertebrates (we saw black ants, insect larvae, boring beetles, millipedes, wasps, locusts, spiders, scorpions and snails on the trees) as well as nesting birds and a variety of lichens and galls. We also observed a lot of termite infestation, but this did not appear to be causing serious damage to the trees.

346 mpingo seedlings were seen in 16 out of the 25 plots. They were more commonly found in the grassy area or small clear patches in the woodland rather than in the dense thicket. Their clumpy distribution could also be interpreted as evidence in favour of root-stock regeneration of old individuals which had been felled many years ago. Mpingo is known to coppice well and it is popular theory that its roots, if disturbed, can also send up new shoots. No conclusive evidence of seedling affinities with adult trees of other species was found in the data. During our period of fieldwork part of the study site was burned. After the fire it was found that those seedlings taller than 1m were much more likely to survive above ground than shorter individuals.

In addition to the core biological surveys we also conducted an investigation into local knowledge of and attitudes towards the tree. This utilised Rapid Rural Appraisal techniques to obtain representative information from large groups of villagers. The information was not always very consistent, but amalgamating the answers from the tree groups to whom we talked a general pattern and consensus can be deduced. This is easiest with the calendar information which we collected. This showed that the phenology of mpingo in this area closely follows the seasons with the tree predominantly bearing leaves, flowers and fruits through the wet season (November to April). This, we learned, is also the time when birds and bees visit the tree. In contrast, all of the activities (burning, clearing and logging) which could have a detrimental effect on mpingo in the area occurred mainly during the dry season.

The answers to questions concerning the uses of mpingo were more variable and it is harder to draw specific conclusions from them. The main uses mentioned were firewood, charcoal production and house-building, but for all three of these the villagers could list may alternative species and indicated that it was not commonly used for any of these things. This indicates that mpingo is not vital to the life of the village. The logging of mpingo, which was illegal, was carried out by outsiders whose presence the villagers generally resented, but since no value to them was attached to the tree there was little anyone cared to do about it.

Finally the expedition also reconnoitred a number of other sites in Lindi region where mpingo is known to grow. We had a brief look at an area just to the north of Mchinga, here the trees were generally larger and distributed more evenly – there was less open grassland, but conversely also less dense thicket. Land clearance for mango and cashew nut plantations was a major threat there. At Nachingwea we visited a patch in Lyonja Forest Reserve where all the trees much larger than at Mchinga – the whole forest appeared much older – but here most of the mpingo trees were dead or dying. Also at Nachingwea we were also able to take measurements of mpingo trees growing in a small experimental plantation just outside the forestry office – the CBH data obtained fits neatly into the standard model of 70-100 years time to reach timber size. Close to Liwale we also saw trees with a more or less definite age – these had been the first trees to re-colonise a deserted farm. Around the old palaeontological excavation site of Tendaguru there were contrasting areas showing the effects of fire on mpingo seedlings – where the ground showed signs of regular burning there was the much less regeneration than where the fire was much less frequent. The site in Kilwa district in and around Mitaurure Forest Reserve was the most interesting of those we saw and was subsequently investigated much more fully by the follow-up expedition *Tanzanian Mpingo 98*.

The threat to mpingo has three principal components: logging, land clearance and fire. Illegal felling was reported by all of the foresters whom we met, but their ability to counter it was severely hampered by an acute lack of funds and transportation – a familiar problem in this part of the world. Unfortunately, in this region there is considerably less investment in forestry than even in the north of Tanzania, and this is in an aspect of conservation which has always suffered in comparison to the efforts made at large mammal protection in the National Parks system within the country and by outside donors. The clearing of forest for new farmland is a problem the world over and cannot be overcome without a reduction in the birth rate. However local farmers frequently flout regulations over the felling of mpingo trees and this is a situation which could easily be improved were the farmers able to benefit in some way from allowing the trees to continue to grow on the land that they clear.

Many foresters regard fire as the critical factor in the conservation of mpingo and the savannah woodlands in general. We were told that changes in burning practices in the last twenty years have resulted in considerable damage to the woodlands, retarding seedling growth to the point where they never reach mature tree size. Part of the reason behind this would appear to be the lack of stake in the land which local people exploit. Since it is all government land they often seem to care little for its wellbeing and this leads to the irresponsible attitude of which the reckless use of fire is the most prominent feature.

To conclude, *Tanzanian Mpingo 96* has established a valuable baseline set of data on mpingo against which further studies can be compared. Much more research is required before we can draw firm conclusions about the general ecology of the tree, however we can already envisage that any management plan adopted under Fauna & Flora International's *Soundwood Programme* would have to incorporate a strong element of community conservation. Perhaps through strong, pro-active measures mpingo can serve as a 'flagship species' for the conservation of Tanzanian woodlands as a whole. A strategy for sustainable harvesting could save the mpingo as an ecological, economic and artistic resource for future generations.

The Team

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