Using GIS for vegetation mapping and conservation planning in Madagascar

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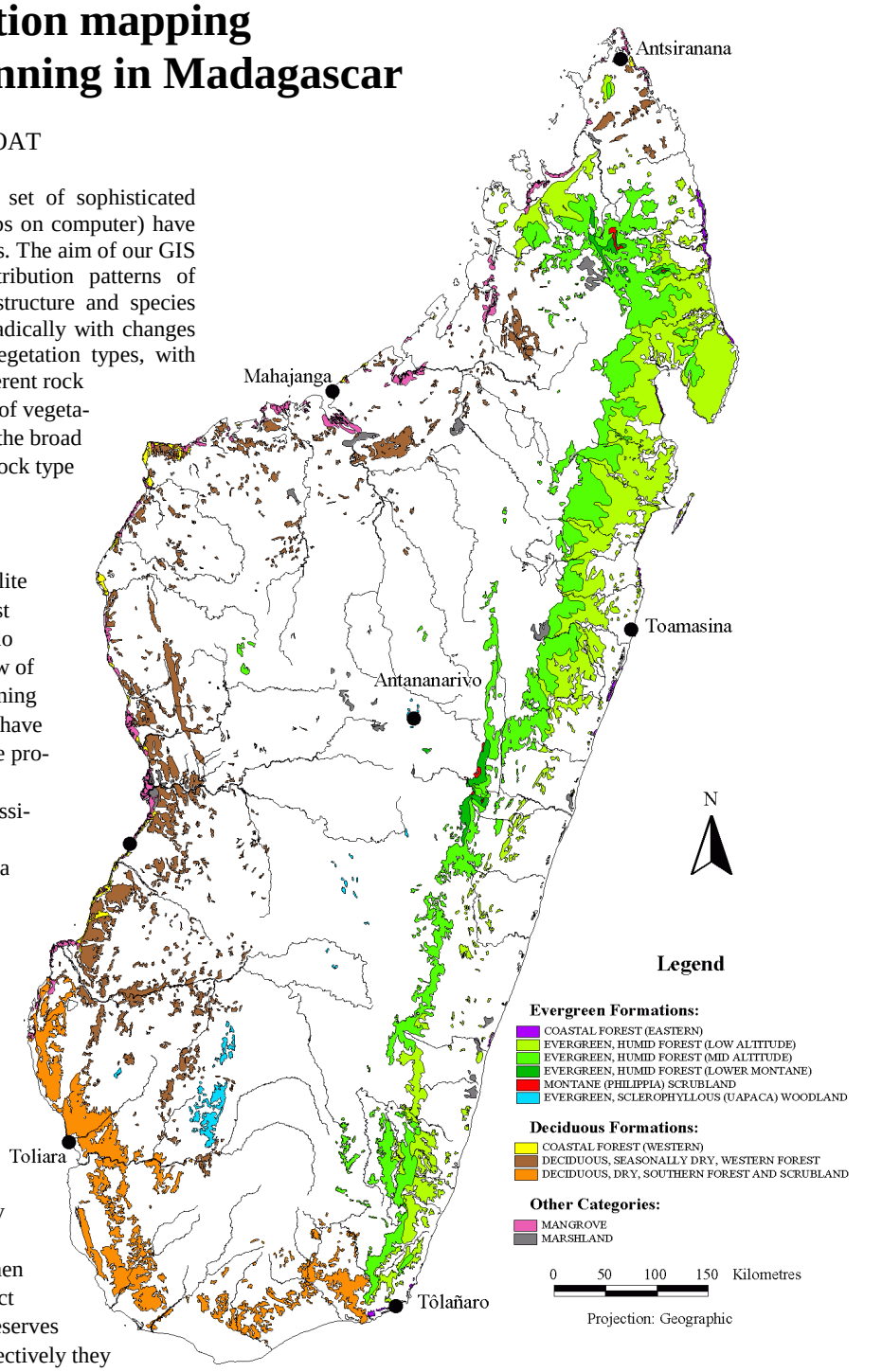
Geographic Information Systems (GIS - a set of sophisticated techniques for analysing and overlaying maps on computer) have great potential for studying plant distributions. The aim of our GIS studies in Madagascar is to analyse distribution patterns of vegetation types and plant diversity. The structure and species composition of the vegetation often alters radically with changes in substrate. It is assumed that different vegetation types, with different species compositions, occur on different rock types, and that a new, more informative map of vegetation types could be produced by subdividing the broad primary vegetation types on the basis of the rock type on which they occur.

The map opposite shows the surviving native vegetation of Madagascar, derived from satellite images of the island. The distributions of most plant species are too inadequately known to do more than recommend to protect sites of a few of the most well-documented. Using the 'Remaining Primary Vegetation' map with other data, we have been able to recommend how to maximise the protection of biodiversity.
A map of 'Remaining Primary Vegetation classified by the Underlying Geology' was also prepared, by overlaying the previous map on a map of 'Simplified Geology'. This map, not shown here, provides new insights into the patterns of distributions of plant species and vegetation types, especially in western and southern Madagascar, where the geology varies substantially.

We then calculated the area of each vegetation type that remained. By overlaying a map of the protected areas, we could also calculate the amount of protection in each case. It was immediately obvious which vegetation types are poorly represented in existing protected areas. We then re-examined the maps to see where large intact areas suitable for conservation still exist. If reserves could be set up for each vegetation type, collectively they would include as high a proportion of species diversity as possible. When used in this way, as a mirror of plant diversity, GIS techniques are obviously an important conservation tool.

In particular, these maps show that the dry deciduous southern forests and scrublands are insufficiently protected, especially given their richness in endemic plant species and great geological variation. We have used the graphs and maps to convey points like this in an attractive, user-friendly and succinct format to politicians and decision-makers.



These maps and data have already been distributed on CD-ROM to the organisations involved in conservation projects in Madagascar, including ANGAP (the National Association for the Management of Protected Areas). The maps are being used in Madagascar, within the context of the Environmental Action Plan (a response to Madagascar signing the Convention on Biodiversity in March 1996), to help identify areas of high priority for conservation of biodiversity, and to improve the protected areas network. We are now looking for other opportunities to use these techniques elsewhere.

Du Puy, D.J and Moat, J.F. (1997). Using GIS for vegetation mapping and conservation planning in Madagascar. In: Plant Talk (Plant Conservation Worldwide), (Issue 11 - October 1997), p 24.
Web Page: http://www.rbgkew.org.uk/gis **Plant Talk Website**: http://www.plant-talk.org