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EASTERN TROPICAL AFRICAN CENTRE OF ENDEMISM: A CANDIDATE FOR WORLD HERITAGE STATUS?

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ABSTRACT

Together with the Coastal Forests and Eastern Arc rainshadow, the Eastern Arc forests make up a botanical Centre of Endemism in Eastern Tropical Africa (CEETA), which covers a wide range of vegetation formations in four different phytochoria. The factors that gave rise to the concentration of restricted-range taxa in the different vegetation types appear to result from the same long-term geological and climatic processes. The endemic-rich vegetation types occur in three countries: Mozambique, Tanzania and Kenya and are managed under a wide range of land tenure arrangements from public land and private ownership, to Forest Reserve, Game Reserve and National Park. Much of the CEETA is recognised as a biodiversity ‘hotspot’ of global importance, but lacks a common management strategy. A possible common framework within which to develop an appropriate strategy is that of the World Heritage Convention. The case of the Australian Wet Tropics World Heritage Site is discussed as a comparative example.

INTRODUCTION

Although many vegetation types in Africa can be recognised by characteristic and relatively widespread species, some areas are remarkable in that they contain unusually high concentrations of restricted range plant taxa. Perhaps the best known of these areas is the southern African Cape, which has long been recognised as a unique phytochorion (Werger, 1978; White, 1983). However, the Cape is not the only place in Africa where there are a large number of geographically rare plant taxa in a relatively small area. Some of these centres of endemism are embedded in larger phytogeographical regions. For example, the forests of Cameroon and Gabon in the huge tropical forest Guineo-Congolian region; the arid woodlands of north eastern Somalia in the dry grass and scrublands of the Somalia-Masai region; or the wetter woodlands at the southern end of Lake Tanganyika in the Zambesian region. Vegetation in all three of these clusters of restricted-range taxa is physiognomically similar to other parts of the phytochorion in which they occur, even if they are markedly distinct in terms of the species they contain. This fact is one possible reason for the lack of formal recognition being accorded to African centres of botanical endemism, other than the well-known Cape floristic region. Another is that the centres often lie in several countries and so their unique nature is not apparent from a list of country-wide endemics. In addition, the dominance of White’s (1983) phytogeographical approach as a system for continent-wide vegetation classification has led to local centres of endemism being overlooked.

In eastern tropical Africa there is a centre of endemism focused around the ancient crystalline mountains of the Eastern Arc that occurs in four of White's (1983) phytogeographical regions: Somalia-Masai, Afromontane, Zanzibar-Inhambane and Zambezian. This botanical centre of endemism in eastern tropical Africa (CEETA) is highly fragmented, due to both natural topographic variation and as a result of anthropic disturbance (figure 1). Patches of endemic and species rich vegetation occur scattered throughout the forests, woodlands and thickets of the eastern African coastal plain (Hawthorne, 1993; Burgess *et al.*, 1998). Larger areas of endemic rich forest occur over the full elevational range of the Eastern Arc mountains, with small pockets of heath and upland dry forest that contain some extremely rare plants (Lovett, this volume). In the rain-shadow of the Eastern Arc, notably in the Ruaha and Lukosi valleys, yet another pocket of rare plants occurs in arid woodland (Lovett, 1988). Although occurring in phytogeographically and physiognomically dissimilar vegetation, the suggestion has been made that environmental stability over evolutionary time-scales is the factor responsible for both the survival of relictual taxa and

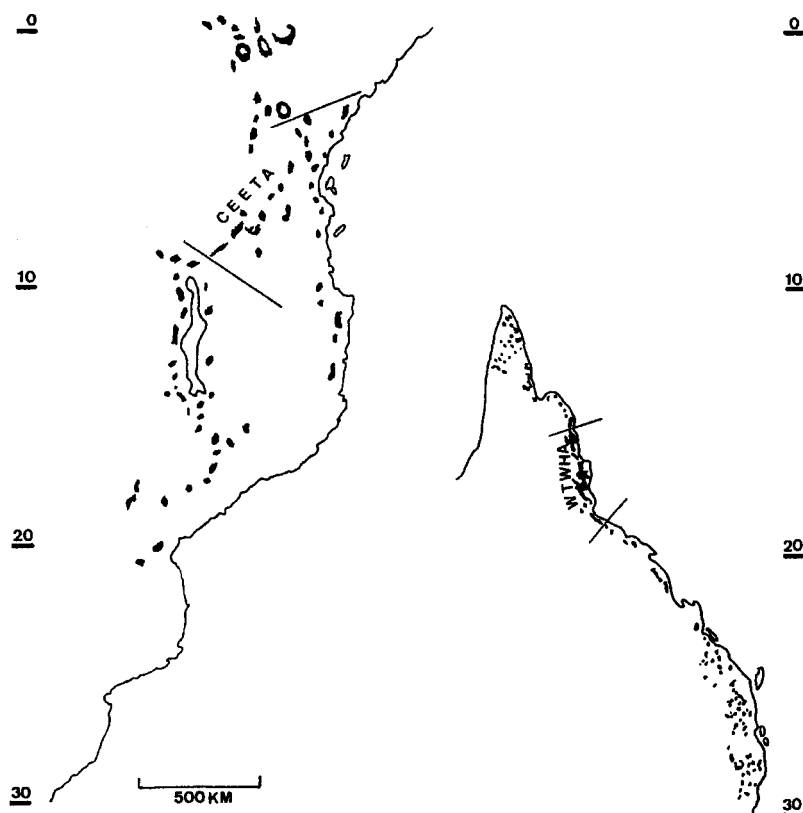


Figure 1. The coasts of eastern Africa and eastern Australia (on right) drawn to approximately the same scale. The centre of Endemism in Eastern Tropical Africa (CEETA) boundaries follow those defined in Lovett (1990). The Wet Tropics World Heritage area (WTWHA) boundaries are from the Wet Tropics Management Authority (1997).

the generation of new ones within the CEETA (Lovett & Friis, 1996). The concentration of restricted range plant species has led the forests to be recognised as a globally important biodiversity 'hotspot' (Myers, 1990; Mittermeier *et al.*, 1998), although this does not include the important Eastern Arc arid rainshadow. Thus common ecological and evolutionary processes link the seemingly disparate vegetation types, and also suggest a common management theme is needed to conserve the endemic plants.

MANAGEMENT ISSUES

There are two main problems in developing a comprehensive management theme for the CEETA. Firstly, the scattered nature of patches of vegetation containing rare plants. Natural variation in topography, soils and climate accounts for some of the fragmented appearance of the CEETA, and is also responsible for its richness. For example, cloud forests have a distinctive endemic-rich flora and occur throughout the Eastern Arc range, but are present only in small areas on the highest mountain ridges. Forests on karst limestone often have several distinct endemics, but are limited to sites with limestone outcrops. As well as natural causes for spatial disaggregation of the endemic rich CEETA vegetation, much of the eastern African coast and hinterland have been subject to centuries of human influence through fires, cultivation and the grazing of domestic livestock. Although information is limited, it appears that restricted-range taxa are replaced by more widespread species when disturbance exceeds that to which the plants are adapted. Vegetation rich in endemics is thus reduced to areas unsuitable for cultivation or that have escaped interference by being of cultural significance.

The second problem is the wide range of ownership and management approaches currently being applied to the endemic rich areas of the CEETA. On a regional scale, the endemic-rich vegetation patches occur in three countries: Mozambique, Tanzania and Kenya. Thus a common conservation proposal would require international co-operation. At a local level, the patches are administered under a wide range of land tenure arrangements from public land and private ownership, through village ownership, to Forest Reserve, Game Reserve and National Park. The socio-economic situation of people living adjacent to, and deriving resources from, the various vegetation patches also varies widely: pastoralists in the drier vegetation, remote agricultural villages, estate workers on plantations, and peri-urban populations. Different groups of people will have different linkages and demands on natural resources. The vegetation will be able to sustain some of these demands, but not all. Whilst national parks of land alienated from local land tenure can attempt to control excessive utilisation of resources with a professional staff of rangers, other areas can only survive through co-operation of the community in which they occur. The first stage in this process is a general recognition of the importance of the area. An international agreement that has been successful in translating the recognition of globally important sites to a local level is the Convention Concerning the Protection of World Cultural and Natural Heritage, more widely known as the World Heritage Convention.

WORLD HERITAGE CONVENTION

The World Heritage Convention was put forward at the seventeenth session of the general conference of the United Nations Educational, Scientific and Cultural meeting in Paris in 1972. The conference noted that the world's cultural and natural heritage is increasingly

threatened with destruction by decay and the powerful forces of changing social and economic conditions, and adopted the convention on 16 November 1972 (information on the convention is obtainable from the UNESCO web site <http://www.unesco.org/whc>). The convention is now signed by more than 150 states. Article 2 of the convention defines what should be considered as 'natural heritage':

- Natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view.
- Geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation.
- Natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty.

It is up to the states party to the Convention to identify and delineate areas to be nominated for World Heritage status (Article 3), and having done so then the state takes on the duty to protect and conserve the area (Article 4). The Convention also recognises that an appropriate policy is needed to give the natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning programmes (Article 5a).

In Tanzania there are currently five sites on the World Heritage List recognised under the Convention. Four of these are sites of natural heritage, and the fifth is a site of cultural heritage (table 1). The CEETA would qualify as a site of natural heritage on all three main criteria cited in the Convention. The main value is the extra-ordinary biological diversity and richness in species of restricted distribution (Lovett & Wasser, 1993; Burgess *et al.*, 1998; papers in this volume). Vegetation in the Eastern Arc, Coastal Forests and Eastern Arc rainshadow contains biological formations that according to Lovett & Friis (1996):

- Represent a major stage in the Earth's evolutionary history through the preservation of relictual species and endemic genera.
- Provide an outstanding example of ongoing biological processes through the evolution of species swarms.

The steep sided Eastern Arc mountains rising out of the coastal plain to heights of up to 2,635 m and the Ruaha River Gorge cutting deep through the hills between Mtera and Kidatu can be described as:

- Superlative natural phenomena or areas of natural beauty.

Finally, the recognition of the forests as a biodiversity hotspot of global importance (Myers, 1990; Mittermeier *et al.*, 1998) justifies the area as:

- Containing the most important natural habitats for the conservation of biological diversity.

The criteria above were derived from the justification for a comparable area recognised as a World Heritage site—the Wet Tropics of Australia (Wet Tropics Management Authority,

1997). This is an important comparison because the CEETA is rather unusual compared to other World Heritage sites in that it is composed of many islands of vegetation, rather than being a single feature, such as Ngorongoro or Kilimanjaro. The next section discusses some comparisons with the Wet Tropics of Australia, both in biological terms and in the history of changes in management approaches.

Table 1. World Heritage Sites recognised in the United Republic of Tanzania with date of recognition and brief description (information from the UNESCO web site <http://www.unesco.org/whc>)

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- 1979 Ngorongoro Conservation Area. A huge and perfect crater in which there is a large permanent concentration of wild animals.
- 1981 Ruins of Kilwa Kisiwani and Ruins of Songo Mnara. The remains of two great East African ports which flourished in the 13th to 16th centuries located on two small islands near the coast.
- 1981 Serengeti National Park. Vast plains covering 1.5 million hectares of savannah with immense herds of herbivores.
- 1982 Selous Game Reserve. An immense sanctuary of 50,000 square kilometres with large numbers of wild animals.
- 1987 Kilimanjaro National Park. The highest point in Africa at 5,963 metres tall.
-

WET TROPICS OF AUSTRALIA

In tropical north-east Australia, a species- and endemic-rich area of forest occurs that has remarkably similar biogeographic patterns to the CEETA (see figure 1). Both are disjunct forest habitat islands, a feature that may have played an important role in speciation. Both have marked biogeographic differences between adjacent forests on volcanic and crystalline rocks. Both show cross-continental East-West patterns of disjunctions (even with some of the same genera, for example the tree genus *Ternstroemia*). Both show similar latitudinal diversity patterns with sharp boundaries and, on a regional scale, a major southerly arid gap: the Zambesi Gap in Africa and the Burdekin Gap in Australia. Both have congruent distribution patterns of geographical and phylogenetic relics and species swarms, and both have a curious dry forest outlier to the west: the Itigi thicket in eastern Africa and the Forty Mile Scrub in north-eastern Australia. From a management perspective, both areas are, in many cases, discrete islands surrounded by cultivation and other land uses and vegetation types; and both have many different types of land tenure with a wide variety of stakeholders.

In tropical eastern Australia most of the endemic-rich forests have been put together administratively under the Wet Tropics World Heritage Area, with the primary management goal (Wet Tropics Management Authority, 1997) “to protect, conserve, present, rehabilitate and transmit to future generations the Wet Tropics World Heritage Area”.

If the Australian Wet Tropics is to serve as a model for developing an administrative umbrella plan for the CEETA, it is worthwhile reviewing its history. Creation of the Wet Tropics World Heritage Area was not without controversy, and it has taken many years to produce a draft management plan. For those who know the history of management in the

Eastern Arc during the 1980s, some aspects of the story will sound familiar! In particular the campaign in 1986 in Tanzania against the extensive mechanised logging operations in the Catchment Forest Reserves of the East Usambara and Udzungwa mountains, with the goal of altering management in favour of conservation rather than 'mining' of the forests for timber. In Australia there was initially disagreement between the State Government of Queensland and the Federal Government of the Commonwealth, principally over logging operations, but this problem was subsequently resolved:

- 1985 conservationists picketed logging operations.
- 1986 public opinion supported cessation of logging.
- 1986 the Commonwealth Government established a National Rain-forest Conservation Program, but the Queensland State Government refused to participate.
- 1987 State and Commonwealth governments were at odds over logging.
- 1988 World Heritage listing was approved.
- 1989 the State Government's legal challenge to the listing was rejected by the High Court.
- 1990 the Queensland and Commonwealth governments agreed to jointly fund and manage the Wet Tropics World Heritage Area.
- 1992 an extensive community consultation programme began.
- 1993 the Queensland Government passed the Wet Tropics World Heritage Protection and Management Act.
- 1994 the Wet Tropics Management Authority published its first annual report.
- 1995 the draft Wet Tropics Plan was released for public consultation.
- 1997 the draft plan implementation is delayed due to stakeholder disagreement.

The management plan aims to achieve "protection through partnerships" with the stakeholders. A similar approach of participation has been advocated for management of eastern African natural resources, with greater involvement of villagers in management decisions. A wide consultative process can cause delays, for example implementation of the Wet Tropics Management plan was held up in 1997 when the Aboriginal stakeholder group considered that their views were not adequately represented in the plan. However, few resource managers and conservationists would today disagree with the need for full stakeholder participation and responsibility. The use of World Heritage Status as a management tool can also lead to problems, as it can change the balance of regional, state and international responsibilities (Parliament of the Commonwealth of Australia, 1996). The positive side of World Heritage status and subsequent management approaches for the Wet Tropics of Australia is that it did resolve a highly polarised dispute and created a framework within which further problems could be resolved. More importantly, it had enormous popular support and following a shift from logging to tourism, the tourism industry in the region is now worth 753 million Australian Dollars, and represents the major source of income in many communities. World Heritage status has been an important marketing point in the development of the tourism sector.

CONCLUSION

The Eastern Arc, Coastal Forests and Eastern Arc rainshadow contain patches of vegetation that represent a Centre of Endemism in Eastern Tropical Africa (CEETA). The endemic-rich

vegetation occurs in several countries under a wide range of management regimes. A possible way of creating a common conservation plan for the remaining fragments of this vegetation is to nominate them for World Heritage status. The long history of experience and success in a comparable area in the Wet Tropics of Australia could serve as a useful guide for future management of the CEETA. The two areas are remarkably similar from both the biogeographic and management perspectives. The World Heritage site that covers the fragmented Australian Wet Tropics acts a key focal point for management, and could serve a similar role in the globally important centre of endemism in eastern tropical Africa.

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