

# Tanzanian coastal forests – new information on status and biological importance

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*This paper presents the current results of a continuing survey of the distribution, status and biological importance of Tanzanian coastal forests. The Frontier-Tanzania Coastal Forest Research Programme has shown that at least 34 locations, and possibly another eight, support important coastal forests. There are probably 350–500 sq km of forest remaining, with most sites smaller than 20 sq km. Most sites, and 75–85 per cent of the total area, are located in Forest Reserves. Coastal forest supports many endemic taxa and many individual forests support species and subspecies known from nowhere else. All these forests are severely threatened and effective conservation action is a priority. The Frontier-Tanzania project findings are contributing to conservation programmes co-ordinated by the Wildlife Conservation Society of Tanzania and the World Wide Fund for Nature (Tanzania).*

## Introduction

Sheil (1992) presented a general outline of the biological importance of Tanzanian coastal forests and the intense human pressure they face. The Frontier-Tanzania Coastal Forest Research Programme, a collaborative venture of the Faculty of Science of the University of Dar es Salaam and the Society for Environmental Exploration (London), has been visiting these forests since June 1989 and plans to continue operating until all forest sites have been surveyed and assessed in terms of their biology and socio-economic features. This paper gives an up-to-date summary of the distribution, status and biological importance of coastal forests in Tanzania and shows how this information is assisting conservation efforts.

## Methods of assessment

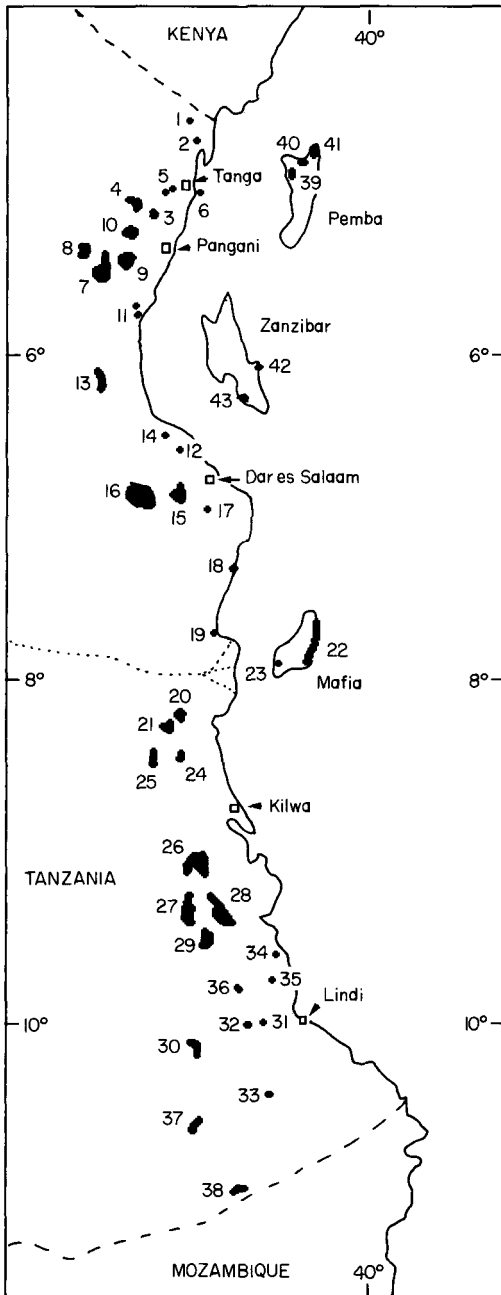
Probable locations of coastal forests were deduced from a forest cover map for Tanzania produced using satellite images from the 1970s (Rodgers *et al.*, 1985) in conjunction with the Forest Reserve Map for Tanzania (1962)

and 1:50,000 topographic maps. Staff at the University of Dar es Salaam and the Wildlife Conservation Society of Tanzania also provided information on the location of forest sites.

Field visits are being carried out to all potential sites to determine the type of vegetation and to map areas of forest. Most field visits have been undertaken by expeditions of the Frontier-Tanzania Coastal Forest Research Programme, the remainder by the Danish and Tanzanian sections of the International Council for Bird Preservation.

## Coastal forests in Tanzania

The positions of all known and probable coastal forests in Tanzania are presented in Figure 1 (updated from Sheil, 1992). Table 1 presents summary information on the extent of forest vegetation at each site (where known) and the legal status and extent of any associated protected area. A minimum of 350 sq km of coastal forest is known to remain in Tanzania, but there could be a further 100–200 sq km in regions yet to be visited. Few of the 34 known coastal forests are larger than 20 sq



**Figure 1.** Location and approximate extent of known and probable (\*) coastal forest localities in Tanzania.

**Tanga Region.** Muheza District: 1, Horohoro; 2, Kilulu Hill; 3, Tongwe; 4, Kwani/Makinyumbi\*. Tanga District: 5, Tanga Limestone; 6, Yambe Island\*. Handeni District: 7, Gendagenda; 8, Mgambo. Pangani District: 9, Msubugwe; 10, Pangani River;

11, Mkwaja.

**Dar es Salaam Region.** Kinondoni District: 12, Pande.

**Coast Region.** Bagamoyo District: 13, Zaraninge (Kiono); 14, Ruvu North. Kisarawe District: 15, Pugu and Kazimzumbwi; 16, Ruvu South; 17, Vikindu; 18, Kisiju. Rufiji District: 19, Mchungu; 20, Namakutwa-Nyamueete; 21, Kiwengoma. Mafia District: 22, Eastern Seaboard; 23, Kilindoni.

**Lindi Region.** Kilwa District: 24, Tong'ombe; 25, Mbinga; 26, Mitundembea FR area\*; 27, Rungo FR area\*; 28, Ngarama N and S FR area; 29, Pindirola FR area. Lindi District: 30, Rondo; 31, Litipo; 32, Chitoo; 33, Nyangamara; 34, Ndimba FR area\*; 35, Ruawa FR area\*; 36, Matapwa FR area\*.

**Mtwara Region.** Newala District: 37, Chilangala; 38, Mahuta\*.

**Pemba Island.** 39, Ngezi; 40, Msitu Mkuu; 41, Ras Kiuyu.

**Zanzibar Island.** 42, Jozani; 43, Muyani

For explanation of FR see footnote † to Table 1.

**Footnotes to Table 1**

† Areas where given are derived from ground survey. U, possible presence indicated by satellite photographs but no site visit reported. These unconfirmed localities are generally assigned names relating to the Forest Reserve (FR) they lie near or within.

‡ %, percentage of forest known or thought to fall within a protected area; ?, exact location of protected area boundaries with respect to forest uncertain; R, Protective Forest Reserve (no extraction permitted); r, Productive Forest Reserve (intended for sustainable extraction); G, Game Reserve (no extraction permitted). All reserves are under the control of Central Government (Forestry and Beekeeping Division or Game Division) unless marked with 'l' indicating Local Government Control. Total gazetted area (to the nearest sq km) is given in parentheses.

§ Notable non-forest-dependent species are excluded from this table. Rare species are those described as such in literature. Endemics are those known only from a single or two proximal forests, such as Jozani and Muyuni. Parentheses indicate subspecies; ' - ' indicates no data available.

¶ Forest lies within Zaraninge Proposed Forest Reserve. The legal status of this area is undergoing revision.

\*\* There is local disagreement over the exact location of District and Forest Reserve boundaries at Kiwengoma Forest.

**Table 1.** Biological importance of Tanzanian coastal forests: status and summary

| Forest locality*              | Area<br>sq km† | Protected<br>status‡ | Plants§             |      | Invertebrates§ |       | Vertebrates§ |         |       |
|-------------------------------|----------------|----------------------|---------------------|------|----------------|-------|--------------|---------|-------|
|                               |                |                      | Endemic             | Rare | Endemic        | Rare  | Endemic      | Rare    |       |
| 1. Horohoro                   | < 1            | 0%                   | –                   | –    | –              | –     | –            | –       |       |
| 2. Kilulu Hill (Moa)          | c. 9           | 0%                   | –                   | –    | –              | –     | 2            | –       |       |
| 3. Tongwe                     | 3              | 100%                 | R (12)              | –    | 1              | –     | 1            | –       |       |
| 4. Kwani & Makinyumbi         | U              | 0%                   | –                   | –    | –              | –     | –            | –       |       |
| 5. Tanga Limestone            | 3              | 0%                   | –                   | 3    | 7              | –     | –            | 1       |       |
| 6. Yambe Is.                  | U              | 0%                   | –                   | –    | –              | –     | –            | –       |       |
| 7. Gendagenda                 | 26             | 20%                  | r; 45% R<br>(9, 19) | 7    | 2              | –     | –            | 0       | 0     |
| 8. Mgambo                     | c. 20          | 0%                   | –                   | –    | –              | –     | –            | –       | –     |
| 9. Msubugwe                   | 10–15          | 100%                 | r (44)              | 1    | 2              | –     | –            | –       | –     |
| 10. Pangani River             | 10             | 0%                   | –                   | –    | –              | –     | –            | –       | –     |
| 11. Mkwaja                    | c. 3           | 0%                   | –                   | –    | –              | –     | –            | –       | 2     |
| 12. Pande                     | 11             | 100%                 | G (12)              | 3    | 6              | –     | –            | 0       | 1     |
| 13. Kiono/Zaraninge¶          | 20             | 100%                 | lr (219)            | 4    | 14             | 1     | 1            | 0 (1)   | 6     |
| 14. Ruvu North                | 1–10           | 100%                 | r (319)             | –    | –              | –     | –            | –       | –     |
| 15. {Pugu                     | 11             | 100%                 | R (24)              | 13   | 7              | Some  | Many         | 1 (1)   | 6     |
| {Kazimzumbwi                  | 29             | 80%                  | R (49)              | –    | 3              | 1     | 1            | 0       | 5     |
| 16. Ruvu South                | 98             | 100%                 | R (355)             | –    | 1              | –     | –            | 0       | 2     |
| 17. Vikindu                   | 10             | 100%                 | r (16)              | 1    | 1              | –     | –            | 0       | 1     |
| 18. Kisiju                    | 2              | 0%                   | –                   | 0    | 2              | –     | –            | 0       | 0     |
| 19. Mchungu                   | 2              | 100%                 | r (10)              | –    | 6              | –     | 1            | –       | –     |
| 20. Namakutwa-<br>Nyamuete    | 10             | 100%                 | r (46)              | –    | –              | –     | –            | –       | 3     |
| 21. Kiwengoma**               | 18–25          | –                    | ? r (?)             | 4    | 28             | 29    | 10           | 0 (1)   | 9     |
| 22. Mafia Eastern<br>Seaboard | 3              | 0%                   | –                   | 1    | 2              | 6 (2) | 2            | 1       | 0 (3) |
| 23. Kilindoni                 | < 0.1          | 0%                   | –                   | –    | –              | 0     | Some         | 0       | 0     |
| 24. Tong'ombe                 | c. 10          | 100%                 | R (25)              | –    | –              | –     | –            | –       | 3     |
| 25. Mbinga                    | c. 5           | –                    | ? r (?)             | –    | –              | –     | –            | –       | –     |
| 26. Mitundembea FR area       | U              | –                    | ? R (85)            | –    | –              | –     | –            | –       | –     |
| 27. Rungo FR area             | U              | –                    | ? r (226)           | –    | –              | –     | –            | –       | –     |
| 28. {Ngarama N FR area        | U              | –                    | ? r (326)           | –    | –              | –     | –            | –       | –     |
| {Ngarama S FR area            | 5+             | 100%                 | r (20)              | –    | –              | –     | –            | –       | –     |
| 29. Pindirol FR area          | 5+             | 100%                 | r (118)             | –    | –              | –     | –            | –       | –     |
| 30. Rondo                     | 18–20          | 100%                 | r (135)             | 50+  | –              | –     | –            | 0 (1)   | 7     |
| 31. Litipo                    | c. 10          | 100%                 | r (10)              | 15+  | –              | –     | –            | –       | 1     |
| 32. Chitoo                    | 7              | 100%                 | r (8)               | –    | –              | –     | –            | –       | –     |
| 33. Nyangamara                | 6              | 0%                   | –                   | –    | –              | –     | –            | –       | –     |
| 34. Ndimba FR area            | U              | –                    | ? lr (75)           | –    | –              | –     | –            | –       | –     |
| 35. Ruawa FR area             | U              | –                    | ? r (29)            | –    | –              | –     | –            | –       | –     |
| 36. Matapwa FR area           | U              | –                    | ? R (165)           | –    | –              | –     | –            | –       | –     |
| 37. Chilangala                | c. 1           | –                    | ? lr (0.1)          | –    | –              | –     | –            | –       | –     |
| 38. Mahuta                    | U              | –                    | ? lr (15)           | –    | –              | –     | –            | –       | –     |
| 39. Ngezi                     | 7.5            | 100%                 | lr (14)             | 2    | 5              | 0 (1) | 0            | 1 (1)   | 1     |
| 40. Msitu Mkuu                | 1.3            | 0%                   | –                   | –    | –              | –     | –            | –       | 1     |
| 41. Ras Kiuyu                 | 2.1            | 0%                   | –                   | –    | 1              | –     | –            | –       | –     |
| 42. Jozani                    | 5              | 100%                 | lr (?)              | 1    | 4              | –     | –            | { 0 (6) | 3     |
| 43. Muyuni                    | < 28           | 0%                   | –                   | –    | –              | –     | –            | { –     | –     |

\* Numbers relate to Figure 1

km and the average size is 12 sq km. The majority of the sites, and some 75–85 per cent of the total area, fall within Forest Reserves under the administration of the Tanzanian Forest and Beekeeping Division.

Intensive programmes of site visits have been undertaken in the Handeni and Pangani Districts of Tanga Region, all districts of Coast Region (Bagamoyo, Kisarawe, Rufiji, Mafia), Dar es Salaam Region, Lindi District of Lindi Region, and on the Islands of Zanzibar and Pemba. Field surveys in Muheza (Tanga Region), Kilwa (Lindi Region) and Mtwara, Newala and Masasi (Mtwara Region) are required before the total number and size of coastal forests remaining can be determined.

### Biological importance

East African coastal forests support many endemic genera and species of plants and animals. For example, there are believed to be six bird species, two mammals, six reptiles, five amphibians and at least 50 invertebrate and 100 vascular plant species endemic to coastal forests in Kenya and Tanzania. The habitat is thus a high priority for the conservation of biodiversity.

Many individual forests also support forest-dependent species of plants and animals that are known only from only one or very few forest sites. Table 1 presents summary information on such species from the coastal forests of Tanzania. Data on species distributions were obtained from publications (Moreau and Pakenham, 1941; Howell, 1981; Pakenham, 1983, 1984; Hawthorne, 1984; Collar and Stuart, 1988; Luke, 1988; Bagger *et al.*, 1989; Beentje, 1990a, 1990b; Faldborg *et al.*, 1990; Burgess *et al.*, 1992; Mlingwa, 1992), and from specimens collected by the Coastal Forest Research Programme since 1989. Table 1 shows that, on current information, 100 plant, 37 invertebrate and 13 vertebrate species and subspecies are confined to a single site. With further work some species may be found to be more widely distributed but Table 1 indicates just how precarious the future of some species could be.

Unfortunately, these data are influenced by the following factors: some forests have been sampled more intensively than others; and some have been sampled too recently for all specimens collected to be identified. The results of further studies in all unstudied forests and the identification of large numbers of specimens from all forests are needed before an unequivocal ranking of conservation priorities can be made. However, the preliminary data show that biologically important forests appear to be those of largest size and located on highest ground (where forest might have persisted during glacial dry periods).

### Use of results in active conservation

The high biological importance of coastal forest, the small area remaining, and the intense human pressures most sites are under, means that effective conservation action at a number of sites has become a pressing priority for conservation organizations working in the region. In the last 2 years coastal forest conservation programmes have been started by both national and international conservation organizations: the Wildlife Conservation Society of Tanzania and the World Wide Fund for Nature (Tanzania). Because most remaining coastal forests (75–85 per cent by area) are located within Forest Reserves (Table 1), all these projects are working in close co-operation with the Tanzanian Forest and Beekeeping Division of the Ministry of Tourism, Natural Resources and Environment.

The detailed maps and information on location, status, threats and biological importance generated for every coastal forest visited by the Frontier-Tanzania Coastal Forest Research Programme over the past 4 years have provided invaluable background information to these conservation programmes, and in some cases have determined conservation field sites. Frontier-Tanzania intends to continue the programme of visits until all forests have been visited and comparative data on their biology and socio-economic significance generated. It is hoped that this programme will further stimulate conservation

action and enable a more accurate determination of conservation priorities to be made.

#### Acknowledgments

Field support for this study was provided by the Frontier-Tanzania Coastal Forest Research Programme, a joint scientific initiative of the Faculty of Science, University of Dar es Salaam, Tanzania, and the Society for Environmental Exploration, UK. A. D. was supported by grants from the Oryx 100% Fund (FFPS) and the People's Trust for Endangered Species. N.B. received support from the Society for Environmental Exploration, the Royal Society for the Protection of Birds (UK) and a British Ecological Society travel grant. All authors acknowledge the individual and collective contributions of the many Tanzanian scientists and European volunteers who have worked with Frontier in the field. The following organizations and individuals also provided data used in this paper: Tanzanian Ministry of Tourism, Natural Resources and Environment (Forestry Division), University of Dar es Salaam, Wildlife Conservation Society of Tanzania, World Conservation Monitoring Centre, International Council for Bird Preservation (Secretariat and Tanzanian and Danish Sections), Oxford Forestry Institute, C. Ansell, N. Baker, D. Broadley, P. Clarke, A. Cogle, J. P. Lequeux, L. Hoffman, K. Howell, B. Hynde, R. Jenkins, J. Kapuya, P. Kasigwa, J. Kielland, J. Kingdon, D. Kock, J. Lovett, Q. Luke, F. Mbago, C. Mlingwa, C. Msuya, L. Mwasumbi, A. Robertson, A. Rodgers, Z. Rulungaranga, H. Suleiman, W. Hawthorne, B. Verdcourt, K. Volleson, T. Waters, and T. Williams.

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