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The Role of Customary Institutions in the Conservation of Biodiversity: Sacred Forests in Mozambique

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ABSTRACT

Recently the role of customary local institutions in the conservation of biological diversity has become a topic of widespread interest. In this paper the conservation value of one such institution, traditionally protected forest, is studied with regard to its ecological representativity and institutional persistence. On the basis of a case study from Mozambique the paper concludes that traditionally protected forests do have a practical conservation value, especially as fire refuges and in the preservation of metapopulations of endangered species. However, it is also important to recall their spiritual aspect, which is crucial for their continuing appreciation and upholding. Even though customary institutions are still strong in the study area, they are subject to power struggles at both local and national levels. In the present context of political transition, any outside interventions regarding such local institutions as sacred forests, which have high symbolic value, should be considered carefully.

KEY WORDS

Africa, biodiversity, sacred forests, conservation areas, local institutions

INTRODUCTION

In many African countries the conservation of biological diversity through a centralised system of parks and reserves is threatened by problems in enforcement, as the existing conservation areas commonly suffer from various types of encroachment ranging from poaching to outright invasion. So far, remedies for

the problem have been sought from economic incentives to support the enforcement of protection laws, funded by international donors and implemented through projects. But projects alone are not sufficient for comprehensive protection, as they can only cover a fraction of the vital ecological assets (Müller 2000). Concurrently, other alternatives, such as areas protected by local people according to endogenous rule-systems like sacred forests, have gained international recognition in major declarations and conventions (Nummelin and Virtanen 2000; Schaaf 1999). But despite the rekindled interest, such traditionally protected forest areas remain little studied from the conservation point of view.

According to Margules and Pressey (2000: 243) effective systems for the conservation of biological diversity must be representative and persistent. Ideally, a network of conservation areas should represent the full variety of biodiversity in the region covered. And once established, the institutional support system should be able to exclude threats and promote long-term survival of the species by maintaining ecological processes and viable populations. In Africa traditionally protected forests are often believed to represent an original, formerly much more extensive forest type, which has later been degraded into a less rich type such as grassland by human activity, typically the opening of new land for shifting cultivation or pasturage. But recently researchers have disputed the predominance of dense climax forest over most of Africa. According to them, vegetation is in continual transition, and thus it is not possible to determine 'original' or 'climax' type. Furthermore, they insist that human activity should not be considered as external to nature. For example some traditionally protected forests are the results of long-term human manipulation of local micro-environmental factors such as soil and plant characteristics, and thus at least to some extent 'non-original' (Fairhead and Leach 1995).

Parts of nature are protected under traditional norms according to two different premises: the controls can be either space or species-based (Mandondo 1997: 355). Many species-based controls are linked to beliefs about spirits and their dwelling places. But in addition to religious controls, some species are protected for their utilitarian value, such as medicinal plants, fruit trees, and those species, which are believed to provide environmental services. However, if conservation is pursued at the level of ecosystems the main interest lies with space-based controls over larger areas under tree cover, such as sacred forests. There are two geographical factors, size and land type, which are important in terms of ecological representativity and viability.

The size of sacred forests varies considerably. Survey data from East Africa shows a variation in average size from over six hectares to less than one. While in some areas studied in Tanzania only one quarter of the sacred forests were under two hectares, in other areas over 70 per cent of the forests were smaller than that. In Kenya the sizes of all the sacred groves studied in a densely populated area were less than 1.2 hectares. The acreage seems to have some relationship

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with population density, as small groves are typical in areas with high demographic pressure. In terms of representativity for biodiversity conservation purposes, the land type where the sacred sites are situated is another important factor. Typically the protected forests are on hills and slopes, but there are also some sites on flat land and along springs and streams (Castro 1995; Gerdén and Mtallo 1990; Mwihomeke et al. 1998).

Due to their embeddedness in specific cultural systems sacred sites have also a spiritual dimension, and their persistence cannot be assessed separately from the cultural institutions which make them meaningful and valuable for the local populations. Traditionally protected forests can be divided into the following socio-cultural categories: i) burial grounds; ii) places where deities or spirits are believed to reside; iii) places for ritual; iv) sites linked to special historical events or populations; and v) forests that surround natural sacred features like rocks, caves or ponds.¹ Even though there are exceptions, all these categories are typically based on religious beliefs, and thus ultimately on supernatural sanctions for their protection. But to a varying degree these are backed up by human sanctions administered by selected members of the respective community. When there are established procedures which define who is competent to decide what is the rule and what are the human sanctions in case of its violation, the rule becomes a law (Perelman 1984: 45).

In order to grasp the socio-cultural meanings connected to traditionally protected forests we must understand the holistic relationship between man, the spirit world, nature, and society. In the context of many African cultures the concept of community includes both the living and the dead, and the spiritual is as much part of reality as the material. In this sense a sacred grove is not just a cultural relic, but an alternative way to transcend the divide between the local (or visible) and the universal (or invisible) (cf. Posey 1999: 4; Swan 1989: 383–5). In patrilineal societies like the Shona a specific role in mediating the relationship between the material world and the spirit world is attributed to the elders of the apical lineages, who command privileged access to ancestral spirits of the chiefly family. The latter are believed to be the spirit guardians of the whole chiefdom, who also monitor the behaviour of the present generation. Thus, the basis of both religious and political power is transcendental (Bourdillon 1987: 253–5; Mandondo 1997). But such a system is viable only in a relatively homogeneous community which has a common history based on joint cultural and religious values. Failure to maintain consensus over such essential values within the political community is likely to result in lack of authority to enforce the rules in other way than by force (Perelman 1984: 53–4).

Even though the basis of traditionally protected forests is in local customary law, it does not exclude state law, and in some cases the two systems coincide. For example some of the tree species protected by state law (like the African black ebony, *Dalbergia melanoxylon*) are also present in sacred groves, and

riverine forests are officially protected for example in Tanzania and Zimbabwe. The situation is somewhat different when local by-laws are explicitly made to reinforce existing customary rules, like in some villages in Tanzania (Gerdén and Mtallo 1990). In Kirinyaga in Kenya the local Native Council had ordered the registration and subsequent protection of all places of worship, including sacred groves, during the colonial era (Castro 1995). The difference between the two approaches is that unitary state law treats every citizen on the basis of equality irrespective of their membership in a local community, while recognition of the co-existence of various local laws with different cultural and religious bases presupposes legal pluralism. The question is whether the special rights enjoyed by members of the local community are compatible with the principle of equity between citizens (Perelman 1984: 46–7).

STUDY AREA AND METHODS

In this article the conservation value of the sacred forest institution is discussed on the basis of a case study from Mozambique. The article is based on fieldwork carried out during 1998–9 in the Chôa highlands in Barué District, which lies along Mozambique's western border with Zimbabwe in Manica Province. The Chôa highlands form a series of north-south ridges with a central plateau area. Climatically the area falls within the 1400 mm isohyet, with marked alteration of annual wet and dry seasons. Vegetation consists of extensive wooded or open grasslands with some deciduous woodlands and a few patches of evergreen forest near perennial streams (Mussanhane et al. 2000: 90–5). The Afro-montane habitats in the escarpment region are characterised by high species endemism (Hatton and Munguambe 1997: 14). With only about ten inhabitants per square kilometre, the population density of this remote area is low. Almost all the people are Shona, and speak the ChiManica dialect. The main livelihood is subsistence agriculture, which is supplemented by cattle and some cash crops (Mussanhane et al. 2000: 95–6).

In addition to the ecological representativity of the two sacred forests studied, I will examine the socio-cultural basis of their continued functioning at the juncture of changing state law and customary law. The methods used include participant observation, semi-structured interviews with key informants, and visits to the sacred forests.² Aside from my own fieldwork the results are based on a forest inventory carried out by J. Mussanhane and L. Nhamuco from the Eduardo Mondlane University³. The study is part of a multi-disciplinary research project on the local management of natural resources in Mozambique, Zimbabwe and Tanzania.

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CUSTOMARY AUTHORITY AND TRADITIONAL RELIGION IN MOZAMBIQUE

Mozambique gained independence in 1975 after a protracted liberation war, and subsequently a new radical government was established by Frelimo, the front organisation which had directed the armed struggle. In the colonial period customary authorities had played an important role in local administration, especially with respect to labour recruitment, law enforcement and collection of taxes. In line with their Marxist doctrine, the new rulers viewed customary authority as 'feudal', geared to serve its colonial masters and its own selfish class interests. Along with others who had collaborated with colonial authorities, representatives of customary authority were systematically excluded from positions of responsibility in the new local structures (Alexander 1997: 2). The government policy even warned against recuperation of such 'negative historical values' as veneration of the graves of the chiefs, which could be used for 'reactionary and obscure purposes' (Resolução sobre questões sociais e culturais 1980: 9). But despite the hostile government rhetoric and practice, socio-cultural institutions grounded in traditional religion never really ceased to exist (West and Kloeck-Jenson 1999: 457–9).

One factor in this process was a new civil war, which started only two years after independence, and lasted up to 1992. During the war both sides were forced to seek the support of customary authorities. Even though such efforts by the Frelimo government were rather informal and localised, the new guerrilla movement Renamo sought actively to incorporate traditional authorities in their rudimentary civil administration of the zones they occupied. But while chiefs and headmen were increasingly involved in the everyday management of community affairs in many areas, the war tended to disrupt traditional religious life, such as the annual rain ceremonies. This was due to various reasons like translocation of population which fled the war zones to neighbouring countries and urban areas, problems with transport and material resources needed for organising the ceremonies, and lack of security. The last aspect was a serious problem for the chiefs and their spirit mediums, who had become a target group (to be either recruited or eliminated) for both belligerent parties (Alexander 1997: 5–15). Ending of the war moved the dispute to the political arena, and by the late 1990s recognition of such local institutions as sacred forests was already incorporated into new legislation (see e.g. Lei no. 10/99: Art. 1, 13).

The legitimacy of customary socio-political institutions is based on traditional religion, in which spirits of the ancestors have a crucial role. Among the Shona the spirits of the dead are preserved in a burial ceremony, and the burial place is considered to be sacred. The spirits of dead chiefs and other members of the ruling elite have a special status, for they are considered as the founding spirits who are the custodians of the land and its fertility. The most sacred burial sites are those of the first settled chiefly lineages of the area, and they are usually

also the sites for the most important rituals like rain ceremonies. There are also specific places and trees connected to *mhondoro* spirits, or chiefly ancestors, which can take the form of a lion acting as messenger (Mandongo 1997).

In Chôa the principal sacred forest is Chinda, which is the main ritual site of the area, as well as the burial place of an important early chief. There are other sacred forests with local value like Mungwa, where the rain ceremonies of the Nhacapanga ward are held, and where one of its apical ancestors is buried (Mussanhane et al. 2000: 100–1). Besides such localised burial sites used for ceremonies, and graveyards for commoners, there are other types of traditionally protected sites like forests around springs and streams, and some caves where the spirits of some past warriors are believed to reside. Especially in the lowland area at the northern part of Chôa a number of individual trees (typically *Ficus* spp., *Azelia quanzensis* or *Khaya nyasica*), which are traditionally protected ceremonial sites were also identified. Most of the sacred forests indicated were situated on ridges or hills (Barauro, 18 March 1999; Tewetewe, 29–30 April 1999).

The rules governing access to and use of resources from sacred sites vary considerably, but usually those that are linked to founding spirits and which are of regional significance are protected more strictly than individual or village level sites. In general the rules that apply in Chôa are relatively tolerant: cutting of live trees or branches, setting fires and opening fields are forbidden. On the other hand collecting dead wood, fruits and mushrooms, and even grazing cattle are allowed except in the most sacred core area where the ceremonies are held. There are also various behaviour related controls regarding indecent language, sexual behaviour, and colours that can be worn. The sanctions are mainly of a supernatural type, as the ancestral spirits are believed to maintain constant vigil over these sites (Chinda, 14 November 1999).

With respect to Chinda, local elders related various stories about natural calamities that had befallen guerrilla groups which had broken the customary norms upon entering the forest during the recent civil war. The misfortunes included extensive rain and fog, which made the perpetrators lose their sense of direction, as well as encounters with spirit-beasts in the form of *mhondoro* lions and huge pythons. According to customary law those caught are also subject to different kinds of human punishment, ranging from reparatory ceremonies to ejection of the culprit from the community. However, supervision is rather lax as the sites are not visited regularly, and nobody has been punished for such offences during the post-war period. The force of this kind of idealised rules grounded on religious beliefs is difficult to evaluate, as their enforcement relies mostly on internalisation and voluntary observation (Chôa-Sede, 3 November 1998; Chinda, 14 November 1999; cf. Perelman 1984: 45).

Control over ritual sites is not a politically neutral issue. In African societies religion and politics are not separate domains, as various case histories testify. Schoffeleers (1979) has recorded the intense struggles for the control over religious shrines between autochthonous populations and the conquerors in pre-

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colonial and colonial Malawi, while Mukamuri (1995: 72–97) has documented the political manipulation of sacredness by the ruling lineages to gain and maintain control over immigrant groups in post-colonial Zimbabwe. Similar struggles have also been reported from Mozambique, where the prolonged political transition has revived dormant disputes over customary power (Alexander 1997: 9–10; West and Kloeck-Jenson 1999: 476–9).

In the study area people of the *shato* (python) clan,⁴ to which the present chief Macufa also belongs, is considered as the apical lineage of longest known residence in the area. Consequently the lineage is also in control of the main ritual forest at Chinda, and it holds overall religious power. But in pre-colonial times the lineage did not command political power, which belonged to the Hatziro lineage of *gwai* (sheep) clan. According to the Hatziro family the two roles were united only in the 1940s when the ruling chief Sahatziro came into conflict with the colonial authorities, and the head of the Macufa family managed to get himself nominated as the new chief by the Portuguese. But even though their ritual pre-eminence in the highland area clearly helped the Macufa family to grab political power too, their spiritual power was subsequently contested in part of their new political territory. Presently Mr. Sabadza, a local rain maker of the *shava* (eland) clan claims that the Macufas' spiritual territory ends at the escarpment on the Mozambican side of the Caeredzi valley, while the valley and its ritual sites belong to his area (Nhaterere, 12 May 1999; Barauro, 21 May 1999; Inyazonia, 18 November 1999; Nyamaropa, 12 December 1999; Hadabi, 13 December 1999).

Along with such disputes over legitimacy, there are signs that respect for customary norms is weakening with regard to sacred forests, which are threatened by uncontrolled bush-fires and illegal cutting of trees (Chôa Sede, 18 November 1998; Tewetewe, 19 April 1999; Barauro, 21 May 1999). One factor in the apparent decline of customary institutions is the disruptive effect of the civil war, which dispersed the local communities and subjected them to various new influences. However, in some ways the period of indiscriminate violence also reinforced the status of traditional religion, and ceremonial sites like the Chinda forest in Chôa have been used as venues for officially sanctioned healing rituals to appease the spirits of those wronged during the war (Chôa-Sede, 3 November 1998).

SACRED FORESTS AND BIOLOGICAL DIVERSITY

The National strategy and action plan for the conservation of biological diversity in Mozambique, which was prepared in 1997, seeks to 'establish and manage a representative system of areas for the protection of habitats and maintenance of viable populations species in natural surroundings' (Hatton and Munguambe 1997: 40). This is a rather demanding task in a large (784,755 km²) and

underdeveloped country like Mozambique. The situation is further aggravated by the wide variety of ecosystems, including patches of Afro-montane habitats, different types of woodlands/forests, edaphic grasslands, and a variety of wetlands, coastland, and marine habitats. While about seven per cent of the territory is formally under conservation areas (national parks and wildlife reserves), in reality most of them lack effective protection (Hatton and Munguambe 1997: 2–4).

The problems are acknowledged in the national biodiversity strategy, which emphasises the need to involve local communities and other stakeholders in the management of protected areas, and to develop new measures for the protection of natural habitats outside the state parks and reserves. Special emphasis should be placed on identification of sensitive ecosystems. Recommended actions include the promotion of community-based management schemes, and integration of traditional knowledge and management practices into scientific research programmes and conservation initiatives (Hatton and Munguambe 1997: 40–3).

This project carried out a forest inventory in the Chôa highlands. It covered the sacred forests of Chinda and Mungwa, and two non-protected forests/woodlands for comparative purposes.⁵ The objective of the inventory was to assess the conservation value of traditionally protected forests in the area. Both of the protected forests are relatively large: the size of Chinda is about eight hectares, and Mungwa is approximately nine hectares. The two non-protected forests, Dani and Njere, are about 20 and 25 hectares respectively. Protected Chinda, which is the only evergreen forest in the sample, is located at an altitude of 1,600 metres, while the three deciduous woodlands are situated lower, at 1,300 to 1,400 metres. As the few remaining evergreen forests in the area are all traditionally protected, it was not possible to find a comparable non-protected site for Chinda (Mussanhane et al. 2000: 101–3).

The results show that the two non-protected woodlands have higher frequencies in the lower diameter classes, a higher regeneration rate, and a lower basal area than the protected areas. The forest structure is also simpler in the former, where it consists of only one stratum with an average height of five to nine metres. In protected Mungwa the average height varies between 8 and 18 metres, and consists of two strata in places. In protected Chinda the whole forest is in two strata, and trees in the dominant stratum attain a height of 18 metres. The species composition is also different: in unprotected Njere 85 per cent of the trees consist of one species (*Uapaca kirkiana*), and in unprotected Dani two species (*U. kirkiana* and *Brachystegia spiciformis*) make up 95 per cent of the tree population. While *U. kirkiana* (74%) is also the dominant tree in protected Mungwa, there are no other clearly dominating species. The proportion of mature individuals of *U. kirkiana* is also much higher in Mungwa (21%) than in Njere (3%) or Dani (6%). In Chinda there is no clearly dominant species, even though *Garcinia* spp. is common in the regeneration stratum (Mussanhane et al. 2000: 104–7).

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The relatively higher tree diversity of the sacred forests is also indicated by the two biodiversity indices, Berger & Parker and Shannon & Wiener,⁶ which were used in the study. In Chinda and Mungwa the Shannon & Wiener index indicated higher biodiversity, than in Njere and Dani. The values of the Berger & Parker index confirm these results, even though the value for Mungwa was closer to those of Njere and Dani than those of Chinda. The results are similar to those obtained by the Zimbabwe team for the sacred forest of Dzete Mountain and the surrounding woodlands, which they studied (Table 1).

Table 1. Tree species diversity in selected traditionally protected and non-protected forests and woodlands in Mozambique and Zimbabwe (according to Mussanhane et al. 2000; Tyynelä and Mudavanhu 2000; Tyynelä 2001).

Locality	no. of plots	Berger & Parker index	Shannon & Wiener index
Chinda (protected)	4	0.21	2.22
Mungwa (protected)	4	0.74	1.45
Njere (non-protected)	8	0.84	0.90
Dani (non-protected)	8	0.86	0.65
Dzete (protected)	8	0.20–0.36	1.63–2.40
Mukarakate (non-prot.)	34	0.50	1.36

An important aspect with regard to conservation of biological diversity is the species composition. While the number of tree species is not considerably higher in the protected forests, there are various species which are rare or absent from the surrounding non-protected areas. For example, of the 23 tree species identified in protected Mungwa 11 were also found in the non-protected woodlands, while almost all of the species encountered in Chinda were absent from the other areas (Mussanhane et al. 2000: 104). Results from two case studies in Tanzania and Zimbabwe also indicated that certain tree species such as African black ebony, *Dalbergia melanoxylon*, are found only in the protected areas (Lukumbuzya 2000:166–7; Tyynelä and Mudavanhu 2000: 61–2).

The findings of a Tanzanian study about plant diversity supports the above finding that a large proportion of the species found in traditionally protected forests are not found in the surrounding non-protected areas (Mwihomeke et al. 2000: 181–9). This is linked to the fact that in many areas practically all the remaining patches of evergreen forest are traditionally protected. The species that are typical to these forests require shade, permanent water and protection from fire. In favourable conditions trees develop a closed canopy, which

maintains a humid habitat inside the forest, and makes it less susceptible to fire. The number of species is also elevated, but there is no obviously dominant species. On the other hand the surrounding woodlands are typically dominated by one or two fire-tolerant species like *U. kirkiana*. Thus, even though the protected forests might not represent a previously dominant climax type, they do provide an important fire refuge, which makes it possible for a number of typical evergreen forest species to survive (Mussanhane et al. 2000; cf. Mwihomeke et al. 2000: 191).

But what is the conservation value of the forests' status as sacred according to local beliefs in Chôa? We should recall that other than socio-cultural factors also have an impact on the rate of exploitation and damage by fire. These include the low population density of the area, as well as the long distance and difficult accessibility from the nearest human settlement. In Chinda the area is protected from fire by perennial rivers and the forest's humid micro-climate. Soils and topography are also important factors, which condition both fire sensitivity and initial establishment of a vegetation type. All these factors are inter-linked, but it is unlikely that geographical factors alone would have been sufficient to preserve the sacred forests of Chinda and Mungwa in their present form. The sacredness of the forests has contributed substantially to the preservation of their relatively high biological diversity.

CONCLUSION

There are no previous studies which measure the biological diversity of traditionally protected forests in Mozambique, or assess their ecological representativity. Even though the scope of this study was very limited and our knowledge of the study area's ecological history is deficient, the results show that the sacred forests studied are valuable for conservation purposes. They serve as important fire refuges for plants and animals with low fire tolerance, and can create a network of 'green islands' serving as stepping stones for patchy metapopulations of endangered species (see Hanski and Ovaskainen 2000). Even though the sites that are traditionally protected are rather small, and their distribution tends to be biased towards certain landscape categories like hills and streambanks, they remain important especially in the Mozambican context, where conservation of government-controlled parks and reserves is poorly enforced. Without them the biological diversity of many areas would be much poorer, and various endemic species would already have disappeared.

In addition to assessing the ecological representativity of the traditionally protected forests, we must also consider their institutional basis and its persistence. Various researchers have emphasised empowerment of those endogenous institutions, which are presently *de facto* managing local resources. Replacing

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or duplicating them with new structures has seldom worked, even though the new institutions might appear more democratic by Western standards (Fairhead and Leach 1995). With respect to sacred forests the responsible endogenous structures often combine both religious and political authorities, which control the performance of ceremonies and access to sacred sites together. But their present legitimacy varies considerably from place to place. In Mozambique they still wield considerable autonomous power in sparsely populated areas like Chôa, but they have often been undermined by state and party structures in other, more populous areas (see e.g. West and Kloeck-Jenson 1999). As noted by Falconer (1999: 370), the diversity of traditionally protected forests and especially their socio-cultural contexts makes it difficult to rely on unitary state law for their use in nature conservation. In Mozambique the concept of 'cultural-historical protected zones' of the new Forest Law represents a move towards pluralist legislation, which supports the use of local customary institutions for the conservation of nature.

However, if local institutions are promoted from above merely as a tool to preserve biodiversity for its own sake, separating the institutions from their socio-cultural bases, they will soon lose their legitimacy. Sacredness is a powerful means of conservation only when it is linked to a broadly respected belief system, with adequate normative controls and means for their enforcement. The problem with norms, which rely on internalisation of local socio-cultural values and voluntary observation, is that they depend upon consensus on what is proper and reasonable (Perelman 1984: 53). When faced with an influx of outsiders with different belief systems, or penetration of new social doctrines, the situation can remain under control only if the endogenous local institutions are given appropriate legal authority to enforce the local norms. At present granting such authority to customary chiefs is problematic even in Chôa, where a long dormant dispute over the identity of legitimate office-bearers has re-emerged in the new political context. Similar situations have been reported from other areas in Mozambique (Alexander 1997; West and Kloeck-Jenson 1999).

Instead of concentrating on one privileged institution like chieftainship, we should perhaps look into the whole constellation of local management practices. Sustainable management of natural resources is essentially a process, not a static condition. Rather than placing one local institution above the others for administrative convenience, the emphasis should be on creating enabling legislation and socio-economic conditions to support efficient local management. The problem is how to combine respect for different community-based rule-systems with equal rights of individual citizens, who might not share the local cultural and religious traditions. Historical development in the West has led to a secular state based on religious and ideological pluralism, but with relatively high socio-cultural homogeneity and a uniform legal system (Perelman 1984: 54). In Mozambique the heterogeneity of the socio-cultural and ethnic composition of

the population has made smooth development of a unitary state difficult, and the recent transition to multi-party democracy has brought up the latent tensions, which the centralised single-party rule had attempted to suppress. During the process such local institutions as sacred forests with high symbolic value have also become entangled in national political struggles, which can impair their local legitimacy. In this context any external interventions should be considered carefully.

NOTES

¹ The classification is based on ten studies which contain some information about traditionally protected forests, namely Castro 1995 for Kenya; Gerdén and Mtallo 1990, Kajembe 1994, Mwihomeke et al. 1998, and Ylhäisi 2000 for Tanzania; Matowanyika 1991 and Mandondo 1997 for Zimbabwe; Falconer 1999 for Ghana; and Laird 1999 and Swan 1989 for more general overviews.

² Reference to my own fieldwork data is made by indicating the place and date when it was collected; the fieldnotes are in my personal archives. The fieldwork for this study was funded by the Academy of Finland through the project 'Popular participation in the management of local natural resources: the role of endogenous institutions in Tanzania, Zimbabwe and Mozambique'.

³ In each forest/woodland studied sample plots were placed at a distance of 50 and 100 metres from the area's geographical centre to the north, east, south and west (eight plots in the non-protected forests and four plots in the smaller protected forests). Within these plots trees were sampled according to diameter classes. For trees with a diameter at breast height (dbh) larger than five centimetres a sample area of 1000 m² was used. Trees in that area were identified and counted, and their height as well as dbh were measured. For trees with a dbh less than five centimetres or height under 1.3 metres (regeneration) the number of individuals and stubs were counted within a reduced area of 100 m² (Mussanhane et al. 2000: 96). The species nomenclature follows Coates-Palgrave (1996).

⁴ The Shona kinship system is patrilineal, and each person inherits a traditional clan name (*mutupo*) from his/her father. These exogamous clans are further divided into sub-clans (*zvidao*) which can have their own totems. The clan name is often the name of an animal, and members are not allowed to eat the flesh of that animal, or at least there is a token taboo on some part of it. For example the Hatziro family which is prominent in Chôa is of *kamba* (tortoise) *zvidao*, and of *gwai* (sheep) *mutupo*. The spirit of the common ancestor of the whole group becomes a prominent spirit guardian (*mudzimu*), and is frequently honoured with ceremonial beer. (Bourdillon 1987: 23–8.)

⁵ In this study a standard Zimbabwean classification system was used to identify classes of woody cover. It consists of the following five classes: natural forest (canopy cover > 80% of the ground surface, and tree height > 15m); woodland (canopy cover 20–80%, and tree height 5–15m); bushland (canopy cover 20–80%, and height 1–5m); wooded grassland (canopy cover 2–20%, and height 1–5m); and grassland. The study sites were selected from the first two classes. (Mussanhane et al. 2000: 96.)

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⁶ The index of Berger and Parker (D') was calculated from: $D' = N_{\max} / N$, in which N_{\max} stands for the number of trees of the most common tree species in the sample, and N for the total number of trees in the sample. The index of Shannon and Wiener (H') was defined as:

$$H' = \sum_{i=1}^k \ln(p_i) p_i,$$

where p_i is the proportion of species i in the sample (N_i/N), and k is the total number of tree species in the sample. Low values of D' and high values of H' indicate a high species diversity.

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