

NATURE CONSERVATION IN RHODESIA: A REVIEW

D. N. S. TOMLINSON*

Department of National Parks and Wildlife Management, Box 8365, Causeway, Salisbury, Rhodesia†

ABSTRACT

The history of conservation is outlined and the present status and aims are reviewed. There are six types of conservation area in Rhodesia which are listed and described in terms of their present location, size, floristic and faunistic components, planning stage, conservation and management status. Management problems are defined and the ongoing research programme is tabulated. The need for a reappraisal of practical management and planning principles are discussed using a case history as an example.

INTRODUCTION

Conservation can be defined as the preservation or creation of diversity in environments, thus maintaining the greatest variety of living creatures in order to provide suitable habitats for the varied types of people that still exist and so enable this human diversity to survive (Dasmann, 1968).

This does not always mean protection from injury or destruction as, in order to conserve all the components of the biotic community, it may be necessary to control those which adversely affect others. For example, an excess in the numbers of elephants may lead to an unprecedented increase in the rate of destruction of certain rare plant communities. Likewise, management by introduction may be necessary in order to ensure the wellbeing of certain species; for example, game with specialised dietary requirements (e.g. giraffe) may require the introduction of a food resource (e.g. *Acacia* spp.) when this is inadequate to meet their demands.

The most important single factor which has indirectly ensured the protection of

* *Present address:* Department of Forestry, P/Bag 9029, Pietermaritzburg, Republic of South Africa.
† Now Zimbabwe.

many larger areas of conservation interest has been the presence of the tsetse fly *Glossina* spp. In its absence man would have settled in most of these areas and destroyed much of the wildlife during the process of agricultural development. Other factors which have been taken into consideration when designating natural areas for conservation are:

- (a) their historical importance;
- (b) their spectacular scenery;
- (c) the presence of unusually numerous and diverse bird, mammal and reptile faunas;
- (d) their unique botanical features;
- (e) the presence of large bodies of water (reservoirs) and their potential for the development of a wide range of outdoor recreational facilities.

THE HISTORY OF CONSERVATION IN RHODESIA

The history of conservation is outlined in Table 1 and covers major aspects of legislation from 1891 to the present day.

The first conservation efforts were aimed solely at large mammal species and it was not until 22 years later (1913) that any type of protection was given to the plant life. A further 14 years elapsed before it was realised that catchment areas and alluvial situations needed special protection from tree felling and subsistence cropping. In 1929 the Government assumed full responsibility for all wildlife throughout the colony. This change proved to be impractical and it was eventually reversed to the original situation comprising decentralised zones.

Unfortunately the belief that the destruction of certain species of 'vermin' would aid in the conservation of other species has resulted in the present-day situation where, for example, the wild dog *Lycaon pictus* has virtually been eliminated from the country.

The inclusion of amphibians and reptiles in the Game and Fish Preservation Act took place in 1938 and it was not until 1941 that legislation was passed to protect trees, grasses and other products of the soil. Although special protection was given to exploitable timber species in 1929 it was not until 1975 that a list of rare or endangered plant species was given equivalent status to that of royal game.

THE TSETSE FLY STORY

One of the most controversial issues with regard to game conservation in Rhodesia dates back to 1930. With the realisation that game species were intermediate hosts together with tsetse flies as carriers of a trypanosome deadly to cattle, the Tsetse Fly Act was passed and previous hunting restrictions on large tracts of land were lifted.

TABLE 1
HISTORY OF CONSERVATION LEGISLATION

Year	Act	Major features
1891	Game Law Amendment Act	Certain mammal species listed for protection.
1899	Game Preservation Ordinance Act	26 administrative districts, each listing (a) which mammals are protected; (b) which mammals could be hunted.
1906	Game Preservation Ordinance Amendment Act	Royal game status conferred on certain species.
1913	Herbage Preservation Ordinance	Prevention of destruction to vegetation by fire; removal of trees at discretion of owner.
1927	Water Act	Prohibition of tree felling less than 100 m from water's edge.
1929	Game & Fish Preservation Act	Designation of land for preservation of natural communities; lawful hunting methods prescribed; certain species declared vermin with rewards offered for their destruction; controls on fish exploitation.
1929	Nature Reserves Forest Produce Act	Controls on exploitation of indigenous and plantation timber.
1930	Tsetse Fly Act	Designation of hunting areas for complete elimination of game animals (tsetse fly hosts); cancellation of former restricted hunting areas.
1931-1935	Game & Fish Preservation Act Amendments	Proclamation of 9 game reserves; increased powers of law enforcement; introduction of prescribed management practices such as veld burning and vermin control.
1935-1940	Game & Fish Preservation Act Amendments	Protection of certain amphibians and reptiles.
1941	Natural Resources Act	Protection of landscapes and scenery for their aesthetic appeal and scenic value; emphasis on protection of trees, grasses and soils; conservation education.
1947-1949	Game & Fish Preservation Act Amendments	Game wardens appointed for law enforcement; first controls on utilisation of certain areas by tourists; veld management regulations.
1949-1953	National Parks Act	Establishment of Government Department of National Parks; two types of nature reserve; (a) <i>National Parks</i> —mainly for outdoor recreation and protection of spectacular landscapes; (b) <i>Game Reserves</i> —specifically provided for the protection and viewing of wild animal life.

TABLE 1—*contd.*

Year	Act	Major features
1954	Federal National Parks Act	Administration of all national parks in Rhodesia, Northern Rhodesia (Zambia) and Nyasaland (Malawi); 14 national parks in Rhodesia covering ca 2 million ha of land. Establishment of government department designated as 'Game Department' personnel responsible for control of 'Big Game' species in farming areas and tsetse fly zones. Further controls on fish exploitation. Amalgamation of National Parks and Game Departments; combined jurisdiction over 13 national parks, 8 game reserves and 5 controlled hunting areas. Improved controls on trapping methods. Controls on the exploitation of bees. Decentralisation of authority to intensive conservation areas where the utilisation of wild life is under the control of land owners; certain plant species given equivalent status to that of royal game; redesignation of certain conservation areas for specific types of tourist utilisation; jurisdiction over 67 conservation areas covering 11.8% of the total land area of Rhodesia (see Appendices 1-5).
1960	Wild Life Conservation Act	
1961	Fish Conservation Act	
1963	Parks & Wild Life Act	
1973	Trapping of Animals Act	
1974	Bees Act	
1975	Parks & Wild Life Act	

Large-scale hunting operations were initiated in an attempt to eradicate this pest and fences were erected to control the movement of game species from wild areas into cattle ranches.

In 1953 it was pointed out that since the start of operations 550,597 game animals had been shot in an attempt to control the tsetse fly but little had been done to utilise and exploit this resource for food, profit or recreation. As a result of a major public outcry, some of the areas were opened to public hunting, a move which had drastic consequences. Many inexperienced hunters took to the field to shoot big game species and the numbers of wounded elephant and buffalo reached alarming proportions. This prompted the employment of professional hunters to control the dangerous species of game and members of the Game Department became responsible for this part of tsetse fly operations.

In 1954 public criticism of the game destruction resulted in a commission of enquiry being set up, which urged that adequate reserves be established to preserve game before it was too late, and that hunting operations be curtailed. In response to this action other measures of tsetse fly control were attempted, including the clearing of riverine vegetation, and experiments on the blood meals of the fly. By 1964 a clear pattern of host specificity emerged and a field trial proved that selective hunting on certain favoured host game species could work. This provided the basis for the re-introduction of hunting measures to recover the situation, which had deteriorated badly following the cessation of hunting and had allowed a rapid re-invasion by the tsetse fly. A series of fenced corridors were established, forming boundaries between farms and wild areas, and the hunting of selected game species was carried out within them. In addition, ground insecticide spraying operations were begun in certain habitat types favoured by the fly and marked progress was made in its eradication. The residual effect of the spraying operations, however, may have serious detrimental effects on other organisms and indeed on the entire ecosystem in the long term.

An important factor which emerged from the hunting operations was the exceptional ability of game populations to re-invade and re-populate the previously hunted areas in a relatively short space of time.

PLANNING AND MANAGEMENT

The aims and objectives of conservation in Rhodesia (after Child, 1977)

To ensure the survival of representative biotic communities the following steps have been recommended:

(a) A survey by 'experts' to select and demarcate areas containing all representative biotic communities for their future conservation.

(b) The promulgation of an effective Wild Life Act and the utilisation of competent law enforcement officers to protect all community components against destruction by the direct activities of man.

(c) The formulation of management plans to zone areas for specific uses, to catalogue community components and to devise work-plans covering investigational and management procedures.

(d) The instigation of specific research projects on wildlife communities to establish the key environmental factors which directly affect their stability.

(e) In combination with (d), the instigation of effective monitoring procedures to ensure that communities are relatively stable and able to maintain themselves over long periods of time, and to regenerate and replace themselves without further marked change.

(f) To ensure that land-use practices in areas surrounding small isolated communities do not indirectly affect their stability.

(g) To ensure that management policies remain as flexible as possible so that in the event of any unforeseen occurrences management practices can be altered to suit the changing condition.

(h) The establishment of a computerised model to gain a clearer and better definition of research requirements and a greater understanding of the complexity of ecosystems. The objective would be to predict the effect of certain management practices on the ecosystem.

Protected areas

A total area of 4,649,696 ha or 11.8% of Rhodesia has been set aside for conservation purposes. There are nine *National Parks* and two *Special National Parks* (Rhodes' Estates) covering an area of 2,687,395 ha (58% of all conservation areas), nine *Recreational Parks* covering 39,928 ha (0.86%), four *Animal Sanctuaries* covering 14,440 ha (0.31%), 15 *Safari Areas* covering 1,896,397 ha (40.82%) and 28 *Botanical Reserves and Gardens* covering 7,536 ha (0.16%). Figure 1 depicts these areas with the exception of Botanical Reserves, which have been omitted owing to their small size. Appendices 1-5 outline the areas which have been set aside for conservation purposes in terms of their size, floristic and faunistic components, planning stage, conservation and management status under the Parks and Wild Life Act (1975).

The purposes for which these areas have been set aside can be defined as follows:

National Parks: Areas comprising large expanses of land, relatively untouched by man's influence, and comprising diverse plant and animal communities. The main objective in these areas is to preserve and protect representative examples of all the major indigenous biotic communities which occur throughout the country.

Recreational Parks: Areas which are normally situated in close proximity to urban centres and include features (such as dams) which have the potential for a wide range of outdoor recreational activities.

Animal Sanctuaries: Areas which contain unusually diverse, abundant or rare animal species.

Botanical Reserves: Areas which contain rare or endangered indigenous plants.

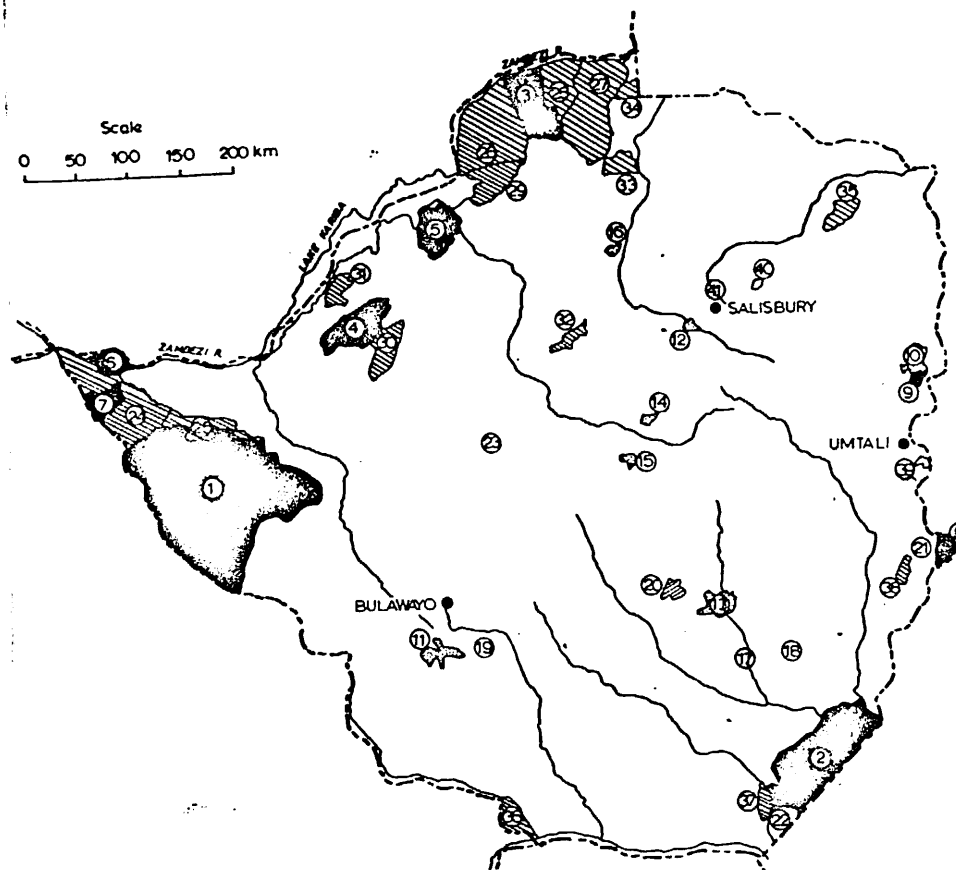


Fig. 1. Conservation areas. (Refer to Appendices 1-3 for area names corresponding to numbers.)

Botanical Gardens: Areas set aside for the purpose of propagating both indigenous and exotic plant species for the enjoyment of the public.

Safari Areas: Large areas provided specifically for outdoor recreational pursuits such as camping, sport hunting, fishing, photography, game viewing and bird watching.

Zonation

Budowski (1976) stated that past experience, particularly in those countries where tourism based on nature had increased dramatically, clearly showed that most former projections of tourist impacts were inaccurate. All too often there had been no assessment, because the value of keeping natural areas as much as possible in their natural state was not recognised. Now the situation has changed and in some parks

of the USA; for example, buildings that had been erected for tourist accommodation are being torn down, motor traffic is being restricted and the impact of tourism is being reduced or otherwise controlled. The intention is not so much to limit the flow of visitors but rather to redistribute them in space and time.

In full recognition of the above possible eventuality and in order to cater for the long-term future of Rhodesian Conservation Areas, a programme of park zonation for specific types of utilisation has been initiated. Four categories of area utilisation are recognised, namely Special Conservation Areas, Wilderness Areas, Wild Areas and Development Areas.

Special Conservation Areas. Special Conservation Areas are set aside for

- (a) the preservation of especially valuable ecosystems and their components;
- (b) the setting aside of witness stands of vegetation;
- (c) safeguarding special breeding areas of vertebrates;
- (d) the protection of species of limited distribution; and
- (e) for particular scientific research.

Entry to these areas is strictly controlled and is only for scientific reasons.

Wilderness Areas. Wilderness Areas are natural areas of such a size as to contain as far as possible the complete flora and fauna of that part of the park in which they are situated. In other words, these are complete functional systems which contain a biotic community capable of maintaining homeostasis without interference from outside sources. They bear no more than incidental signs of occupation by man and are designed to cater for the genuine wildlife enthusiast or persons who are prepared to walk and camp under conditions of minimum comfort.

Wild Areas. Wild Areas are areas serviced by roads for use by vehicles with designated stopping places, buildings comprising rustic bush camps made from natural materials and hides situated adjacent to areas where wild animals are known to congregate, such as watering places. Signposted foot and horse trails are established in suitable parts of these areas and tourists are allowed to leave their vehicles when accompanied by a professional guide, or by an employee of the Department of National Parks. The management of biological communities is carried out in these areas where and when necessary.

Development Areas. Development Areas are set aside for the construction of hotels, camping grounds, caravan parks, staff offices, picnic sites, trading areas and airfields. These areas will normally be sited at the extremities of parks so that access can be controlled in order to prevent the encroachment of intensive development and deterioration of the natural atmosphere of the other zones.

The overall aim is to zone the areas so that the intensity of human intervention declines from Development Areas through Wild and Wilderness Areas to Special Conservation Areas.

Applied management

Fire. Fire has long been recognised as having a profound effect on African plant communities and among its more important management uses it can be applied to suppress the encroachment of woody growth into grasslands, remove accumulated dead vegetation and promote 'out of season' food (green grass) for ungulates. Uncontrolled fires, however, are regarded as the greatest single threat to long term productivity, and accordingly conservation areas are divided into a number of fire management blocks bordered by fire-breaks where possible.

Animal capture and translocation

Operation 'Noah' was acclaimed throughout the world when a handful of rangers rescued no less than 4,957 animals which were trapped on islands by the rising waters of the newly constructed Lake Kariba. The re-introduction of the white rhinoceros *Ceratotherium simum* into Rhodesia from South Africa in a combined operation, has been an outstanding success and certain areas have already reached the stage where animals can safely be captured and introduced into other areas (Tomlinson, 1977). Equally successful has been the capture and re-location of some 41 black rhinoceros *Diceros bicornis*, from an area where poaching activities threatened their continued existence, to the safety of the Gona re Zhou National Park.

As a result of tsetse fly operations and poaching activities, the Lichtenstein hartebeest *Alcelaphus lichtensteini* was reduced to extremely low numbers in the southeast of the country. A capture operation was mounted in neighbouring Mozambique and a total of 59 adults were successfully re-introduced to the Gona re Zhou.

Livestock and man-eating crocodiles in farming areas are often captured and translocated to conservation areas, as are many other animal species too numerous to mention here.

Animal population reduction

In some areas there have been some notable and marked changes in plant communities as a result of their utilisation by elephants. This has resulted in a decision to initiate a series of culls to remove the proportion considered excessive for the available food resource and a threat to certain rare plant communities. Recently an attempt has been made to capture as many young elephants as possible during culling operations for subsequent sale and translocation to other parts of the world. Population reduction exercises on other species have taken place in some areas but, as a matter of policy, the trend today is to capture where possible, rather than to shoot.

Biological research

The Department employs 14 terrestrial research officers and eight fisheries research officers whose primary commitment is to offer advice based on appropriate

research and to safeguard representative samples of scientifically important ecosystems.

DISCUSSION

A combined staff complement of about 800 personnel backed by the National Parks Act (1975) augurs well for the future of nature conservation in the country in spite of some notable problems.

It is important to recognise that conservation areas zoned for tourists are set aside primarily for man. However, planning policy must not only provide for man's needs but also ensure the maintenance of ecological stability.

In order to demonstrate the need for ecologically based planning, Matusadona National Park is discussed here as a case history.

Geologically, the park is divided by an escarpment of paragneiss which runs in an east-west direction, providing a plateau in the south and dropping northwards (± 300 m) to part of the Zambesi River valley which includes an extensive area of relatively flat sandstone country bordering Lake Kariba in a series of uneven inlets and peninsulas. There is a relatively sharp vegetation ecotone (Fig. 2) along the escarpment where 'parklike' *Julbernardia globiflora* woodlands dominate the upper plateau and mopane/*Combretum* thickets dominate the valley floor. *Panicum repens*, a highly palatable grass species, forms a narrow belt along the shoreline.

The woodlands on the plateau have a fauna which differs from that of the mopane/*Combretum* thickets, although some of the larger species are capable of using both communities. A major limiting factor to species distribution in the tropics is the phenomenon of the wet and dry seasons which influence the availability of water. Lake Kariba provides a permanent supply of open water and, in combination with the presence of *Panicum repens*, has a marked influence on the distribution and movements of certain large game species.

A *Wilderness* area has been designated on the plateau and a *Wild* area below it, with the escarpment providing a boundary between the two zones (Fig. 2). This enables Wilderness users to enjoy an entirely different experience from those using the Wild area. The shoreline offers opportunities for viewing large numbers of ungulates, especially elephant and buffalo, but these are not seen by Wilderness users. Visitors using vehicles in the Wild area will, however, be able to see the large herds of big game, but will not be able to enjoy the wide variety of panoramic views of Kariba or encounter the fauna and flora restricted to the plateau.

In addition, in order to cater for the entrance road and utilisation of the Bumi River by fishermen, two long thin strips of Wild area have been designated along these features (Fig. 2). This type of planning is merely for convenience and ignores the needs of Wilderness users. Users of the Wild area are again given priority over Wilderness users, since they have both the entire river courses at their disposal, but

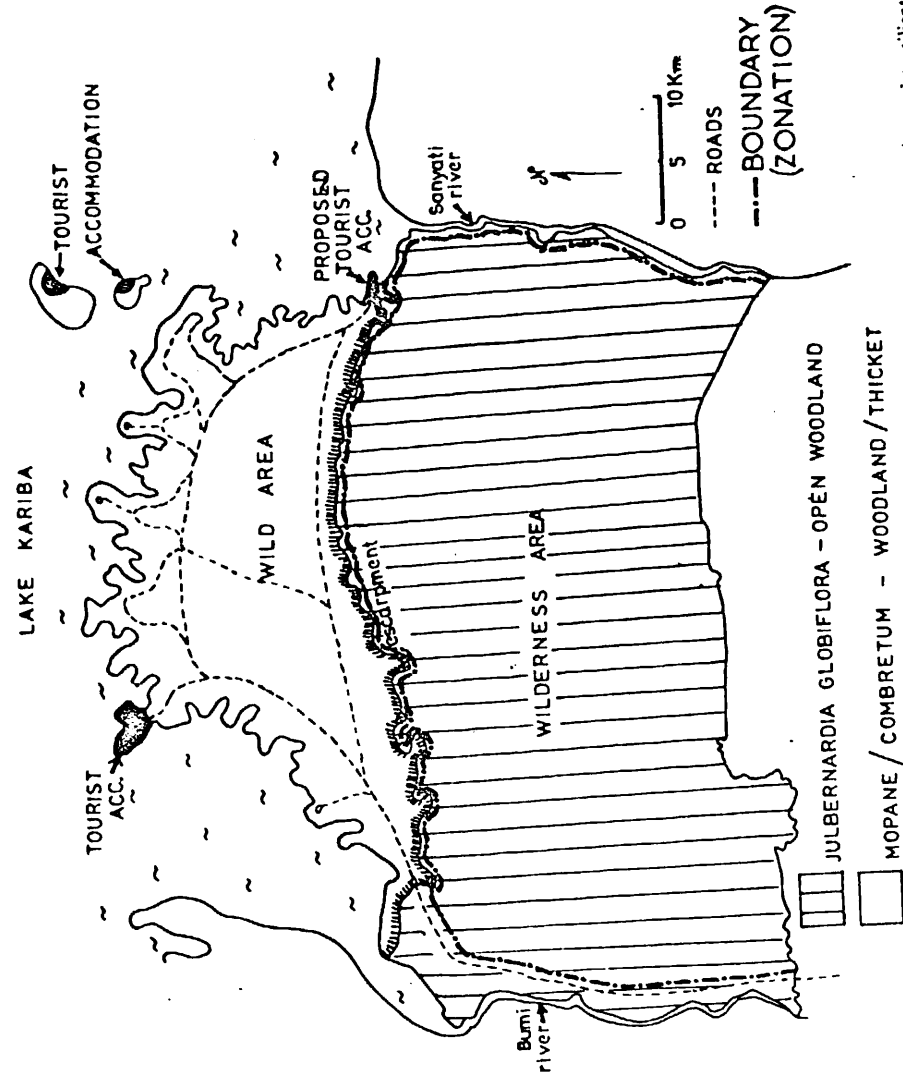


Fig. 2. Matusadona National Park showing major vegetation types and the existing plan of zonation for tourist utilisation.

only a small portion of the *Julbernardia* community. Since large game also concentrate on rivers during the dry season, Wilderness users are also denied the opportunity of walking along an undisturbed river course.

In order to provide equal opportunities for the different needs of tourists and to ensure that the area is zoned in accordance with sound ecological principles, it is suggested that the zones should be arranged as depicted in Fig. 3. In addition, a portion of the lake adjacent to the shoreline (Fig. 3) should be given Wilderness status and power-boating prohibited. At present no such plans have been recommended and the entire shoreline will be accessible to boating activities.

No islands have been designated as part of the National Park and it is suggested that at least one is declared a Wilderness area and kept free from man's influence. The two islands depicted in Fig. 3 are both zoned for the development of tourist facilities by private enterprise.

Another common aspect of conservation policy which has disadvantages is the positioning of park boundaries along river courses. Matusadona illustrates this type of planning because both its eastern and western boundaries are situated on the Sanyati and Bume rivers respectively. Administrative difficulties arise because, with no restrictions on one side of the river, it is impossible to control and manage the aquatic resources. Accordingly, it is proposed that some form of servitude zone be designated along the outside river boundary and afforded National Park status (Fig. 3).

Two points (A and B—Fig. 3) are proposed where entrance to the Wilderness area could be controlled and from where tourists could start on inland foot trails or canoe trails along the shoreline.

Cahalane (1952) pointed out that the provision of resort facilities within park space attracts those people interested in these facilities and repulses those seeking wilderness. Development areas should therefore also cater for the needs of those people who have no interest in Wilderness. The addition of such facilities to existing tourist accommodation cannot be considered as having any further detrimental effect on the 'naturalness' of the area than the accommodation units themselves.

Finally Van Riet (1971) emphasises the need for micro-climate investigation when considering the siting of accommodation units for tourists. This is relevant to Matusadona where two development areas have been planned in the Wild area (Fig. 2). There is a mean annual temperature difference of ca 3°C between the top and bottom of the escarpment. The lower lying areas are the hottest and the accommodation units are sited within thickets, where game cannot be viewed easily and air flow is also impeded.

CONCLUSIONS

1. There is a need for greater ecological knowledge on wildlife conservation in Rhodesia in order to improve the quality of decision-making.

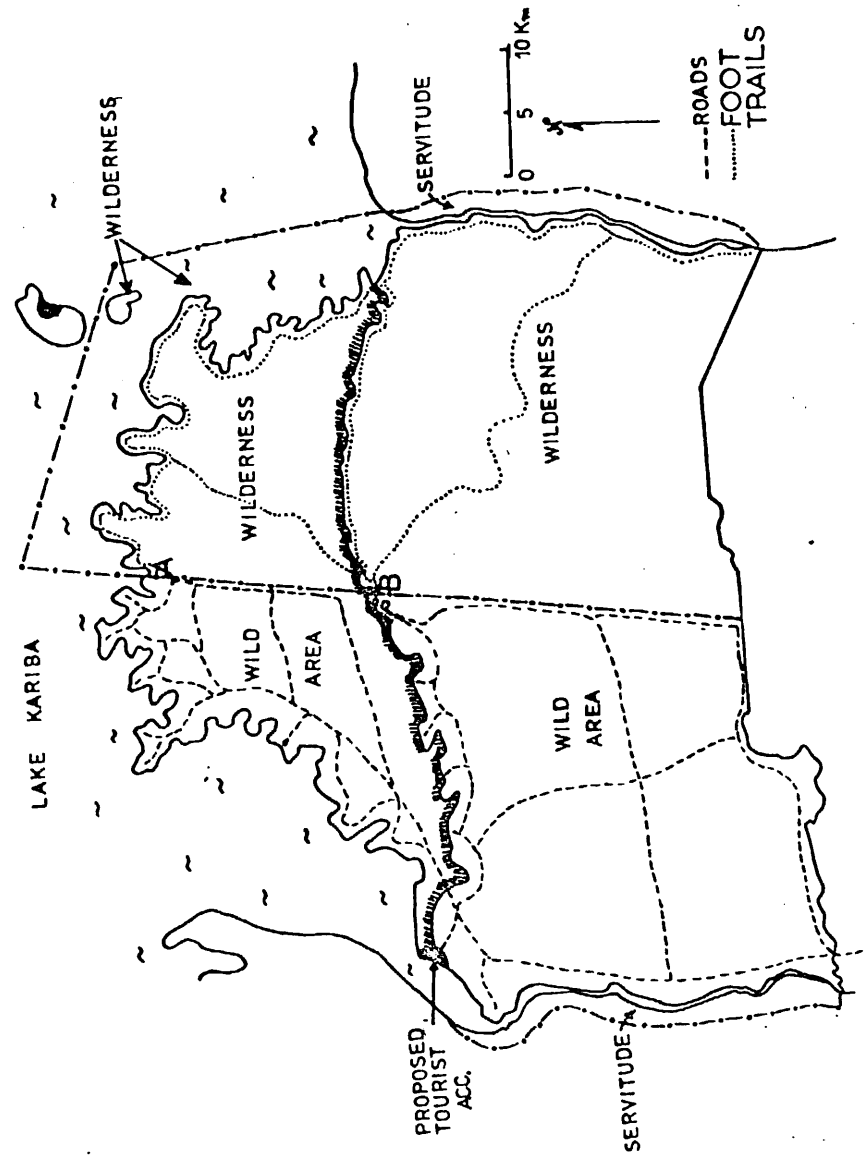


Fig. 3. Matusadona National Park showing proposed alternative plan of zonation for tourist utilisation. A & B = administrative control points facilitating movements to and from Wild and Wilderness areas.

2. The future aims and objectives are designed to ensure that representative areas of the entire range of ecosystems are conserved and in line with the IUCN recommendations. Approximately 12% of the entire land surface has been set aside for conservation purposes.

3. Recent changes in management policy have made possible the capture and translocation of a wide variety of species, to many different parts of the country, and also elsewhere in the world.

4. Further consideration should be given to the needs of tourists to enable them to make contact with, and enjoy, a wider range of biotic communities.

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APPENDIX I
NATIONAL PARKS

No. (See Fig. 1)	Conservation area	Size (ha)	Major features	Major plant communities	Vulnerable terrestrial populations	Planning items				Conservation/management measures
						SCA	W/A	W/A	DA	
1	Wankie National Park	1465100	Large concentrations of big game species	<i>Baobab-Cambrium Terminalia</i> <i>Brachycolapogon</i> Woodlands & scrub savanna	Elephant, buffalo, giraffe, eland, large predators, black & white rhino (re-introduced). Diverse species representation. Black rhino (reintroduced) Elephant—large tusked, Nyala, suni, hippo, hartebeest. Diverse species representation. Diverse species representation. Hippo, buffalo, black rhino, eland, impala, large predators, crocodile, significant avifauna.	—	✓	✓	—	History of timber logging. Animal reduction, erosion control, pumped water, fire control. Riverine vegetation damage by elephant. Animal reduction. Limited pumped water supplies. Excessive utilization of flood plain by herbivores. Animal reduction. Severe elephant and fire damage to woody species. Animal reduction. Thicket damage. Animal reduction. Logging history. Animal reduction. Pumped water, erosion control, fire control. Development of permanent footpaths at Falls. Secure, underutilized, fire control. No resident staff—managed as part of Maletui Wildlife Area. Fire damage. Largely wilderness. Fire damage. Burning management.
2	Gonarezhou National Park	496400	Large concentrations of big game. Scenic riverine landscapes.	<i>Colapogon-savanna</i> and <i>Andriopachy</i> woodlands. Riverine woodlands.	Elephant, buffalo, giraffe, eland, large predators, black & white rhino (re-introduced). Diverse species representation. Black rhino (reintroduced) Elephant—large tusked, Nyala, suni, hippo, hartebeest. Diverse species representation. Diverse species representation. Hippo, buffalo, black rhino, eland, impala, large predators, crocodile, significant avifauna.	—	✓	✓	—	History of timber logging. Animal reduction, erosion control, pumped water, fire control. Riverine vegetation damage by elephant. Animal reduction. Limited pumped water supplies. Excessive utilization of flood plain by herbivores. Animal reduction. Severe elephant and fire damage to woody species. Animal reduction. Thicket damage. Animal reduction. Logging history. Animal reduction. Pumped water, erosion control, fire control. Development of permanent footpaths at Falls. Secure, underutilized, fire control. No resident staff—managed as part of Maletui Wildlife Area. Fire damage. Largely wilderness. Fire damage. Burning management.
3	Mana Pools National Park	219600	Large concentrations of big game. Scenic flood plain vegetation communities.	<i>Commiphora-Cambrium</i> thickets, <i>Colapogon</i> <i>Acacia</i> woodlands. Riverine woodlands.	Elephant, buffalo, giraffe, eland, large predators, black & white rhino (re-introduced). Diverse species representation. Black rhino (reintroduced) Elephant—large tusked, Nyala, suni, hippo, hartebeest. Diverse species representation. Diverse species representation. Hippo, buffalo, black rhino, eland, impala, large predators, crocodile, significant avifauna.	—	✓	✓	—	History of timber logging. Animal reduction, erosion control, pumped water, fire control. Riverine vegetation damage by elephant. Animal reduction. Limited pumped water supplies. Excessive utilization of flood plain by herbivores. Animal reduction. Severe elephant and fire damage to woody species. Animal reduction. Thicket damage. Animal reduction. Logging history. Animal reduction. Pumped water, erosion control, fire control. Development of permanent footpaths at Falls. Secure, underutilized, fire control. No resident staff—managed as part of Maletui Wildlife Area. Fire damage. Largely wilderness. Fire damage. Burning management.
4	Chavara National Park	191000	Large variety of big game. Scenic escarpment. Perennial streams.	<i>Brachycolapogon</i> woodland and scrub savanna.	Elephant, buffalo, giraffe, eland, large predators, black & white rhino (re-introduced). Diverse species representation. Black rhino (reintroduced) Elephant—large tusked, Nyala, suni, hippo, hartebeest. Diverse species representation. Diverse species representation. Hippo, buffalo, black rhino, eland, impala, large predators, crocodile, significant avifauna.	—	✓	✓	—	History of timber logging. Animal reduction, erosion control, pumped water, fire control. Riverine vegetation damage by elephant. Animal reduction. Limited pumped water supplies. Excessive utilization of flood plain by herbivores. Animal reduction. Severe elephant and fire damage to woody species. Animal reduction. Thicket damage. Animal reduction. Logging history. Animal reduction. Pumped water, erosion control, fire control. Development of permanent footpaths at Falls. Secure, underutilized, fire control. No resident staff—managed as part of Maletui Wildlife Area. Fire damage. Largely wilderness. Fire damage. Burning management.
5	Matudona National Park	137000	Big game, scenic lake/hummocky landscape. Diverse fish populations, Zambesi escarpment.	<i>Commiphora-Cambrium</i> thickets, <i>Colapogon</i> <i>Acacia</i> woodlands. Riverine woodlands.	Elephant, buffalo, giraffe, eland, large predators, black & white rhino (re-introduced). Diverse species representation. Black rhino (reintroduced) Elephant—large tusked, Nyala, suni, hippo, hartebeest. Diverse species representation. Diverse species representation. Hippo, buffalo, black rhino, eland, impala, large predators, crocodile, significant avifauna.	—	✓	✓	—	History of timber logging. Animal reduction, erosion control, pumped water, fire control. Riverine vegetation damage by elephant. Animal reduction. Limited pumped water supplies. Excessive utilization of flood plain by herbivores. Animal reduction. Severe elephant and fire damage to woody species. Animal reduction. Thicket damage. Animal reduction. Logging history. Animal reduction. Pumped water, erosion control, fire control. Development of permanent footpaths at Falls. Secure, underutilized, fire control. No resident staff—managed as part of Maletui Wildlife Area. Fire damage. Largely wilderness. Fire damage. Burning management.
6	Victoria Falls National Park	57300	Spectacular falls. Rain forest. Zambesi river frontage with big game	<i>Rain Forest-Culapogon</i> , <i>Brachycolapogon</i> and <i>Bauhinia</i> woodlands.	Elephant, buffalo, giraffe, eland, large predators, black & white rhino (re-introduced). Diverse species representation. Black rhino (reintroduced) Elephant—large tusked, Nyala, suni, hippo, hartebeest. Diverse species representation. Diverse species representation. Hippo, buffalo, black rhino, eland, impala, large predators, crocodile, significant avifauna.	—	✓	✓	—	History of timber logging. Animal reduction, erosion control, pumped water, fire control. Riverine vegetation damage by elephant. Animal reduction. Limited pumped water supplies. Excessive utilization of flood plain by herbivores. Animal reduction. Severe elephant and fire damage to woody species. Animal reduction. Thicket damage. Animal reduction. Logging history. Animal reduction. Pumped water, erosion control, fire control. Development of permanent footpaths at Falls. Secure, underutilized, fire control. No resident staff—managed as part of Maletui Wildlife Area. Fire damage. Largely wilderness. Fire damage. Burning management.
7	Kuombok National Park	31290	Open grassland savanna with large plain. Rare ungulate species with seasonal avifauna.	<i>Aurora savanna</i> grassland.	Elephant, buffalo, giraffe, eland, large predators, black & white rhino (re-introduced). Diverse species representation. Black rhino (reintroduced) Elephant—large tusked, Nyala, suni, hippo, hartebeest. Diverse species representation. Diverse species representation. Hippo, buffalo, black rhino, eland, impala, large predators, crocodile, significant avifauna.	—	✓	✓	—	History of timber logging. Animal reduction, erosion control, pumped water, fire control. Riverine vegetation damage by elephant. Animal reduction. Limited pumped water supplies. Excessive utilization of flood plain by herbivores. Animal reduction. Severe elephant and fire damage to woody species. Animal reduction. Thicket damage. Animal reduction. Logging history. Animal reduction. Pumped water, erosion control, fire control. Development of permanent footpaths at Falls. Secure, underutilized, fire control. No resident staff—managed as part of Maletui Wildlife Area. Fire damage. Largely wilderness. Fire damage. Burning management.
8	Chumanimani National Park	17110	Unspoiled scenery. Montane wilderness, perennial streams.	Dry submontane forest and grasslands. Broad species diversity. Endemism (<i>Pardaliparus</i>).	Elephant, buffalo, giraffe, eland, large predators, black & white rhino (re-introduced). Diverse species representation. Black rhino (reintroduced) Elephant—large tusked, Nyala, suni, hippo, hartebeest. Diverse species representation. Diverse species representation. Hippo, buffalo, black rhino, eland, impala, large predators, crocodile, significant avifauna.	—	✓	✓	—	History of timber logging. Animal reduction, erosion control, pumped water, fire control. Riverine vegetation damage by elephant. Animal reduction. Limited pumped water supplies. Excessive utilization of flood plain by herbivores. Animal reduction. Severe elephant and fire damage to woody species. Animal reduction. Thicket damage. Animal reduction. Logging history. Animal reduction. Pumped water, erosion control, fire control. Development of permanent footpaths at Falls. Secure, underutilized, fire control. No resident staff—managed as part of Maletui Wildlife Area. Fire damage. Largely wilderness. Fire damage. Burning management.
9	Mituzzi Falls National Park	2495	Montane landscapes. Spectacular falls, scenic.	Moist and dry sub-montane forests, grasslands and heathlike sub-montane scrub, endemism.	Elephant, buffalo, giraffe, eland, large predators, black & white rhino (re-introduced). Diverse species representation. Black rhino (reintroduced) Elephant—large tusked, Nyala, suni, hippo, hartebeest. Diverse species representation. Diverse species representation. Hippo, buffalo, black rhino, eland, impala, large predators, crocodile, significant avifauna.	—	✓	✓	—	History of timber logging. Animal reduction, erosion control, pumped water, fire control. Riverine vegetation damage by elephant. Animal reduction. Limited pumped water supplies. Excessive utilization of flood plain by herbivores. Animal reduction. Severe elephant and fire damage to woody species. Animal reduction. Thicket damage. Animal reduction. Logging history. Animal reduction. Pumped water, erosion control, fire control. Development of permanent footpaths at Falls. Secure, underutilized, fire control. No resident staff—managed as part of Maletui Wildlife Area. Fire damage. Largely wilderness. Fire damage. Burning management.
10	Isiyanga Special National Park	28990	Montane landscapes (modified) trout fishing. High intensity recreation.	Moist and dry sub-montane forests, grasslands and heathlike sub-montane scrub, endemism.	Elephant, buffalo, giraffe, eland, large predators, black & white rhino (re-introduced). Diverse species representation. Black rhino (reintroduced) Elephant—large tusked, Nyala, suni, hippo, hartebeest. Diverse species representation. Diverse species representation. Hippo, buffalo, black rhino, eland, impala, large predators, crocodile, significant avifauna.	—	✓	✓	—	History of timber logging. Animal reduction, erosion control, pumped water, fire control. Riverine vegetation damage by elephant. Animal reduction. Limited pumped water supplies. Excessive utilization of flood plain by herbivores. Animal reduction. Severe elephant and fire damage to woody species. Animal reduction. Thicket damage. Animal reduction. Logging history. Animal reduction. Pumped water, erosion control, fire control. Development of permanent footpaths at Falls. Secure, underutilized, fire control. No resident staff—managed as part of Maletui Wildlife Area. Fire damage. Largely wilderness. Fire damage. Burning management.
11	Matopos Special National Park	44200	Huge granite outcrops. Scenic vegetation formations. Historical. High intensity recreation. Fenced game enclosure.	Variable woodland associated with boulder strewn granite hills and valley grassland (Afr-app).	Elephant, buffalo, giraffe, eland, large predators, black & white rhino (re-introduced). Diverse species representation. Black rhino (reintroduced) Elephant—large tusked, Nyala, suni, hippo, hartebeest. Diverse species representation. Diverse species representation. Hippo, buffalo, black rhino, eland, impala, large predators, crocodile, significant avifauna.	—	✓	✓	—	History of timber logging. Animal reduction, erosion control, pumped water, fire control. Riverine vegetation damage by elephant. Animal reduction. Limited pumped water supplies. Excessive utilization of flood plain by herbivores. Animal reduction. Severe elephant and fire damage to woody species. Animal reduction. Thicket damage. Animal reduction. Logging history. Animal reduction. Pumped water, erosion control, fire control. Development of permanent footpaths at Falls. Secure, underutilized, fire control. No resident staff—managed as part of Maletui Wildlife Area. Fire damage. Largely wilderness. Fire damage. Burning management.

Note: SCA = Special Conservation Area.
W/A = Wilderness Area.
WA = Wild Area.
DA = Development Area.
Kopje = Granite Inselberg.

APPENDIX 4
BOTANICAL RESERVES (NOT DEPICTED ON MAP*)

Botanical reserve	Size (ha)	Plant community	Conservation and management status
Pioneer Tolo	38	<i>Schofia brachypetala</i>	Secure within Tuli Safari Area.
South Camp	44	<i>Acacia galepinii</i>	Secure within Tuli Safari Area.
Chirinda Forest	26	<i>Xanthocercis zambesiaca</i>	Secure within Tuli Safari Area.
Banti Yellow-wood ^a	949	Montane forest. Diverse species.	Secure—unique evergreen forest with tropical affinities.
Stapleford Cycad ^a	175	<i>Podocarpus milanjianus</i>	Secure. Management plans to be formulated.
Sebakwe Acacia ^b	212	<i>Euclea natalensis</i>	Secure. Management plans to be formulated.
Sebakwe Great Dyke	60	<i>Acacia karoo</i>	Secure within Sebakwe Recreational Park.
Sebakwe Mountain Acacia ^b	165	Serpentine Grassland	Secure within Sebakwe Recreational Park.
Chisekera Hot Springs ^a	53	<i>Brachystegia glaucescens</i>	Secure. Management plans to be formulated.
Tingwa Raphia Palm ^a	94	<i>Acrostichum aureum</i>	Secure. Management plans to be formulated.
Muzoe ^a	34	<i>Raphia farinifera</i>	Secure. Management plans to be formulated.
Bunga Forest	8	<i>Brachystegia glaucescens</i>	Secure. Adjacent to Vumba Botanical Garden.
Shushi Mulala Palm ^a	39	Montane forest. Diverse species.	Surrounded by rapidly expanding human populations.
Chingwarara Cycad ^a	300	<i>Hyaene benguelensis</i>	Surrounded by rapidly expanding human populations.
Kubarakawana ^a	256	<i>Euclea natalensis</i>	Surrounded by rapidly expanding human populations.
Marishira ^a	2	<i>Oxytenanthera abyssinica</i>	Surrounded by rapidly expanding human populations.
Nyangwe ^a	2	<i>Oxytenanthera abyssinica</i>	Surrounded by rapidly expanding human populations.
Pungwe Bridge Forest ^a	8	Low altitude evergreen forest	Surrounded by rapidly expanding human populations.
Rumise ^a	14	Low altitude evergreen forest	Surrounded by rapidly expanding human populations.
Togwe ^a	39	Low altitude evergreen forest	Surrounded by rapidly expanding human populations.
Haroni Forest ^a	4	<i>Oxytenanthera abyssinica</i>	Surrounded by rapidly expanding human populations.
Rusitu Forest ^a	20	Low altitude closed forest	Surrounded by rapidly expanding human populations.
	150	Low altitude closed forest	Surrounded by rapidly expanding human populations.

* Where Botanical reserves occur outside of other conserved categories of land, protection is nominal and usually not supported by presence of staff or even fencing.

^b Not worthy of this status and will in due course be deproclaimed.

APPENDIX 5

SCIENTIFIC NAMES FOR SPECIES LISTED IN COLUMN 6 OF APPENDICES 1-3

Local English name	Scientific name
MAMMALS	
Elephant	<i>Loxodonta africana</i> (Blumenbach 1797)
Black rhino	<i>Diceros bicornis</i> (Linnaeus 1758)
White rhino	<i>Ceratotherium simum</i> (Burchell 1817)
Hippo	<i>Hippopotamus amphibius</i> Linnaeus 1758
Giraffe	<i>Giraffa camelopardalis</i> (Linnaeus 1758)
Buffalo	<i>Syncerus caffer</i> (Sparrman 1779)
Eland	<i>Taurotragus oryx</i> Pallas 1766
Kudu	<i>Tragelaphus strepsiceros</i> Pallas 1766
Nyala	<i>Tragelaphus angasi</i> Grey 1849
Bushbuck	<i>Tragelaphus scriptus</i> (Gray 1852)
Wildebeeste	<i>Connochaetes taurinus</i> Burchell 1823
Sable	<i>Hippotragus niger</i> Harris 1838
Roan	<i>Hippotragus equinus</i> Dollman & Burlace 1928
Waterbuck	<i>Kobus ellipsiprymnus</i> (Ogilby 1833)
Reedbuck	<i>Redunca arundinum</i> Boddaert 1785
Hartebeeste	<i>Alcelaphus lichtensteini</i> (Peters 1849)
Tsessebe	<i>Damaliscus lunatus</i> Burchell 1823
Gemsbok	<i>Oryx gazella</i> (Linnaeus 1758)
Impala	<i>Aepyceros melampus</i> (Lichtenstein 1812)
Klipspringer	<i>Oreotragus oreotragus</i> Noack 1899
Oribi	<i>Ourebia ourebi</i> Blain 1922
Blue duiker	<i>Cephalophus monticola</i> Matschie 1897
Leopard	<i>Panthera pardus</i> Linnaeus 1758
Hyrax	<i>Procavia capensis</i> (Pallas 1766)
Samango monkey	<i>Cercopithecus mitis</i> Grey 1849
BIRDS	
Fish eagle	<i>Haliaeetus vocifer</i> (Daudin 1800)
Black eagle	<i>Aquila verreauxi</i> Lesson 1830
Crowned eagle	<i>Stephanoaetus coronatus</i> (Linnaeus 1766)
REPTILES	
Crocodile	<i>Crocodylus niloticus</i> (Laurentis 1768)
FISH	
Tigerfish	<i>Hydrocynus vittatus</i> Cuvier 1819
Black bass	<i>Micropterus salmoides</i> (Lacepede 1802)
Bream	<i>Tilapia macrochloa</i>