Landscape domestication and cultural change: human ecology of the Cuvelai-Etosha region

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ABSTRACT

The landscape of the Cuvelai-Etosha region although changed dramatically with climate changes over the past 100 000 years, was only subtly changed by people over most of this period. About 2000 years ago, pastoralists migrated into southern Angola, possibly extending into the ancestral lands of the Hei//om and !Kung peoples who ranged over Ovamboland region for a possible 100 000 years BP. Rapid changes to the landscape started in the 17th century when Ovambo pastoralists and farmers moved southwards into this region, with livestock and agriculture aided by iron-smelting technology. What followed was a "domestication" of the landscape over a mere 300 years: selective removal of trees, cutting out *Colophospermum mopane, Combretum imberbe, Terminalia sericea* and *Spirostachys africana* hardwoods for homes and complex palisade fences and conserving major wild fruit bearing trees such as *Diospyros mespiliformis* and *Sclerocarya birrea* or *Hyphaene petersiana* palms. Even more rapid were changes following colonial expansion after the 1850's and particularly since 1900 with demarcation of political boundaries across ecological and cultural units of northern Ovamboland and southern Angola, road construction across drainage lines, warfare, labour migrancy and linkage into a wider cash economy. All of these have directly or indirectly impacted on the landscape of this region.

INTRODUCTION

Few visitors, planners or park managers travelling through the Ovamboland region or through Etosha National Park today can imagine the extent of regional landscape change that has occurred even over the past 300 years due to human influence. For many visitors to Etosha, most from urban backgrounds, national parks protect "benchmarks of pristine African wilderness". Similarly, to many travellers through Ovamboland, savannas of *Sclerocarya birrea* (marula, *omwoongo*) or *Schinziophyton rautanenii* (mangetti, *omunghete*) trees or *Hyphaene petersiana* (vegetable ivory palm, *omulunga*) palms are "natural" rather than being cultural landscapes vastly changed by human influence.

Still fewer people, whether visitors or most residents in the Ovamboland region could imagine landscapes over longer historical periods, let alone over geological time, yet creating conceptual models of past environments is an essential part of conservation planning. This is particularly important in Africa where there is such a long history of human influence. It is also very topical on a global scale when conservation planners face rapid climatic (and therefore biological) changes due to global warming.

This paper outlines direct human influence on the landscape and people of the Etosha and Ovamboland region. As such, it covers only part of the spectrum of language groups, lifestyles and landscapes in northern Namibia (Tinley 1971) and attention needs to be drawn to the excellent work documenting Himba-Herero ethnobotany (Malan & Owen-Smith 1974), material culture (Jacobsen 1988; 1990), archaeological work reflecting subsistence patterns of Khoe speaking peoples at Ugab river mouth within the past 1000 year (Kinahan 1991). As a detailed inventory of Kwanyama Ovambo ethnobotany has been done by Rodin (1985) and significant aspects of Ovambo architecture, basketry and knives have respectively been documented by Mills (1984), Shaw (1938) and Otto (1984), this paper gives an historical overview of the culture/nature interface in the Ovamboland region.

Perspective on the cultural and biological changes that have taken place is considered not only to be essential in understanding the past and present, but for research and planning for the future. It is useful to conceptualise these previous landscapes and contrast them with those of the present day. This in itself is a useful part of a conservation planning process, illustrating the dynamic nature of vegetation patterns and processes and human influence upon these. This is important to avoid the view that conservation is focussed on pristine habitats to be maintained as such over time. It is equally useful for national park managers to view conservation areas through the eyes of rural people, whether in terms of the symbolism and cultural significance of ancestral lands or plant and animal resources held within national parks.

DYNAMIC LANDSCAPES, MOBILE PEOPLE: WINDOW ON HISTORY

An increasing amount of biological and geomorphotogical evidence accumulated in the past two decades has given a reasonably clear understanding of patterns of climate change over the past 30000 years in southern Africa (Partridge 1988; Vogel & Rust 1986). Changes in Pleistocene climate (1.8 million - 10 000 BP), affected by expansions and shrinking of polar ice-caps resulted in long, cool dry periods alternating with shorter, warmer moist periods and subsequently resulted in changes in vegetation, wildlife and human interaction in the Cuvelai-Etosha region. Although few archaeological surveys have been conducted in this region, hunter-gatherers

are considered to have occupied the southern fringes of the Okavango Delta from 100 000 years ago (Campbell 1976). It is likely that the Cuvelai-Etosha region would have a similar history of hunter gatherer occupation by the Hei//om and !Kung peoples.

Approximately 100 000 - 120 000 years ago, small groups of hunter-gatherers are likely to have hunted or trapped mammals, fish and birds or gathered wild plant resources around the margins of a large ephemeral lake represented today by Etosha Pan (see Buch, this volume).

Until recently, however, the major changes to the landscape of the Cuvelai-Etosha area occurred not because of people, but due to paleoclimatic, erosion and deflation processes (see Buch, this volume). During most of the Holocene (from 10 000 years ago), human numbers were small and influence on the landscape slight. All would have added to, rather than reduced habitat diversity within landscape through creation of different ages and stages of savanna patch recovery after seasonal burns or fruit dispersal. Examples are the favoured fruits from trees such as *Strychnos cocculoides* (geelklapper, *omuini*) and *Strychnos pungens* (blouklapper, *omupwaka)* or wider establishment of groves of mass-fruiting, dioecious trees whose edible kernels provided a year-round food resource, particularly *Schinziophyton rautenenii* and *Sclerocarya birrea* trees. This too would have been a "patchy" change occurring on sandy soils favoured by these species, particularly sites near to surface water. Veld burning to stimulate production of edible corms from several *Lapeirousia (onyengelushe)* species in surrounding sandy woodlands may also have occurred.

Human densities may have been higher during humid periods of the Pleistocene, but were probably less than 0.05 person/km^2. Although no data are available for Ovamboland, range sizes of hunter-gatherer groups in the western sandveld region of the Kalahari, with a similar average annual rainfall (400 - 500 mm/year) averaged 1 000km^2 per group (Hitchcock 1978; Table 1). A single hunter-gatherer group of 30 people would require a range area of 2000 km^2 (Hitchcock 1978), giving a population density of 0.015 people/km^2. Although these changes were subtle, due to low human densities, they took place over millennia and are still apparent today in the *Schinziophyton rautenenii* groves in Ovamboland. These not only were important food gathering sites from which seed dispersal took place, but also were territorial markers for the Hei//om people.

TABLE 1: Range sizes of samples of hunter-gatherer groups in the western sandveld region of the Kalahari, Botswana (Hitchcock, 1978)

Location	Area (km^2)
Khwee	1100
Khwee	1370
Diphala	940
Ana-O	1025
Go/o	890
Ramokgophane	675
Pulenyane	925

NEW TECHNOLOGIES, NEW IMPACTS

Schinziophyton rautanenii groves symbolise one of these subtle changes to the landscape afler some 100000 years of use by ancestors of the Hei//om and !Kung peoples subsisting around the margins of this area today. Colonisation of the ancestral lands of Hei//om and !Kung people, initially by black agro-pastoralists and later by white farmers has drastically altered the lives of the Hei//om and !Kung people through acculturation, assimilation and dispossession of land.

Archaeological evidence from southern Angola and Zambia suggests that the first agriculturalists may have occupied northern Namibia about 1 000 years ago (Phillipson 1977). Trade relationships reflecting different skills and technologies are likely to have developed between agro-pastoralists and hunter-gatherer peoples: exchange of game meat for crops, exchange of knowledge of wild plant uses for knowledge of animal husbandry, exchange of livestock for barter or labour, and the trade in copper ore which was recorded historically in the Tsumeb area. As a result of this process, anthropologist D. Bleek recorded !Kung people with domestic animals, including pigs in southern Angola in 1928, while Hei//om people in Ovamboland in the 1930's had herds of cattle and goats (Marshall & Ritchie 1984). If *Schinziophyton rautanenii* groves symbolise vegetation change after possibly 120000 years of hunter-gatherer presence, then iron hoes, *Pennisetum typhoides* (pearl-millet, *omahango)* fields and livestock similarly represent the arrival of agro-pastoralists in the 17th century, possibly in response to political conflicts in the central Africa Luba/Lunda empires in the 15th and 16th centuries (Williams 1991).

SETTLEMENT AND CHANGE

By contrast with the subtle changes on landscape over the preceding 100 000 years, agriculture and livestock were to have a major socio-economic and ecological effects on society and the landscape over the next 400 years. Agricultural activities limited by rainfall and underground water sources concentrated within the oshana system centred around the Cuvelai as they do today.

The importance and variable nature of flood events recharging the underground aquifer and transforming the oshana drainage system has been well documented recently (Lindeque & Archibald, 1991; Marsh & Seely 1992) and Van der Waal (1991) has reviewed the composition of and size of fish catches during flood events in the Cuvelai system.

The change in landscape due to agricultural settlement in the Ovambo kingdoms was clearly evident to people representing the first wave of European colonial expansion just 140 years ago, with the arrival of trader/explorers such as Andersson and Galton (Lau 1989) or missionaries such as Martti Rautanen, after whom the mongongo trees *(Schinziophyton rautanenii)* so well known to hunter-gatherer people, was named. As Francis Galton (1853) described on his journey with a Ndongo trading caravan in 1851:

"We pushed through thick thorns the whole time, and had begun to disbelieve in Ondonga, when quite a sudden the bushes ceased: we emerged out of them, and the charming corn country of the Ovambo lay yellow and broad as a sea before us. Fine dense timber trees, and innumerable palms of all sizes, were scattered everywhere over the country".

This scene was the product of four major influences on the landscape:

(i) clearing of woodlands for agricultural purposes by a sedentary and growing rural population for millet fields mixed with *Citrullus lanatus* (watermelon, *etanga*) and *Sorghum vulgare* (sorghum, *oshiliavala*);

(ii) traditional conservation of favoured edible-fruit bearing trees (particularly *Sclerocarya* birrea, *Berchemia discolor* (bird plum, *omuve*), *Diospyros mespiliformis* (jakkalsbessie, *omwandi*), *Ficus sycamorus* (sycamore fig, *omukwiyu*) and *Hyphaene petersiana* palms) for their shade as well as part of the food production system;

(iii) an architectural style using more timber than any other architectural style in Africa, as discussed later in this chapter (Figure 3);

(iv) the effects of increasing numbers and changing patterns of livestock movement progressively changed the landscape of Ovamboland.

These human changes on the landscape are discussed in more detail in the following section.

FARMERS, LIVESTOCK AND SETTLEMENT

In common with other parts of the southern African region, human and livestock population densities in communal areas have increased. Assuming the same densities of hunter-gatherers as in the Kalahari sandveld where Hitchcock (1978) carried out his study, the entire Ovamboland/Etosha region, with an assumed human population density of 0.015 people/km^2 would have supported less than 1000 people for millennia, with no livestock until 2000 year ago. In addition to livestock, agro-pastoralists brought the new technologies of agriculture, assisted by iron-smelting technology. These not only altered the landscape, but also provided the basis for establishment of Ovambo kingdoms spread through what is now southern Angola and northern Namibia, with control over production and scarce resources through secular and religious means (Williams 1991). In many ways, the blacksmiths and iron-smelting processes described in southern Angola by Read (1902) symbolised this linkage between political, religious and resource controls. Haematite sources (*oshimanya*) were a basis for economic power and food production, forming an important part of political organisation. Close ties between traditional political leaders, religious leaders/traditional doctors and blacksmiths were clearly shown in linguistic and ritual linkages with iron smelting and iron tools. As Read (1902) recorded in southern Angola in reference to the sledge-hammer used by blacksmiths:
"This tool is called *osoma*, the name given to the chiefs of the country, the idea being that it is the provider of food, for without it there would be no hoes, no cultivation, and consequently no food. The sledge-hammer (*onjundo*) "feeds" the people, or is their "mother"...".

In contrast with small numbers of mobile Hei//om and !Kung peoples, Ovambo kingdoms were centralised and fairly sedentary and concentrated in the oshana area (Figure 2). Pastoralists from these communities moved seasonally, however, as did large migratory herds of zebra, blue wildebeest and springbok, in reaction to vegetation response to rainfall, a transhumance pattern still evident today.

Vegetation changes occurred with clearing of some trees and conservation of others for fruit and shade (Figure 3), and secondary impacts on recruitment of perennial grasses and palatable seedlings of woody plants. Despite agricultural technology and domestic livestock, poor soils and

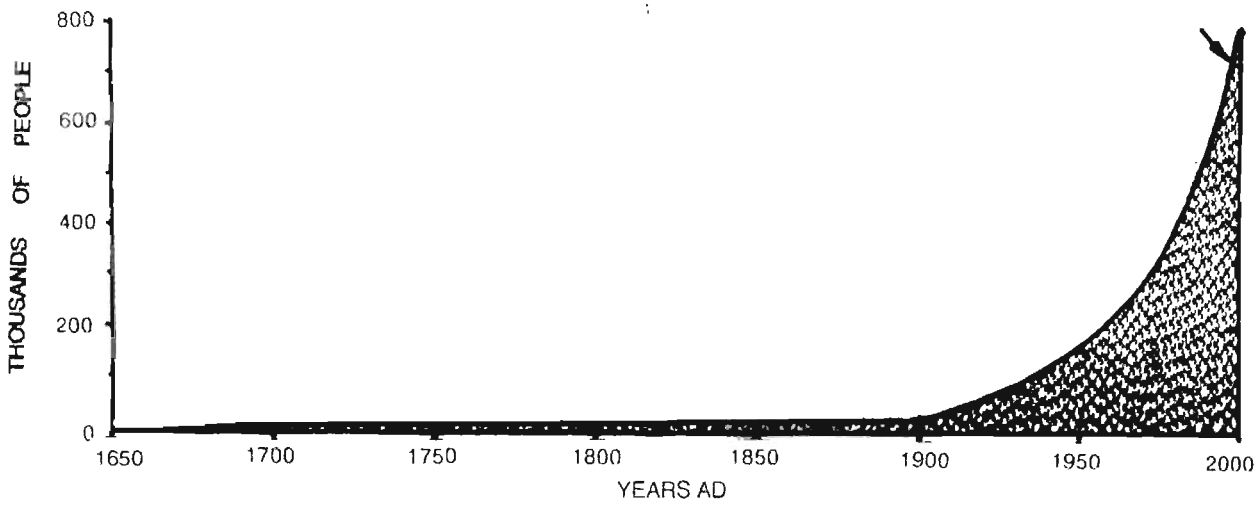

FIGURE 1: Estimated and recorded changes in human population in Ovamboland showing the rapid increase in population number during this century (Department of Statistics, 1923; Directorate of Development Coordination, 1981; Soini, 1981; Windhoek Advertiser, 1991). The arrow indicates current human population number in the region.

unpredictable rainfall meant that Ovambo farmers still had to gather bush foods and hunt wildlife. Agricultural disturbance also increased the availability of ephemeral "weedy" wild spinach species such as *Cleome gynandra* (vingerblaar, *ombidi)* which were probably seldom eaten by Hei//om or !Kung before the arrival of agricultural societies. A dry climate also enabled wild fruits such as those from *Berchemia discolor* trees and wild spinaches to be stored as flat "cakes" (*omavanda).* These remain popular food items today (Tables 3 and 4) and are seasonally sold in markets in Ovamboland (Table 5).

Influx of Christian missionaries from the 1850's, not only challenged the spiritual basis of political power over the next century, but also economic power symbolised by hand-smelted and smithed hoes and consequently the landscape itself. Less than 25 years ago, Soini (1981) observed "Travelling around the countryside and talking with the inhabitants in 1965 - 70 it was easy to observe how the hoe was giving way to the plough. A "taboo", expressed in the old religion, demanded that women only hoe fields because of the fertility. With Christianity however such taboos gradually disappeared and the first Christian native to follow the mission workers example of ploughing the field with oxen is still alive. The skill of ploughing spread so rapidly, that over half the families had a plough of their own. In some districts only 5 - 10% of the families preferred to make exclusive use of the hoe in tilling the soil. Initially oxen were used for ploughing, but donkeys were introduced from the south and were used by half the ploughers".

Combined with human population increase, this new technology and rising numbers of livestook have had a major influence on the landscape and lifestyle of the people. So too did the division of the seven Ovambo peoples (Kwanyama, Ndonga, Kwambi, Ngandjera, Mbalantu, Kwaaluudhi, Nkolokathi) (see Figure 2) with a straight line drawn across cultural and ecological units by Portugese and German colonial governments to divide up southern Angola and what was German South-West Africa. Rodin (1985), for example, on the basis of 1960 population figures in Bruwer (1966) has suggested 200 000 Kwanyama Ovambo people lived in Angola compared to 87 000 Kwanyama people in Ovamboland, Namibia. In 1921, the population of Ovamboland was estimated to be 90 000 people (a population density of 1.6 people/km^2) (Department of Statistics 1923). By 1991, the population had increased to 615057 people, or an average human population density of 11 people/km2 (Windhoek Advertiser 1991). In the urban areas of Oshakathi and Ondangwa population densities had reached 100 people/km^2. Since the withdrawal of the South African army, however, these human population numbers in these urban centres have started to shrink as people move back to farming (Tapscott 1990). There have also been rapid increases in the number of livestock (Table 2).

These increases are not only the result of natural population increase, but also of warfare and the consequent influx of refugees and cattle, compounding the effects of heavy grazing and clearing. For example, nearly 80% of the 45 000 exiles repatriated to Namibia in 1989, resettled in Ovamboland (Tapscott 1990). During the same year, the Ministry of Wildlife, Conservation and Tourism, estimated that at least 50 000 cattle entered Ovamboland from Angola (Jensen 1990). In the central oshana area, vegetation change is commonly evident with invasion of *Flaveria bidentis* and *Pechuel-Loeschea leubnitziae* (stinkbush, *edimba*) in disturbed areas along roads and around waterpoints and changes in woodlands due to selective removal of trees described below. Heavy browsing by livestock has also affected recruitment of young *Hyphaene* palms (Konstant *et al.* 1995 and Sullivan *et al.* 1995) and young edible fruit bearing trees such as *Sclerocarya birrea, Ficus sycamorus* and *Berchemia discolor.* By contrast, trees and shrubs in the Ebenaceae (*Diospyros, Euclea*) show a far better recruitment due to their unpalatable, tannin rich leaves.

TABLE 2: Numbers of livestock in Ovamboland in 1945/46 compared to numbers in 1992. Data on recent donkey numbers are from 1990 (from Marsh and Seely, 1992)

Livestock	1945/46	1992	% Increase
Cattle	250 000	485 000	94
Goats	120 000	499 000	316
Donkeys	6 000	120 000	2000

Traditional conservation practices: buffer maintaining woody cover

In Ovamboland, as in communal areas elsewhere in southern Africa, people traditionally have a right to fuel, thatch, building materials, wild food resources and to hunt most bird and mammal species. Although these resources are common property, restrictions relating to season, gender or private rights are traditionally placed on the use of some resources and can result in resource conservation. In any society, several conditions must be met for a natural resource to be intentionally managed. The resource must be of value to that society, must be perceived to be in short supply and vulnerable to over-exploitation by people and within the socio-political nature of the society, there must be the necessary structure for resource management (Chapman 1987). In the past in Ovamboland, control of scarce resources as a basis for political and religious power included controlled seasonal access to salt from saltpans (Otjivalundu, north of Etosha, Baixa de Cassanje, Angola); iron ore deposits; hunting of elephant for ivory due to the importance of these as trade items; and access to animals and birds with symbolic power for leadership (lion and elephant fat, crocodile brains and liver) or rainmaking rituals (ground hornbill, crocodile). Rituals also were historically used to strengthen controls over hunting grounds established in the woodlands between Ovambo kingdoms (Williams 1991).

In Ovamboland, these conditions sustain the conservation of edible fruit and shade producing trees, thus maintaining woody plant cover and habitat for birds and small mammals in densely populated and cultivated areas. *Sclerocarya birrea, Berchemia discolor, Hyphaene petersiana* and *Diospyros mespiliformis* are traditionally

conserved in most communal areas, with tenurial rights attached to trees in cleared fields. It is no coincidence that these are the most favoured sources of edible wild fruits (Table 3) gathered in the Ovamboland region today resulting in:

- selective removal of trees, and conservation of edible fruit bearing species creating the characteristic "cultivated woodlands" of *Sclerocarya birrea* and *Berchemia discolor* within millet fields;

- gathering and dispersal of edible fruits favouring germination and growth of *Sclerocarya birrea* trees at homesteads and *Hyphaene petersiana* palms at hand-dug wells;

Similarly, in Zimbabwe, the density of the three most frequently used tree species, including *Diospyros mespiliformis*, remained relatively constant between undisturbed woodland and cleared agricultural fields. As a result, proportional contribution from these species to total woody cover increased tenfold, from 0.5% in undisturbed woodland to 5% in cleared fields (Campbell 1986). The same situation applies in other semi-arid regions in Africa. In densely populated farmland outside Kano, Nigeria, for example, this has resulted in woodlands botanically similar to those in Ovamboland, with *Faidherbia albida*, *Adansonia digitata*, *Parkia* biglobosa, *Diospyros mespiliformis*, *Ficus sycamorus* and *Piliostigma thonningii* the most important tree species (Nichol 1989).

In Ovamboland, vegetation is also protected at grave sites for religious reasons, a practice that continues today. In contrast to the depletion of large mammals in Ovamboland, the success of traditional conservation in maintaining edible fruit bearing trees is obvious. Nevertheless, this too can alter with cultural change, such as the development of a social stigma against gathering of wild foods due to perception of use as a reflection of poverty (Ogle and Grivetti 1985).

If rural self-sufficiency is to be maintained, loss of the woody plant resources that provide a resource during periods of drought or economic recession must be avoided.

Traditional architecture and wood consumption in Ovamboland

Wood consumption for traditional architecture varies considerably in Africa, with the traditional Ovambo architectural style consuming more wood than any other form of traditional construction in southern or central Africa. Historically, the complex palisade fences and homes of traditional leaders consumed immense amounts of wood (Figure 3). Although wood use for the traditional Ovambo architectural style had a low impact under low population densities, the combination of high human populations and high wood consumption had a major impact on tall *Terminalia sericea* and *Colophospermum mopane* woodlands or localised patches of *Spirostachys africana* (tambootie, *omuhongo*) trees on clay-rich soils. A few homesteads of this size still remain in Ovamboland, but few people are wealthy enough to acquire the timber required for construction of traditional homesteads of this size today. A recent study of wood use in a homestead near Oshigambo showed that a single palisade fence surrounding the main homestead was made of 7 700 poles, or removal of more than 100 m^3 of construction wood from surrounding woodland. Most of the wood (43 m^3) is used for palisade fencing, primarily from *Colophospermum mopane* and *Combretum* trees (Erkiila & Siiskonen 1992). From these data, Erkiila & Siiskonen (1992) calculated that this would represent wood use of 1.5 m^3/person/year. Although this figure was based on the assumption that building timber would last 6 years, when timber may last 15 - 20 years (J. Hailwa pers comm. 1992), wood consumption would still exceed construction timber use in other areas. This can be compared to a more "normal" consumption rate of 0.038 m^3/person/year in Uganda (Howard 1990) or 0.23 t/family/year in mopane woodland in South Africa (Liengme 1983). A result of this wood scarcity is seen in Ovamboland today in:

- certain areas of Ovamboland where removal of *Terminalia sericea* for hut-building has created

TABLE 3: The ten most commonly collected wild fruits in *Colophospermum mopane* (mopane) woodland and *Hyphaene petersiana* palmveld, two of the major vegetation types in Ovamboland during the dry and wet seasons of the year (Hamata and Cunningham, in prep)

SCIENTIFIC NAME	KWANYAMA NAME	VEGETATION TYPE			
		MOPANE (n=40)		PALM (n=40)	
		SEASON COLLECTED			
		DRY	WET	DRY	WET
Berchemia discolor	Omuve/eembe		75% (30)		95% (38)
Diospyros mespiliformis	Omwandi/eenyandi	75% (30)		90% (36)	
Ficus sycamorus	Omukwiyu/eenghwiyu	48% (19)	20% (8)	45% (18)	48% (19)
Hyphaene ventricosa	Omulunga/eendunga	48% (19)		93% (37)	
Sclerocarya caffra	Omwoongo/eendongo		43% (17)		20% (8)
Ximenia americana	Oshipeke/eemheke	3% (1)	20% (8)		
Ximenia caffra	Oshipeke/eemheke	3% (1)	20% (8)		
Grewia desticola	Omushe/eeshe	8% (3)	13% (5)		
Vangueria sp.	Omushimbu/eembu		13% (5)		3 % (1)
Strychnos cocculoides	Omuuni/omauni	8% (3)	13% (5)		

Hyphaene - Sclerocarya - Diospyros woodlands in what formerly was closed woodland dominated by *Terminalia sericea*. Elsewhere in Ovamboland, mopane woodlands have been completely removed or transformed from tall, predominantly single-stemmed mopane woodland to short, multi-stemmed coppice;

- local extinction of *Spirostachys africana* due to high demand for termite resistant building poles. Demand exceeded the limited supply of this species which is charactersitically restricted to clay-rich soils in this largely sandy region.

Agricultural clearing and demand for building timber have both contributed to decline in woodland area and structure of remaining woodlands. As a result of wood scarcity, it is becoming increasingly expensive to replace palisade fencing around homesteads, and favowed species such as *Spirostachys africana* have disappeared locally. Alternative materials, such as thin bundles of millet stems or thin branches, are therefore used. Termite resistant woods normally last about fifteen years before the need for replacement. When these are no longer available less favoured softwoods with a shorter replacement time of four to five years are used. Heavy grazing in irregularly flooded wetlands (oshanas) has also resulted in a decline in availability of thatch grass. This has lead to the commercial sale of poles and thatch from less populated areas, including a commercial trade in mopane poles that extends across the border into southern Angola.

Shortages of favoured hardwoods and thatch, coupled to cultural change, have resulted in significant changes in building styles. In 1947, most families were polygamous, with exceptionally large homesteads built by influential men with many wives (Rodin 1985). By 1973, due to the influence of Christian missionaries, over 90% of households were monogamous, and smaller homesteads without complicated palisade fences were built (Mills 1984; Rodin 1985). Lack of wood may also be a contributing factor to the increased use of mud-block construction, where clay is obtained from scattered termitaria. *Colophospermum mopane, Combretum hereroense* (hardekool, *omukadikuku*) and *Combretum imberbe* are all favoured sources of building timber, but

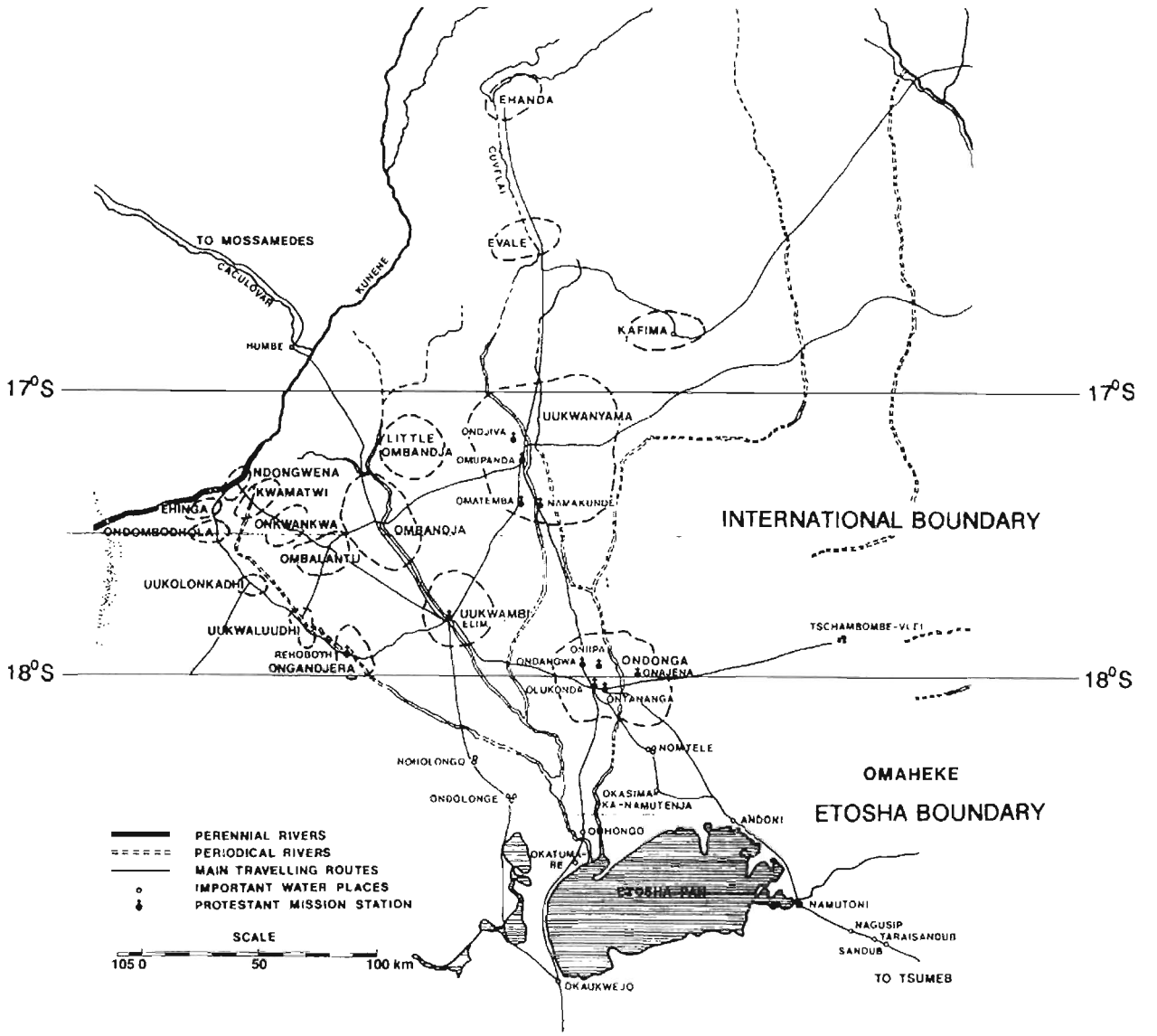

FIGURE 2: Location of historical kingdoms in Ovamboland, important watering places and early mission sites in 1850 in what was later divided into southern Angola and northern Namibia (from Erkkila and Siiskonen, 1992)

FIGURE 3: The complex palisade fences and huts of a polygamous household at Omedi, Ovamboland photographed by Duggan-Cronin in 1937. The combination of high wood use, agricultural clearing and conservation of *Diospyros mespiliformis* (jakkalsbessie, omwandi) and *Sclerocarya birrea* (marula , omwoong) trees for fruits and shade resulted in "cultivated woodlands" shown in the background of this photograph. Permission from the McGregor Museum, Kimberley, South Africa to reprint this photograph is gratefully acknowledged.

are becoming more scarce due to (i) competing uses of timber for fencing, fuelwood and grain stamping mortars and pestles: and (ii) the commercial trade in fuelwood from rural areas to urban centres such as Oshakati and Ondangwa.

As a result, people are walking further, or paying more for building timber. The commercial trade in building poles provides employment for self-employed commercial gatherers and the few people who can afford vehicles to transport the poles for sale. This is at the expense, however, of the rural communities in the outlying areas where the poles are gathered. Local resources are depleted and local self-sufficiency reduced as building poles are taken for use elsewhere. The current situation is the result of increasing scarcity over the past century. In 1866, missionary Hugo Hahn recorded a 60 km belt of *Colophospermum mopane* woodland between the Kwanyama and Ndonga kingdoms. Fifty years later this woodland was 40 km wide, and in the 1950's, 10 km wide. Today, this woodland no longer exists (Erkkila and Siiskonen 1992).

Due to water scarcity, the *Pterocarpus - Baikaiea* woodlands of eastern Ovamboland east of Eenhana are sparsely populated and represent the largest remaining area of Ovamboland with significant woody cover. Sinking of boreholes in this area would lead to the demise of these woodlands and their multiple-use value to local people and for non-extractive uses such as ecotourism.

COMMERCIALISATION AND CHANGE

If the ploughs introduced by missionaries represent the peaceful side of colonial expansion, then rifles and military roads represented its other face. Mine labour recruitment in Ovamboland from the early 1900's changed the socio-economic structure of the region, as did the decades of military conflict from the 1960's (Hishongura 1992). Increasing numbers of weapons, more people and fencing of Etosha National Park have all contributed to the demise of large migratory herds of zebra, springbok and blue wildebeest that formerly ranged through the Ovamboland region. For example, the migratory herd of 25 000 wildebeest present less than thirty years ago has gone, with the remnant 2 500 wildebeest confined to Etosha National Park where they are much more susceptible to anthrax at artificial waterpoints and predation by lion (Berry 1982).

Roads built across the oshana drainage system have altered the flow of water southwards, reducing groundwater recharge and productivity of grazing (Marsh & Seely 1992). Introduction of reliable water supplies without clear grazing management plans has resulted in marked impact on vegetation and disruption of seasonal movement of cattle through the Ombuza and Andoni flats.

A secondary effect of these roads has been one welcomed by entrepreneurs in the region: lower vehicle running costs and easier marketing of goods, including wild plant resources and fish. These include:

TABLE 4: The ten most commonly collected wild, weedy or cultivated spinaches collected by people in *Colophospermum mopane* (mopane) woodland and *Hyphaene petersiana* palmveld, two of the major vegetation types in Ovamboland during the dry and wet seasons of the year (Hamata and Cunningham, in prep)

SCIENTIFIC NAME	KWANYAMA NAME	VEGETATION TYPE			
		MOPANE (n=40)		PALM (n=40)	
		SEASON COLLECTED			
		DRY	WET	DRY	WET
Amaranthus thunberaii	Ekwakwa		100% (40)		100% (40)
Cleome avnandra	Omuhungu/ombogo		95% (38)		100% (40)
Sesuvium sesuvioides	Omundjulu		85% (34)		100% (40)
Celosia araenteiformis	Eshilalodi		55% (22)		
Viana unauiculata	Omakunde	20% (8)	45% (18)	5% (2)	
Citrullus lanatus	Eliwa, Epuputa	23% (9)	35% (14)	5% (2)	
?	Eemhindo		28% (11)		
?	Okalopolola		25% (10)		
?	Uuhamukulu		5% (2)		
Cucumis anouira	Elopa		5% (2)		

FIGURE 4: Pounding *Spirostachys africana* (tambooti, omuhongo) wood to produce aromatic powder used as a perfume ingredient. Omedi, Ovamboland photographed by Duggan-Cronin in 1937. Permission from the McGregor Museum, Kimberley, South Africa to reprint this photograph is gratefully acknowledged.

(i) local trade in fuelwood, craftwork, distilled brandy (*olambika*), building materials and dried tilapia and catfish;

(ii) a regional trade (from outside the oshana region) in aromatic perfumes from *Spirostachys africana*, stems and leaves from *Myrothamnus flabellifolius* (resurrection plant) and fruits of an unidentified species in the Rutaceae that reflects a much older historical barter trade in ground perfumes (Figure 4), dried tilapia from the Zambezi at Katima Mulio, marine fish from the Angolan coast and *Colophospermum mopane* poles from southern Angola;

(iii) an international (and regional) trade in basketry made from *Hyphaene petersiana* palms, as well as trade in dried *Harpagophytum procumbens* and *Harpagophytum zeyheri* (grapple plant, elvata) tubers for medicinal purposes (Table 7), primarily to Europe, with 60.5% of the 200 tons/year exported being supplied from Ovamboland (Nott 1986).

RESOURCE SCARCITY, PRIVATISATION AND INEQUALITY

Tenurial rights to grazing on commonage, or access to resources such as thatch, wood, wild fruits, fish, water and game animals are a feature of communal lands throughout southern Africa. Exceptions, in Ovamboland and elsewhere, have traditionally been private rights to fruits in cleared agricultural fields, hand-dug wells and controls over access to politically or economically important resources such as salt, iron or ivory. Throughout southern Africa, however, traditional systems are undergoing rapid change in response to population increase and the resultant scarcity of all resources. In Ovamboland, for example:

- most hand-dug wells encountered in a survey of over 1 500 wells were privatised, and many are locked (Stuart-Williams pers comm. 1992). Similarly, in the central rural district of Botswana, over 85% of water resources were in private hands, and virtually all water-source owners lived elsewhere (Hitchcock 1978);

- large areas of communal grazing land have been fenced off by the most influential farmers for private use (Tapscott 1990). The cattle of these affluent and influential farmers graze on communal lands until the end of the dry season. When grazing is scarce, cattle are then moved to "privatised" former communal grazing land which has been fenced;

TABLE 5: Continued importance of gathered bush foods, whether wild plants for fruit or spinach, or edible mopane caterpillars (*Gonimbrasia belina*) to rural people with homesteads in *Colophospermum mopane* woodland and *Hyphaene petersiana* palmveld, two of the major vegetation types in Ovamboland (Hamata and Cunningham, in prep)

RESPONDENTS....	MOPANE		PALM	
	%	(n=40)	%	(n=40)
selling *omavanda* (spinach)	45%	(18)	40%	(16)
collecting mopane caterpillars for home use	75%	(29)	3%	(1)
collecting mopane caterpillars to sell	13%	(5)	0%	(0)
drying mopane caterpillars for storage	35%	(14)	3%	(1)
eating marula fruits	92%	(37)	100%	(40)
making marula beer	87%	(35)	100%	(40)
eating marula nuts	90%	(36)	97%	(39)
selling marula fruits	3%	(1)	5%	(2)
selling marula beer	8%	(3)	47%	(19)
selling marula nuts	53%	(21)	50%	(20)
selling *Berchemia* fruits	13%	(5)	75%	(29)
selling *Berchemia* beer	45%	(18)	30%	(12)
planting marulas	10%	(4)	13%	(5)
planting marula seeds	3%	(1)	8%	(3)
selecting marula seeds for planting	3%	(1)	0%	(0)
planting marula branches	5%	(2)	13%	(5)
planting *Berchemia*	18%	(7)	8%	(3)
making *olambika*	50%	(20)	70%	(28)

- fencing off and "privatisation" of communal woodlands that formerly were a common source of building material, thatch, fencing and fuelwood to the community. This is often connected to the "privatisation" of former communal grazing lands;

- fencing off of woodlands that provide a common source of fuelwood and building materials is further exacerbated by the development of the commercial fuelwood trade to Oshakathi and Ondangwa. Commercial harvesting focuses on remaining woodlands to supply urban demand. This further reduces local rural self-sufficiency and favours vehicle owning middlemen, who can shift to other areas once prime fuelwood resources in that commonage are exhausted;

- commercial trade of *Colophospermum mopane* stamping mortars and pestles, thatch grass, pre-constructed hut roofs, grain baskets and fuelwood. These items were previously collected for home use rather than bought.

TABLE 6: Sources of *Harpagophytum* tubers purchased for export purposes in 1985/1986 (from Nott, 1986)

REGION OF NAMIBIA	PERCENTAGE
Ovamboland	60.5%
Maltahohe	9.8
Karabib	9.4
Kaokoland	5.2
Damaraland	4.6
Mariental	4.3
Rehoboth	2.3
Omaruru	1.5
Windhoek	0.4
Namaland	0.4
Gobabis	0.2

Elsewhere in southern Africa, similar developments to these currently occurring in Ovamboland have benefited an affluent, and often absentee minority at the expense of the rural poor. This increases social stratification and ecological deterioration as greater pressure is placed on remaining common property resources.

ETOSHA NATIONAL PARK: LOCAL PEOPLE, LOCAL PLANNING

In conservation planning in the past, little attention was paid to the values of natural resources to rural people or how these needs could be taken into account in the planning process. Etosha National Park is a good example of this process, where declaration of the park contributed to the dispossession of the Hei//om people from ancestral lands occupied for millennia (De la Bat 1981, 1982). As a result of broadening of the conservation philosophy, this approach is no longer as evident since the publication of the IUCN (1980) World Conservation Strategy, the Biodiversity Convention (1992) and the Global Biodiversity Strategy (WRI 1992), which have made detailed policy recommendations on local people's benefits from sustained use of natural resources. This approach has now been adopted by the Ministry of Environment and Tourism.

In semi-arid systems affected by longer term or episodic events, this can result in gaps in knowledge even at a taxonomic surveys level, let alone an understanding of ecosystem functioning. Under these circumstances, traditional ecological knowledge can provide important insights highly relevant in arid and semi-arid systems where scientific data from long-term monitoring are scarce and biological changes may be long-term, sporadic or patchy.

Folk taxonomic knowledge can also be valuable in inventory work for conservation purposes. A recent example is

the contribution made by the Mutitjulu Community to a reptile survey of Uluru National Park in Central Australia (Baker and Mutitjulu Community 1992). Similar traditional knowledge and folk taxonomy can be equally invaluabie in arid zone floral or faunal surveys in Namibia in addition to providing information on fruit dispersal, feeding habits, animal behaviour and a host of other factors. Today, the increasingly acculturated Hei//om and !Kung peoples subsist around the margins of their ancestral lands, displaced after millennia by colonization from both north and south and by the proclamation of the Etosha National Park itself. If ecosystem conservation and planning are to be effective in the Cuvelai-Etosha region, it is not only species or habitats that need to be conserved, but also the oral histories and traditional ecological knowledge that is tenuously held by remaining representatives of the ancestrai occupants of this region. Additional joint research is required that will not only benefit research and planning processes, but enable the remaining skilled Hai-//om people to again play a decisive and dignified role in this area before it is too late. In this context, it is appropriate to end with a quote as relevant to Namibia as it is to Mexico:

"In a country that is characterised by the cultural diversity of its rural inhabitants, it is difficult to design a conservation policy without taking into account the cultural dimension, the profound relationship that has existed since time immemorial between *nature* and *culture*.....Each species of plant, group of animals, type of soil and landscape nearly always has a corresponding linguistic expression, a category of knowledge, a practical use, a religious meaning, a role in ritual, an individual or collective vitality. To safeguard the natural heritage of the country without safeguarding the cultures which have given it feeling is to reduce nature to something beyond recognition; static, distant, nearly dead" (Toledo 1988 cited by Nabhan *et al.* 1991).

Today, although peace has come to Namibia, another battle has to be won. Two major challenges in Ovamboland are first, how to reach a balance between human needs and resources and second, how to avoid the mistakes of the arid Sahelian zone and the human tragedy resulting from insensitive and ecologically unsound development plans and politically expedient decisions. The future of the Cuvelai-Etosha region, for both people and the Etosha National Park depends on how those decisions are made and implemented. The natural resource base of the Cuvelai-Etosha region has always provided a buffer against rural poverty. That buffer is now wearing thin, with disappearance of the woodlands and the herds of game that represented a regional resource. Unless appropriate development alternatives are provided, Etosha, will become a resource-rich island south of Ovamboland. If the natural resource buffer of Ovamboland disappears then not only Etosha, but urban Windhoek will face a rising tide of rural refugees.

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REFERENCES

BAKER, L M & MUTITJULU COMMUNITY. 1992. Comparing two views of the landscape: aboriginal ecological knowledge and modern scientific knowledge. *Rangeland Journal* 14 (2): 174 - 189.

BERRY, H.H. 1982. The wildebeest problem in Etosha National Park: a synthesis. *Madoqua* 13(2):151 - 157.

CAMPBELL, A. C. 1976. Traditional utilization of the Okavango Delta. pp. 163 - 173 *In proceedings of the Sympoium on the Okavaongo Delta and its future utilisation,* National Museum, Gaborone, Botswana.

CHAPMAN, M.D. 1987. Traditional political structure and conservation in Oceania. *Ambio* 16: 201 - 205.

DE LA BAT, B. 1981. Naturrbewring in SWA. *J SWA Scient. So,c.* 35: 51 - 61.

DE LA BAT, B. 1982. Etosha 75 years. *SWA Annual* 82: 11 - 22.

DEPARTMENT OF STATISTICS 1923. *Report on a census of the population taken on May 1921 and the census on agriculture on 30 April 1921.* Government Printer, Pretoria.

DIRECTORATE OF DEVELOPMENT COORDINATION. 1981. *Population census of 1981.* Government Printer, Windhoek.

ERKIILA, A. & SIISKONEN, H. 1992. *Forestry in Namibia 1850 - 1990.* Silva Carelica 20, University of Joensuu. 244 pp.

GALTON, F. 1853. *The narrative of an explorer in tropical South Africa.* John Murray, London.

HISHONGURA, N. 1992. *The contract latour system and its effects on family and social life in Namibia.* Windhoek, Gamsberg MacMillan.

HITCHCOCK, R. 1978. *Kalahari Cattle posts: a regional study of hunter-gatherers, pastoralists and agriculturalists in the Western Sandveld region. Central district. Botswana.* Vol. 1. Ministry of Local Government and Lands, Gaborone.

HOWARD, P C. 1991. *Nature Conservation in Uganda's Tropical Forest Reserves.* IUCN, Gland, Switzerland.

IUCN. 1980. *World Conservation Strategy*. IUCN, Gland, Switzerland.

JACOBSEN, M. 1988. Preliminary notes on the symbolic role of space and material culture among semi-nomadic Himba and Herero herders in western Kaokoland. *Cimbebasia* 10: 75 - 100.

JACOBSEN, M. 1990. *Himba: nomads of Namibia*. Struik, Cape Town.

JENSEN, A.M. 1990. Rural development project, environmental component. Ovamboland, Namibia. Unpublished report to Lutheran World Federation, Axena Aps., Denmark.

KINAHAN, J. 1991. *Pastoral nomads of the Central Namib Desert: the people history forgot*. Namibia Archaeological Trust & New Namibia Books, Windhoek.

KONSTANT, T.L., SULLIVAN, S. and A. B. CUNNINGHAM. 1995. The effects of human population pressure on *Hyphaene petersiana* basketry resources in the palm savanna of Owambo, northern Namibia. *Economic Botany* 49(4) : 345-356.

LAU, B. 1989. *Charles John Andersson: trade and politics in Central Namibia 1860 - 1864*. Archeia no. 10, National Archives of Namibia.

LIENGME, C.A. 1983. A study of wood use for fuel and building in an area of Gazankulu. *Bothalia* 14: 245 - 257.

LINDEQUE, M & ARCHIBALD, T.J. 1991. Seasonal wetlands in Owambo and the Etosha National Park. *Madoqua* 17(2): 129- 133.

MALAN, J.S & OWEN-SMITH, G.L. 1974. The ethnobotany of the Kaokoland. *Cimbebasia* (B)2, 131 - 178.

MARSH, A. & SEELY, M.K. 1992. *Oshanas: sustaining people environment and development in Central Owambo. Namibia*. Windhoek, DRFN & SIDA.

MARSHALL, J. & RITCHIE, C. 1984. *Where are the Jul/wasi of Nyae Nyae* Centre for African Studies Communications No. 9, University of Cape Town.

MILLS, G.T. 1984. *An inquiry into the structure and function of space in indigenous settlernent in Ovamboland*. Unpublished M.Arch. thesis, University of Cape Town.

NABHAN, G. P., HOUSE, D., HUMBERTO, S. A., HODGSON, W., LUIS, H.S. & GUADALUPE, M. 1991. Conservation and use of rare plants by traditional cultures of the US/Mexico borderlands. pp. 127 - 146 Bn: M L Oldfield and J B Alcorn. 1991. Biodiversity: culture. conservation and *ecodevelopment*. Westview Press, Boulder.

NICHOL, J.E. 1989. Ecology of fuelwood production in Kano region, Nigeria. *Journal of Arid Environments* 16: 347- 360.

NOTT, K. 1986. A survey of the harvesting and export of *Harpagophytum procumbens* and *H. zeyheri* in SWA/Namibia. Etosha Ecological Institute, Okaukuejo.

OGLE, B.M & GRIVETTI, L.E. 1985. Legacy of the Chameleon: edible wild plants in the Kingdom of Swaziland, southern Africa. A cultural, ecological, nutritional study. Part lil - cultural and ecological analysis. *Ecol. Food Nutr.* 17: 31 - 40.

OTTO, A. 1984. Flechtkunst in Sudwestafrika. *SWA Annual*, 1984. pp. 23 - 27.

PARTRIDGE, T C. 1988. Geomorphological perspectives on recent environmental change in southern Africa. pp. 367 - 378. In: Macdonald, I.A.W. & R.J.M. Crawford (eds). Long-term data series relaffng to southern Africa's renewable natural resources. *South African National Scientific Programmes Report No.* 157.

PHILLIPSON, D.W. 1977. The later prehistory of eastern and southern Africa. London, Heinemann.

READ, F.M. 1902. Iron smelting and native blacksmithing in Ondulu country, south-east Angola. *African Affairs* 2: 44 - 49.

SHAW, M. 1938. Ovambo knives. *Ann. S. Afr. Mus.* 24 (5): 253 - 275.

SOINI, S. 1981. Agriculture in northern Namibia, Owambo and Kavango 1965 - 1970. *J. Sci. Agric. Soc. Fin.* 53 (3): 168 - 208.

SULLIVAN, S., KONSTANT, T.L. and CUNNINGHAM, A.B. 1995. The impact of utilization of palm products on the population structure of the Vegetable Ivory Palm *(Hyphaene petersiana)* in Owambo northern Namibia. *Economic Botany* 49(4) : 357-370.

TAPSCOTT, C. 1990. The social economy of livestock production in the Ovambo region. NISER Discussion Paper no. 4, University of Namibia.

TINLEY, K.L. 1971. The case for saving Etosha. *African Wildlife* (Supplement) 25: 1 - 16.

VOGEL, J C AND RUST, U. 1986. Environmental changes in the Kaokoveld Namib desert during the present millenium. *Madoqua* 15: 5 - 16.

WILLIAMS, F-N. 1991. Precolonial communities of southwestern Africa. Archeia 16, National Archives of Namibia, Windhoek.

WINDHOEK ADVERTISER, 1 FEBRUARY 1992. citing Department of Statistics data for 1991. Windhoek Advertiser, Windhoek, Namibia.

WRI. 1992. Global Biodiversity Strategy: guidelines for action to save. study and use Earth's biotic wealth sustainably and equitably. WRI, IUCN, UNEP.