Traditional Utilisation of the Okavango Delta

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Introduction
The history of human settlement in the Okavango Delta has already been outlined by Dr Tlou, who described some of the factors which influenced the environments chosen by the different groups, and pointed out that only since 1849 have written records relating to the area existed, and even so far as oral records go, little is known before about 1800, the arrival of the Tawana.

The Delta consists of a great number of differing, but closely interrelated, habitats, ranging from Kalahari sand to deep-water swamp, many of which are often found in close proximity. For the purpose of this paper, the Delta has been taken to include the central flood areas, the Okavango River, the Boteti River, Lake Ngami, the Selinda and Mababe and the Kalahari sandveld immediately surrounding these.

Apparently there are three main factors influencing human settlement and natural resource utilisation: the topography of the land which in the past determined resource distribution, the spread of noxious insects, particularly tsetse fly (Glossina morsitans) and malarial mosquitoes (Anopheles spp.), and the historical mode of subsistence of the people themselves.

Early and Middle Stone Age implements found at Chanoga, Toteng, Samadupe, Shithwa and Kgwebe indicate that man has inhabited at least the southern periphery of the Delta for 100 000 years or more. In Rhodesia and Namibia occur rock paintings of people with marked physical characteristics, and fat-tailed sheep which suggest a possible southern route of migration around the Delta for Hottentots who may have traversed the area about 1 500 years ago. From the Mababe come late Stone Age tools of recent date.

The Yei, the first Bantu people to settle in the Delta, found Bushmen (now commonly called "San") settled along the major water courses, as well as in the drier hinterland. From 1849 onwards, White travellers have left accounts of the country and its people. It is from these and the oral histories of the present Bantu inhabitants that most of our knowledge derives.

The Bantu are agriculturalists, and frequently stock-owners with a fairly complicated political, religious and kinship organisation, whereas the San have no property, little political organisation and live by collecting veld food and hunting. The first Bantu did not arrive in the Delta until about 1750, thus, utilisation on anything other than a purely subsistence basis is only 200 years old.

The environment
Considerable changes have taken place in the Delta during the last 200 years, particularly in the south and west and along the Boteti River. In 1850 the bulk of the annual floods appears to have flowed down the west side through the Thaoge system into Lake Ngami, which was much larger than it is today and was surrounded by massive reed-beds. Fifty years previously it had been dry with a river flowing through a channel in its bed, and by 1865 it was nearly dry again, while a vast swamp had formed to its north, south-east of Tsau. Much of the northern area of the Delta consisted of huge reed-beds, the Ng'gokha River was probably dry, and there was a shallow, but perennial stream down the Selinda and down the Mogogelo into the southern Mababe. The Boteti was lined with reed-beds, in places several kilometres
across. The tsetse fly spread south to the northern shore of Ngami and westwards beyond Tsau, although it did not occur on the Boeti. Mosquitoes were ubiquitous, probably worst in the reed-beds and in areas where concentrations of wildlife watered.

Very large herds of plains game, including wildebeest, hartebeest, springbok, eland, oryx and giraffe, covered the hinterland plains, sometimes coming in thousands to drink at night along the river and lake shores; the reed-beds contained quantities of lechwe, reedbuck, sitatunga and crocodile, while large herds of buffalo and elephant moved into them from the riparian areas to feed. The open waters teemed with hippopotamus. The waterways were filled with fish, particularly barbel (Clarias spp.) and bream (Tinca tinca), which bred on the inundated floodplains and meadows, returning to permanent waterways as the floods receded.

The people

River San lived on many of the major waterways threading the Delta and Mbugwe lived on islands in the northern areas. Tsetse, mosquitos and the floods kept the remainder to peripheral areas; thus, until recently, the bulk of the population lived in a 20 km-wide strip, which almost encircled the Delta, except in the north-east where the tsetse fly was particularly bad. For each group of people there was one or more particular mode of subsistence which was of primary importance in determining where they lived. For the Yei it was fishing; they sought areas of open, but shallow water and floodplains; for the Tawana and Herero stock predominated in their lives and they sought fly-free areas of good grazing accessible to surface water, and for the Mbugwe and Nanzwa, whose subsistence was tied to the tilling of the soil, fertile areas away from the fly were necessary. As Dr Tiou pointed out, traditional environment was important and when the Mbugwe left their Zambezi River home near Karine Mufako, they found a similar river system on the Okavango, while the Yei, who had lived on the floodplains of the Capriv, sought out a similar environment in the south-eastern Delta.

Social change was rapid as the various groups impinged and inter-marriage took place between those groups which kept feudal servants to the extent that today the Kgalagari have 3% San blood. The Mbugwe, with less than 3% San blood, probably on account of their strict preferential marriage system, are the least affected, although they also incorporated San servants on moving to the Kwando and Okavango.

When found at Kgwebe by the Tawana in 1809, the Kgalagari owned considerable numbers of cattle although their main stock consisted of sheep and goats. The Yei also owned numbers of cattle, but lost these about 1840 when expelled by the Tawana. The Herero in Namibia lived off their large herds of cattle which were of immense religious importance to them. Fleeing from the German War in 1904-6, they brought with them practically none of their cattle and to subsist had to sell their guns and become servants of the Tawana. Until about 1928 they served the Tawana, started hoe agriculture and hunted extensively until they built up new herds and became independent. Today they are amongst the biggest cattle owners in Nyanga.

While all the Bantu peoples supplemented agriculture by hunting, they learned many new techniques from the San. In the same way, the San and Tawana also learned the use of canoes (mokoro) from the Yei. The Tawana emerged about 1840 as the dominant group, tending to enserf other groups and to impose on them their legal system and, to some extent, their social culture. Thus, from about 1880 onwards, with the exception of the remoter Mbugwe, all groups slowly started to merge their subsistence activities until today it is often difficult to tell one group from another.
Determining Factors for Environment Selection

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<td>Veld-food collection</td>
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A = Major import
D = Minor import
B = Important
X = Generally not practised
C = Second import
? = No longer known

Land-use rights

The kimerland San lived in interrelated groups, each of which recognised an area in which it had more or less exclusive hunting and food-collecting rights. The Yei, Mbuyuku, Nanzwa and River San lived in small interrelated groups, each group having a permanent homestead and a number of groups forming a cluster covering perhaps 500 km² under one headman. They recognised exclusive hunting, fishing and ploughing rights around each homestead and, without let or hindrance, the tribal area. General hunting rights away from settlement. Food-collecting rights along waterways were carefully defined, but not defined from these they rapidly vanished. The Kalalagani recognised ploughing rights at their homestead and grazing rights at certain surface water areas, such as pans, but they moved around considerably with their herds, returning to a homestead with permanent water during the dry season. They did not recognise any San rights, but probably respected Yei rights. On their arrival, the Tawana appear to have recognised Yei land-use rights, but none other. They settled in one large village, first on the Kei and then at Nguba. Amongst themselves they recognised exclusive ploughing areas and cattle pastures. They were twice raided by the Kololo, the second time many of them being emerged and taken to Bolozi. They escaped in about 1849 and of them then took Yei cattle, which they drove into the desert, some as far south as Gnasala.

After the Tawana became the dominant group, they expected tribute from all subervient peoples and placed Tawana families in charge of various areas, expecting them to collect the tribute. Originally this involved meat, skins of fur-bearing animals and certain plants from the veld, as well as corn, metal tools, canoes, etc. After 1850, when the value of ivory was realised, it was extended to include both ivory and ostrich feathers.

After 1840 the Yei, having lost their cattle, began to make much more extended hunting trips into the Delta, until eventually they took their families with them, often spending the whole winter living on the islands, hunting, fishing and collecting wild food.

In 1850 the White hunters and traders began to arrive at Ngamani and commercial hunting commenced. During the next ten years 600 elephants were shot at the lake alone, and many thousands must have been wounded, considering the weapons used. The Tawana put pressure on all the subervient groups to produce commercial trophies and many of the Tawana themselves became professional hunters. Rhinoceroses were exterminated, elephant badly depleted and buffalo driven far northwards.

The attitude towards wildlife changed from one requiring a natural resource to be used for subsistence, to one of a commercial item to be hunted for gain. At first the profits went to the chief, who used some of these on behalf of his tribe, but this slowly changed to the individual. Although commercial hunting was to wane, it was revived in 1896 with the loss of cattle as a result of rinderpest, and again in the 1960s with the increase in trophy values. The old attitude of the right to hunt for personal gain and the right to employ others to hunt on his behalf resurfaced.

During the early 1960s, the Tawana began to move away from their central village at Tusa and settled in the areas where they had traditional series and kept their cattle. By 1915 when the tribe moved to Maun, many families had broken away and the chief was unable to make them return. Everywhere they settled the inhabitants began to adopt Tawana culture.

Fishing

The main fishermen were, and still are, the Yei. The Tawana did not normally eat fish, since they rever the crocodile and eat nothing from the river, although many of them will eat fish today. The Mbuyuku fish when not employed with their crops and the Nanzwa do only a little fishing. The River San are expert fishermen, having incorporated the Yei techniques with their own. Traditionally, River San employed three main techniques: they built stone weirs across the mouths of flooded areas, standing fish as the floods receded; they poisoned pools with Ephorbia invenabilis; and they speared fish, either from a reed raft or by pushing a mat of reed leaves before them into the shallows in the shade of which the fish hid. They probably also used tontel-shaped traps, thrust down over the fish by hand, the fish being withdrawn through a hole in the neck.

The Yei used these methods and several others: they made nets with mokgatse (Samosesia stypticus) and Hibiscus cerasifera soaked in a solution from mooko (Aquaria karon), to which were attached floats made from buoyant reeds (malimis). The nets were either strung across open water, towed between two canoes towards the shore or towed toward other canoes whose occupants banked the water with paddles. They poisoned fish, using both Ephorbia and the crushed bark of the mahau (Gordonia nigrolineata). They built log fences across rivers made of Phragmites reeds closely bound with Samosesia string. Sometimes straight, sometimes in the shape of a series of hearts, the fences contained a series of traps, tubular baskets placed at one end and with a funnel of sharp sticks at the other, through which the fish forced their way going upstream and, thus, were caught. Sometimes these traps were set in stone or earth walls across flooded meloba; one traveller described such a wall about 50 m long with traps inset, each a metre apart. Large-mouthed baskets were pushed along the bottom of shallow water and as the fish entered, the mouth of the basket was jerked above the surface and the fish thrown ashore. The larger traps were made from Gavia and Hibiscus wanes, while the smaller were made from reeds, chuma. They also fished with
iron-barbed spears, often wading several abreast, feeling with the spear in front of them.

The Mbuyu, who were accustomed to deep water, fished mainly with nets and canoes, but they also speared fish, caught them with traps and fences and poisoned them.

Hunting

Hunting was a major occupation for most men. The hinterland San hunted with light bows and flightless, poisoned arrows, using poison for the larvae of the _Dorippus beetle_ (which acts both on the blood and nervous system) and the _Mopane beetle_ ( _Polycesta flexuosa_ ) which was often mixed with plant poison. The most common being taken from the _Hibiscus on الصين_ ( _Boophane disticha_ ), _Nasaka chetum_ ( _Nasaka nuditans_ ), and _Bitter apple_ ( _Morinda_ ( _Salvadora hexandra_ )). _Magadi_ ( _Dischadophleum cymosum_ ) is believed to have been used in conjunction with the poison extracted from the saas of puffaddens and cobras. The Ye, Nauwa and Mbuyu also used poison on weighted spear-heads hung above paths frequented by large game; the latter also used it on their heavy, fluted arrows.

The River San and Ye trapped large animals using 3 m deep pits lining river banks on paths leading to animal watering places. These pits often narrowed drastically at the bottom or had sharpened stakes planted in them and were covered by reeds, grass and earth across which animal spoor and dung were placed. Sometimes two pits were positioned end-to-end, with a wall 30 cm thick dividing them. A startled animal falling into the first pit plunged forward to become firmly wedged in the second. When animals with valuable skins were caught alive, they were smoked with wood to protect the skin. Another pit-trap used by the Kgalagari and Tswana, called _kopa_, consisted of a kilometre-long, brush-fence funnel with a wide mouth and a huge pit in the exit, about which spearheads were hidden. Numbers of hunters chased herds of game into the funnel and when they fell into the pit at the narrow exit they were speared. In late winter the grass was burned around the pit to bring on new shoots, thus attracting wildlife to the vicinity.

The Tswana organized tribal hunts ( _matshaka_ ), which involved one or more regiments armed with spears, axes and clubs. Animals even as large as elephant were surrounded and speared or hamstrung and clubbed to death. The Ye and Mbuyu also organized large hunts, burning reed-beds to evict cane-rats or cornered antelope, and driving lechwe into lagoons, where spearmen stationed in canoes chased and killed them. Dogs were frequently used, particularly when hunting dangerous game, such as elephant and leopard.

Snakes were common, usually made of string from _Sesamum_ or _Ilbicus_, and attached to a convenient sapling or pliable stick stuck in the ground. A running loop was laid on the ground and the stick or tree was bent down and attached to a trigger in a hole below the loop. On kicking the trigger, its leg was noosed and the animal lifted into the air. Such loops were also hung on paths to water and in gaps left in brush fences lining river banks.

The Mbuyu, Ye and Nauwa built platforms above drinking places and paths, spearing animals which passed beneath them. The Mbuyu also fixed barbed, double-headed hooks to rope made from _molokwee_ palm and tied to a bundle of reeds.

The hooks were baited and hung on supports above the river surface. Crocodiles, taking the hook, drowned themselves and were later found by the reed-bundle float. The Ye also fished in the same way, using smaller hooks baited with rice and rats.

Perhaps the most spectacular hunting was the harpoon-feeding of hippo from a raft or canoe. Usually a raft, made by laying bundles of papyrus crosswise around a central stick, was allowed to drift into a lagoon with hippo in it. The raft was large, carrying several people and two or three canoes. The harpoon consisted of a metal-barbed head loosely stuck into the end of a 2 m pole and attached to it by a length of rope. A longer rope was attached to the middle of the pole. The harpoon (and sometimes several of them) was driven into the hippo's back. If the area was reedy, the hippo was allowed to charge around until the pole, pulling crosswise behind it, finally reared up. When the area was open, canoes were launched and the occupants, hanging onto the end of the rope, were towed around until they finally secured it to a tree. Often the infuriated hippo retaliated, lashing chunks from both them and the boat.

The Mbuyu fixed sharpened sticks into small logs, which they buried in holes covered with grass or elephant paths. The elephant transfixied the sole of its foot on the stake, thus immobilizing itself and was later hamstringed and then speared to death.

Mambili slave-traders from Angola had long traded for ivory from the Mbuyu; the Tswana, although they had traded furs previously, only realized the value of ivory in the 1890s. At this time, apart from levying heavy tribute in skins, feathers and ivory from subvassal groups, they also became professional hunters, buying guns and horses and going on extended hunting trips. A part of everything hunted belonged to the chief: the tusks nearest the ground, the bristles, all ostrich feathers, kudu, cheetah and lion skins, and the pangolin. All smaller furs-bearing animals' skins belonged solely to the Tswana, being used for skirts and cloaks.

Hunting became so competitive that the chief eventually granted rights to certain families to hunt in particular areas. He retained for himself the area around Tsubora, where his servants hunted exclusively for him. Later, two Tswana families were given the entire hunting rights to the west of the Delta.

Veld food

Veld foods were of major importance to all except the Herero and Mbuyu. They probably made up more than 70% of the Ye diet, 60% of the Kgalagari diet and 30% of the San diet. No thorough list of veld foods has been made, but they must exceed 200 varieties. Women spent much of their time collecting them. Each group had preferred plants and although others were available, they often made little use of them. For those who grew crops, the main aim was to find either fruit, or reishi for their staple porridge, such as wild _quash_ and _morakele_ ( _Morinda schizantha_ ), and _lilly flowers_ ( _Nymphar corolla_ ). For some groups one or two plants formed a major part of their diet; for instance, the _dze/wa_ San made extensive use of _mungo nuts_ ( _Rhicospondium raetum_ ) and mounted (and still do) major collecting expeditions during the season. The Ye favoured the water-lily, _mosi_ ( _Nymphar corolla_ ), eating the bulb, stem and flower. Where _papyrus_ ( _Cyperus papyrus_ ) is plentiful, the young shoots ( _koma_ ) are used almost throughout the year. Another reed, _tale_ ( _Pennisetum treme_ ), is crushed, mixed with water and allowed to stand when it often forms a staple diet, particularly during times of crop failure. The Mbuyu, in years of drought, collect and survive almost entirely on _mopolo_ ( _Punarnia mollata_ ) and _morula_ ( _Strelitzi cajafra_ ).

Drinks were prepared from fruit and sap, some of them very intoxicating. The two palms, _molokwee_ ( _Hyphaene senofrins_ ) and _tapo_ ( _Pousa rutina_ ) were tapped and the sap drawn. Originally the sap was allowed to ferment and was drunk like wine, but after the White incursion, it was sometimes boiled in a kettle and the steam cooled in a gun-barrel, the resulting liquid being highly alcoholic. Beer was brewed from the fruits of _molokwee_ ( _Punarnia mollata_ ) and _morula_ and a fairly intoxicating drink known as...
as kgosi was made from the pounded berries of morella (Gressa flavo) mixed with honey. A slightly sharp, but pleasant soft drink was made by soaking baobab fruit, morua (Adansonia strobe). Various types of tea were infused from the leaves of mokota (Combretum zonale) and linga (Artemisia afo). A “lemonade” was made from the fruit of nodatus (Diocuris moribilis), which became potent when allowed to stand.

Children and women of all groups were expected to collect wild food. As boys grew older at the cattle-post, they would spend much of their time hunting with dogs and snares, collecting almost every small animal, including mice, squirrels, hares, tortoise, little predators, birds, eggs and caterpillars, particularly the philia (Gomphinae nitida), and nato (Cnidae incisa), which lives on acacia.

Other plants

Plants were, and still are, used for a wide range of purposes. The Mbutshu made their houses with mats woven from Phragmites reeds (mathata), slit down one side, opened flat and woven. Phragmites reeds are collected throughout the Delta, peeled out in dug-out canoes and used by all except the Herero and a few Tawana to make houses and bailiades around their houses. Fibre mats were made from the bark of mikokosha (Sterculia temnata); dies were made from millet and moratsho (Diospyros angolensis); beads for decoration came from the seeds of noppri (Albizia persicius) and musaka (Alizia quanzensis); soap from moshowaragake (Albizia sericea); tannin from nontane (Elephantorrhiza depressa); baskets from a variety of reeds, including Cyperus angulatus and Mucambyntum tortilis, as well as the fronds from both palms; charcoal for forging iron from mouturi (Combretum imbire) and mopandi (Eysenhardtia africana); birdlime from mego (Diptychonyx augustofolia) and Lorentza st., wooden dug-out canoes from mopand (Kigelia africana), mopahlongo and moporo (Lonchopterus capensis), and many woody objects: pots, plates, drums, etc, from zhathe (Lecceoma dissecta), nuna, shi (Butea africana) and Butea pteriflora. Many other plants were used as medicines, some for religious purposes and others for the cure and prevention of sickness. The bark of Silvenana cappa was boiled and the water drunk against malaria; mowano (Termiris sinica) leaves were boiled and the liquid drunk to stop purging; nkhame (Hararpophyton trachob) tubers were boiled and drunk against fever; lusun (Kuphorina sp.) was used against snake-bite; atufa (Sarcostemma longifilis-sulca) was also used for malaria and worm infections (Ixonotus micropteryx) was a specific against the common cold.

Other material

The Mbutshu and the Yi had been accustom to obtaining iron when living in boLozi. This they continued to trade mainly in exchange for tobacco (which they grew themselves), bead necklaces made from rice, bivalves and ostrich-eggs (prepared by the San) and skins.

All groups, except the hirtzland San, made pots of clay, which they fired in open, dung-lined ovens at about 700°. The trading of honey was extremely important, some families spending much of their time in remote areas tapping hives. Other items that were traded from outside for food included haematie, peculians and copper beads, the latter coming from the north. With the introduction of glass beads, cloth, gunpowder and liquor, trading primarily amongst the Mbutshu, but later amongst all groups, became of great importance and practically everything was traded, including slaves, Mbutshu chiefs selling whole villages.

Stock

With the exception of the San, every group, to some extent, owned stock. Originally the Tawana were probably the largest cattle owners, bringing these with them from the Lohep. They found the Yi keeping quite large herds on the Boteti and in the Mahabe, the Kgalagadi with more sheep and goats than cattle at Kgwebe, and the Kharuweb having hog-homed cattle near Lake Xau. After escaping from the Kolo on about 1841, the Tawana seized most of the Yi cattle. The Yi put up no resistance; they were not a warrior tribe and had, in any event, been severely weakened by three successive smallpox epidemics during the previous 20 years.

By 1850 nearly all the cattle were owned by the Tawana and were kept around the southern Delta and on the Boteti, and some as far south as Ghanzi. Most of the herds were kept well dispersed in an attempt to stop the spread of the disease, which was very prevalent, and to make raiding by other groups more difficult. In 1884 the Ndobele raided the Tawana, who drove their cattle into the Delta to hide them. In 1914 the area was struck by rinderpest and most of the cattle and much of the wildlife was decimated. Two Tawana families living well west of the Delta were the only ones to escape and donated much of their breeding stock to help replenish the tribal herds.

In exchange they were given the overlordship of all the area west of the Delta, with all hunting and tribute rights from subservient tribes. This lasted until about 1960.

Rinderpest appears to have had a severe effect on the cattle owners around the Delta. Not only did it reduce the wildlife, but it also almost eliminated the black fly as a result. During the 1920's before the fly re-infested many areas, there were cattle posts on the Khwe River and far up the Boro River, as well as in the Xanaga Valley. With re-infestation, the cattle moved back to the limits of the Delta.

A recent survey gives some rough indication of stock ownership today. The vast majority of the cattle are owned by a few rich families; in fact, only about a third of the families in Ngamaland own any cattle at all. This is almost certainly a traditional pattern resulting, in the case of the Tawana, from tribal ownership of stock. In the survey, all Herero families were found to own stock and the Herero appeared to own between 50-40% of the cattle in Ngamaland. Only one Yi family in five owned cattle and about 80% of all Yi cattle were owned by less than 10% of the Yi cattle owners. Of the Tawana-owned cattle, only one family in three owned cattle and of these over 60% were owned by 4% of the Tawana cattle owners. A little more than 50% of all families own a few small stock. Only four instances of cattle-lending (mafua) were noted.

This indicates that the most widely utilised natural resource, grass, is utilised by less than half the population, that the Herero as a group are the main stock owners and that, in fact, probably not more than 20% of the population really benefits from stock.

Crops

With the exception of the San, crop agriculture was, and is, practised to some extent by all groups. The Mbutshu, although from the Zambez, were accustomed to dryland farming. When they moved to the Okavango they continued their traditional practice of making fields in riparian areas, lopping branches and small trees, clearing undergrowth and burning. Their main crops were Sorgum vulgare and Xeropchus seminatum (Pennisetum seminatum), which they supported with groundnuts, melons, pumpkins, gourds and sugar-cane. A few fields were also cleared in flooded areas, planting taking place as the floods receded. In this way, they were able to plant in August or September without having to wait until the first rains in November, and so had a much longer growing season.
The fertility of the dryland fields was soon exhausted, requiring constant movement, but every year the floodplain and midge fields were spread with a thin layer of silt, thus retaining some of their fertility.

The Yeti grew the same crops, but they were more accustom to the floodplains and operated mainly by wetland methods. However, the recognized precarious nature of floodbed fields led them to supplement these with dryland farming as well.

The Tawana and Kikuyut were accustomed to dryland farming. They soon learned that if they burned the extensive red-bed, these could be used as very productive fields. They appear to have switched from patch to patch, hoarding, planting and then allowing to lie fallow before starting the cycle again. In this way they probably destroyed all the major red-beds to the south of the Delta and along the Boteti. They also copied the Yeti in their wetland methods, but without experience, they often came to grief.

The Kgalagadi practised dryland farming, but this rarely involved any serious field-clearing. They grew a little sorghum, but depended mainly on melons and beans, and when these did badly they resorted to the veld. The Nanzwa practised only dryland farming. Their main crop, and that of the Tawana, was red sorghum. They also grew maize in smaller quantities, this probably having been introduced from the east shortly before 1850.

Conclusion

Today there are about 40 000 people living in and around the Delta. The recent Rural Income Survey indicates that only about 20% of them derive an income from cattle-raising. Some of them are financed through employment, either locally or elsewhere. However, about 70% or more of them appear to have no apparent means of subsistence other than growing crops or utilising natural resources.

There have been some major ecological changes around the southern periphery of the Delta since as recently as 1850. Pole Evans and others have pointed out the changes in grass cover taking place along the Boteti, around the Lake and in the vicinity of Tau. There are other more dramatic changes, such as the extinction of reed-beds, blocking of waterways and diminution of large trees. It has been suggested that the degradation of the environment has either been caused or speeded up by poor agricultural practices, and in particular, heavy utilisation of the grass-cover by stock.

There has been severe reduction in wildlife, and in some instances, habitat change has been so great as to exclude species from areas where they were wont to exist. Such an instance is the extinction of lodewi and nitutora on the Boteti. In addition, excessive hunting has eliminated rhinoceros from the whole area, excluded giraffe from the southern Delta and diminished elephant.

The introduction of stock has certainly been responsible for many changes for the worse in grass composition, which has resulted in range reduction of many species of wildlife, such as sable, roan and sesebe, and severe reduction in the vast herds of plains wildlife which were such a common feature 100 years ago. Although careful studies have not yet been completed, it is apparent that man and stock come into conflict respecting many edible plants and that the range where traditional wild foods could be collected in abundance is decreasing.

From their knowledge of plants, fishing and hunting techniques, river agriculture and water transport, it is apparent that those people who have relied more on natural resources than on stock for subsistence are well acquainted with their environment. Also, it is doubtful if food-collecting and hunting purely for subsistence purposes has any appreciable effect on the land. In fact, lacking any other major means of subsistence, for nearly 70% of the population the traditional way of life was, and is, well integrated with the needs of the environment.

It appears that only about 20% of the population benefit from the major utilisation of the environment: made by stock, but that stock may well be responsible for reducing the resources of people who still rely to some extent on food-gathering, and reducing the range for many species of wildlife. Uncontrolled expansion of stock-raising into the Delta will only obviously materially benefit one person in five, while, in the long-term, it is likely to have an adverse effect on the subsistence of a much greater proportion of people who, at the present time, must rely on the Delta’s natural resources as a supplement, either greater or smaller, to any other means of support they may have.

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