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People of the two-way river: socioeconomic change and natural resource management in the Nata River region

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Introduction

According to United Nations projections, by 2025 a fairly sizable proportion of the population in some African countries will not have sufficient water to meet their basic needs (Gleick 1998). Southern African rivers and other water-related ecosystems are seen by both ecologists and governments as being in declining ecological health. The reasons for this situation include high demand on the water systems, pollution from a variety of sources, heavy extraction for irrigation and mining in some areas, and the lack of sustainable water use (Chenje and Johnson 1994, 1996). The riparian ecosystems of Africa often support large numbers of people and the soils, plants, and animals upon which they depend (Scudder 1991). Given this situation, it is crucial that efforts be made to maintain as much as possible the natural flow of these water systems. If they are not, then it is likely that the ecosystems will be degraded. Clearly, southern Africa is facing tremendous challenges when it comes to water.

The Southern African Development Community consists of 14 countries with a total population estimated in July 1999 to be 193,797,597. There are 52 international river basins in the SADC region in an area of 10,028,182 square kilometres. International river basins are defined here to mean those river basins that are shared by two or more countries. Virtually all southern African states share one or more basins with other states, with the exception of the island states of Mauritius and the Seychelles.

The water use of a substantial number of people in southern Africa is below the Basic Water Requirement (BWR) of 50 litres per person per day (Table 1). Even in those areas where the population has sufficient access to water, they have their problems. This was the case, for example, in the flood plain of the Limpopo River in southern Mozambique in the early part of 2000, when hundreds of thousands of people were forced from their homes because of the massive amounts of water coming down the river and overflowing the river banks.

The Nata River of northern Botswana and western Zimbabwe is one of five international or transboundary rivers shared between Botswana and other countries (Figure 1). The other international river systems are (1) the Okavango, shared with Angola and Namibia, and linked very occasionally via the Linyanti/Chobe with the Zambezi, (2) the Orange, shared with Lesotho, South Africa and Namibia, the link provided by the Molopo and Nossob which also flow only occasionally, (3) The Limpopo, shared with South Africa, Zimbabwe, and Mozambique, and (4) the Zambezi, shared with Zambia, Angola, Namibia, Zimbabwe and Mozambique. The Nata River can be considered a minor international river in the sense that it has a small catchment area, a relatively limited (and highly variable) flow, and there is no international agreement governing its use between Botswana and Zimbabwe. The Okavango is the largest international river that enters Botswana, while the Nata is one of the smallest (see Table 2 for a comparative analysis of the two rivers).

The purpose of this paper is to discuss the changes over time in the ecology of the Nata River region and to assess the impacts of those changes on the socioeconomic systems of the population that utilize the river's water and the resources associated with it. After a discussion of the ecology of the Nata River region, we examine the ways in which the riparian resources of the Nata River have been utilised over time. We then discuss the changes that have occurred in the Nata region

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Table 1: Southern African countries with total domestic water use below 50 litres per person per day (the Basic Water Requirement, BWR)

| Country | Population (1990) | Percentage with Access to Safe Drinking Water (1985 figures) | Total Domestic Water Use (litres per person per day) | Use as % of the Basic Water Requirement of 50 litres/day |
|------------|-------------------|--|--|--|
| Mozambique | 15.66 million | 15% | 9.30 | 19% |
| Tanzanie | 27.32 million | 53% | 10.01 | 20% |
| Congo | 35.7 million | 32% | 16.70 | 33% |
| Lesotho | 1.77 million | 36% | 17.00 | 34% |
| Angola | 10.02 million | 33% | 18.30 | 37% |
| Malawi | 8.75 million | 56% | 29.70 | 59% |
| Swaziland | 790 000 | 31% | 36.40 | 73% |
| Zimbabwe | 9.71 million | 84% (1990) | 48.20 | 96% |

Note: Data presented in this table were drawn from Gleick (1998:45, 252, Tables 2.1 and 5)

Table 2: Comparison of the Okavango and Nata River basins of southern Africa

| River Basin | Riparian States | Size of Basin (square km) and Size of Delta | Mean Annual Rainfall (mm) and Annual Flow of River (cubic metres) | Human Population in the River Basin |
|-------------|--|---|---|--|
| Okavango | Botswana Angola Namibia Zimbabwe (N=4) | 586,000 (Delta = 7,000 — 12,000 sq km) | 580 mm rainfall 11,650,000 cubic kilometres | 25,000 in Delta 100,000 on Okavango River in Namibia |
| Nata | Botswana Zimbabwe (N=2) | 23,000 (Delta = 400-600 square km) | 400 mm rainfall 279,000,000 cubic metres | 5,600 in Botswana 6,400 in Zimbabwe |

Note: there is an international agreement on the Okavango River, the Permanent Okavango River Basin Water Commission (OKACOM), established in 1994; the Nata River has yet to have an international agreement worked out

Figure 1: The Republic of Botswana

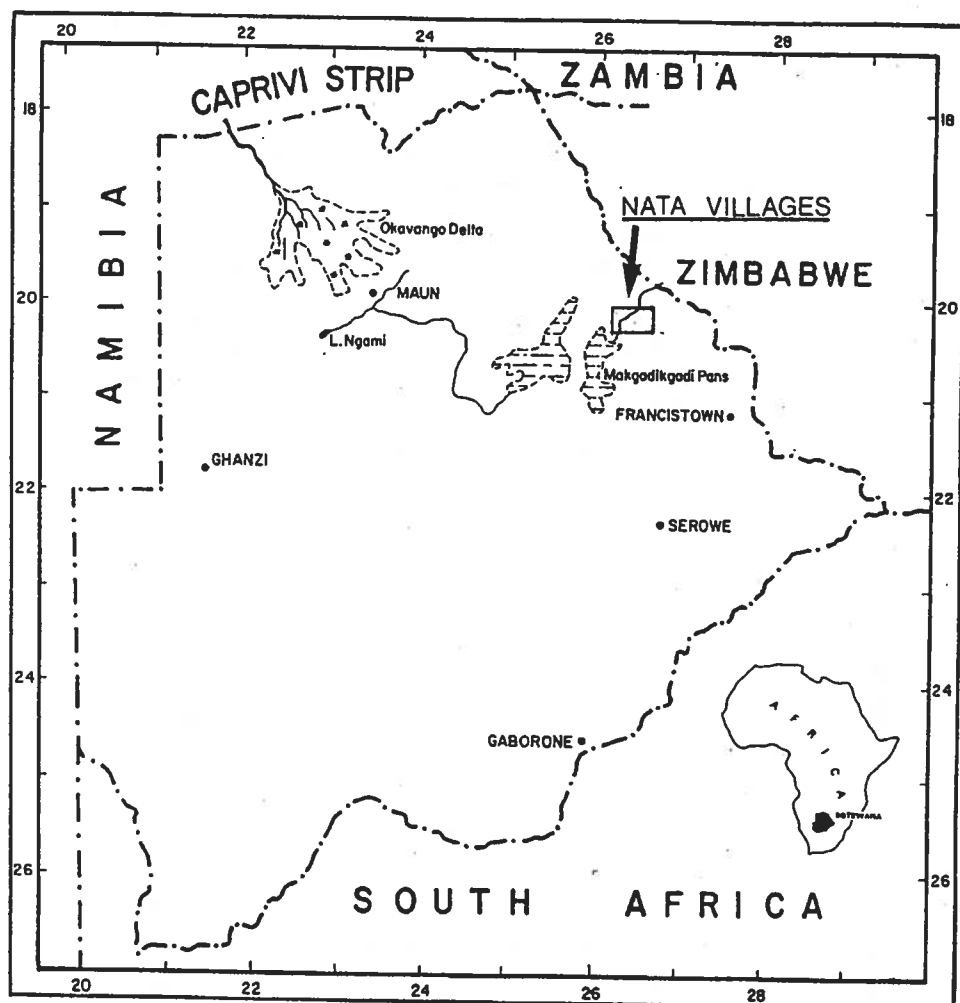
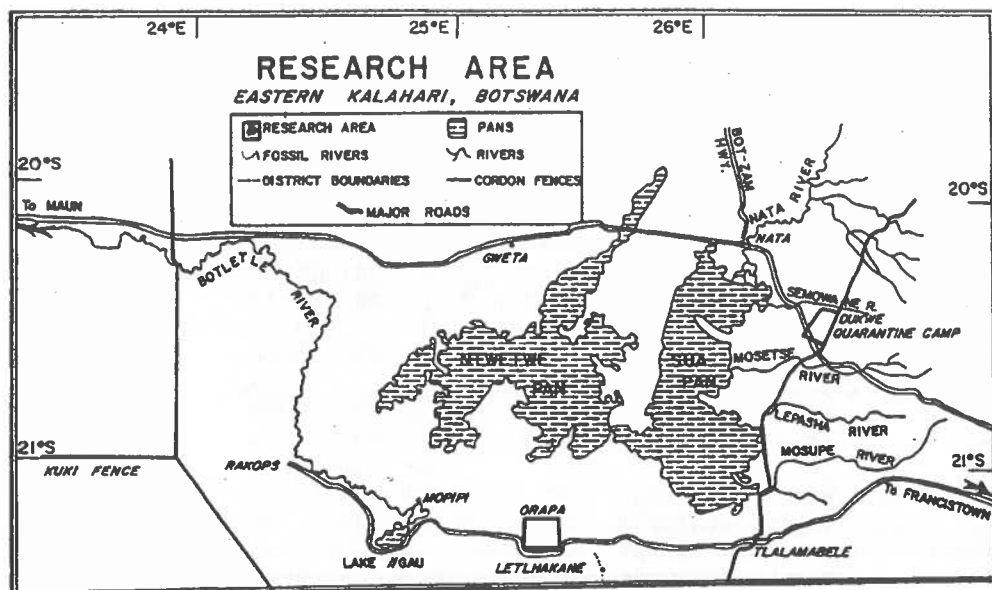


Figure 2: The research area



both in northern Botswana and western Zimbabwe. We conclude with a discussion of the ways in which the conservation and development of the Nata River region have been approached in the past century.

The ecology of the Nata River region

The people of northeastern Botswana and western Zimbabwe have a special attachment to the Nata (known in Zimbabwe as the Amanzanyama) River, which they believe is the source of life itself. The Nata River provides water for local people who use it for domestic purposes (drinking, washing, and sanitation). The river also supports fauna and flora species, including several species of fish but, importantly, no crocodiles or hippopotamus at present. An important aspect of the Nata is that it serves to help replenish the aquifer that is tapped by wells and boreholes in the northeastern part of Botswana today. The Nata flows off the Zimbabwe Plateau and eventually ends up in Sua Pan, one of the two gigantic pans that make up the Makgadikgadi Pans complex in northern Botswana (Figure 2).

The Nata River is somewhat unusual because of its low gradient. When the river is filled due to rains in the upper catchment the water flows relatively quickly down the bed of the river, but sometimes the water currents reverse themselves and flow up river. Because of this behaviour people in the northeastern Kalahari region call the Nata 'the two-way river'.

Rivers in northern Botswana and western Zimbabwe are ephemeral, flowing only after rains if at all. The Nata is the largest of these seasonal rivers. Two smaller rivers are tributaries of the Nata: the Dzivanini (Tsebanana) and the Sa/a Rivers. The Amanzanyama River in Zimbabwe serves as the southern boundary of Hwange National Park, one of southern Africa's premier conservation areas. Hwange National Park, which covers an area of 14,620 sq km, has one of the widest assemblages of large mammals of any comparable area in the world, with 35 species of mammals that are jackal-sized or larger (Child 1995:21).

Flows in the Nata River have been gauged at Nata Village since December 1969. Based on the

data obtained, the mean annual flow of the Nata is 279,000,000 cubic meters. As Sir Alexander Gibb and Partners (1977:72) note, this flow represents a considerable resource by eastern Botswana standards, being exceeded only by the Limpopo and Shashe Rivers. In spite of the fairly sizable mean annual flow of the Nata River, its water development potential is seen by hydrologists and engineers as being relatively limited. It was concluded by hydrological engineers that there was not a suitable site on the river that would provide water of sufficient quantity and quality to warrant construction of a dam (Gemmell 1972; Sir Alexander Gibb and Partners 1977:73).

There are seasonal and longer-term differences in the flow of the Nata River. In some years, such as the 1975-76 rainy season, the river flows for an extended period of time. During drought periods, on the other hand, the river may not flow at all, sometimes for several years at a time. The Nata River mouth in northern Sua Pan at times has had a shallow lake ranging from 400-600 square kilometres in size which has served as a focal point for large numbers of flamingos (*Phoenicopterus minor* and *Phoenicopterus ruber*) and other waterfowl which congregate in the area to breed and to feed on brine shrimp and other resources.

Droughts and long-term climatic change have had significant impacts on floral and fauna populations in the Nata region. In drought periods that lasted several years some of the trees along the river died. In flood years the tree and shrub populations along the river are replenished by seedlings that come down the river. The cycles of droughts and floods have significant effects on the wildlife, livestock, and human, populations in the Nata region.

Thousands of wildebeest and Cape buffalo died in the Nata area in 1962 as a result of the drought which was to last until 1966 (Alec Campbell, personal communication). In fact, so many wildebeest died, according to local people, that the local traders stopped buying the tails, which are used by some people as fly switches and by traditional healers during ceremonies and dances. The bones of the dead animals were collected and sold to the bonemeal factory in Francistown, but eventually the factory had to stop buying the bones because of their abundance. In flood years people have sometimes had to relocate their homes or have had to be rescued by Botswana Defence Force personnel, as was the case in early 2000.

The Nata region consists of gently undulating sandy plains dissected by east-west trending fixed dunes and drainage. Shallow depressions known as pans that contain silts and clays and which hold water after rains dot the area. The topography of the area is slight, with elevations ranging from 956 metres at the point where the Nata enters Botswana from Zimbabwe (at 19 degrees, 52 minutes, 35 seconds south latitude), to 910 metres at Nata Village. The average elevation of the area is 925 metres. Most of the area is underlain by geologically recent Kalahari deposits, and in some areas there are tropical ferruginous soils and black cotton soils (Blair Rains and McKay 1968:21-26).

Historically, the Nata River region was considered to have some of the most abundant herds of large game in southern Africa. As Emil Holub, an early explorer of the Nata River region put it about the sandy plateau north of the Nata: "It is the district of south central Africa where the larger mammalia, such as elephants, rhinoceros, and giraffe begin to be more abundant" (Holub 1881:78). The region supports numerous species of large antelopes as well as the full array of southern African predators. Water-dependent species such as roan and sable are found in the Nata River area, unlike the areas in the east-central Kalahari to the south.

The riverine gallery forest along the Nata and its tributaries provides habitats for a number of animals not found in the open shrub savanna of the Kalahari, including vervet monkeys and bush squirrels. The open grasslands to the west of the Nata contain plants such as *Odysea panicinervis*, which are important to the diet of smaller mammal species such as bush squirrels.

Vegetation varies from riverine gallery forest along the Nata River to open savanna grasslands, interspersed occasionally with stands of mopane (*Colophospermum mopane*). In the northern part of the area there are thick woodlands consisting of *Baikiaea plurijuga* and *Burkea africana*. To the south of the river are open flats with no vegetation whatsoever ranging into grassy plains dotted in places by vegetable ivory palms (*Hyphaene ventricosa*) and baobab trees (*Adansonia*

digitata). Tree density on the linear (*alab*) sand dune ridges north of the Nata River tends to increase as one moves northwards towards Chobe. There are pans between the dunes, some of which support the growth of *Phragmites mauritianus* reeds (sometimes used for house construction purposes) and edible water lilies known to local inhabitants as *tswii* (*Nyamphaea caerulea*).

Water use in the Nata River region

The climate of the Nata area is semiarid, with annual precipitation ranging from 240 to 700 millimetres and averaging 400-450 millimetres per annum. Most of the rainfall comes in the form of high-intensity, short-lived convectional thundershowers. The summer-dominant rainfall pattern in the region is apparent, with December and January having the highest annual rainfall during the rainy season (November-April). Peak flow in the Nata is between January and March each year. Evaporation rates generally exceed rainfall, and at times the evaporation is eight to ten times the rainfall inputs in the Kalahari.

Local people use water that they obtain from the sandy bed of the river in the dry season by digging down into the sand, or they take it out of the river directly when it is flowing during the wet season. People obtain water for various purposes, including drinking, personal hygiene, washing of clothes and dishes, and for domestic construction, such as wetting of mud floors or for mixing with cow dung and mud to make a kind of adobe used in house construction. Domestic water use in the Nata River area ranges from about one bucket (20 litres in size) to about three buckets, depending on the number of people in the household unit and the number of people available to go and get water from the river.

People also utilise pools in the sandy bed of the river for purposes of fishing and watering of livestock. They draw the water directly from the pools for purposes other than drinking; generally, they do not drink the water from the pools in the bed of the river, preferring instead to dig a hole in the sand nearby and let water seep into the hole. They then scoop the water out with a cup or bowl and put it in a larger container such as a bucket or plastic water jug. They do this, they say, because the water is cleaner and less likely to contain harmful bacteria.

According to the people of the Nata River region, river utilisation depends on several factors: (1) the size, density, and distribution of population that exploit the water of the river (human, livestock and wildlife), (2) the degree to which the local population stay close to the river or move away from it for part of the year, (3) the technology of the human population (i.e. whether they have access to large containers such as drums or to pumps that can take water out of the river), (4) subsistence and income-generating requirements of the population (e.g. use of the riverine resources for food, medicines, or goods for sale, such as river sand), (5) needs of the population to cross the river, and (6) the degree to which the river is in flood.

Interviews of local people in the Nata area indicated that people preferred to cross the river when it was less than thigh deep on an adult, or knee deep on a child. There was a fair amount of trepidation about the river on the part of local people, some of whom felt it was dangerous for young children and their domestic animals to get too close to it when it was in flood. Similar concerns were expressed about deep pools in the river, where children or livestock potentially could fall in and drown.

The population of the Nata River region

People have resided on the banks of the Nata since the Early Stone Age (Cooke 1967). The Nata River has served as the boundary between chiefdoms and states, and it was the source of competition between the Ngwato and the Ndebele in the 19th century (Parsons 1973; Maylam 1980). In the latter part of the 20th century, the Nata region was the site of number of important development and conservation activities, ranging from livestock ranching and mining to ecotourism and community-based natural resource management (Gadibolae 1985; Hitchcock 1988; Venn 1996).

The Nata River region has supported a variety of groups including the Ngwato, the largest of the eight Tswana tribes, the Ndebele (Amandebele, Matabele), a Nguni-speaking people who established themselves in western Zimbabwe in the 1840s, and the Kalanga, the largest of the non-Setswana speaking groups residing in Botswana. The Kalanga, who speak Ikalanga, a language related to Shona, are primarily agriculturalists, although they do keep some cattle. The Kalanga make up the majority of the non-Basarwa residents of the Nata River region. There are also people in the Nata River region, particularly near the village of Basutos on the Botswana/Zimbabwe border, who are descendants of Basotho police officers who were brought to Botswana around the turn of the century by the Bechuanaland Protectorate administration.

The population with the longest history of residence in the Nata region is the Basarwa, or, as they are known in Zimbabwe, the Batwa or Amasili. There are a number of different Basarwa groups in northern Botswana, the largest of which is the Tyua (Chwa, Shua) (Table 3).

Table 3: Group names and locations of Basarwa (Bushmen) populations in the northern Kalahari desert region of Botswana and western Zimbabwe

| Study Area | Group Name(s) | Location(s) and Areas Utilised |
|------------------------------|----------------------------------|--|
| Northern Makgadikgadi Region | Tyua (Tshwa, Chwa, Cwa) | Nata River region and area north of Sua Pan and Ntwetwe Pan (Makgadikgadi Pans) |
| | //Goreekhwe | Area northwest of Botletle River and Ntwetwe Pan west of the Nata River |
| | Danisan (Madenassena) | Area north of Ntwetwe and Sua Pans, including Gweta, Kanyu, Odiakwe and Bushmen Pits regions |
| | Ganade (Ganadi) | (Kuakaka Pan, Motomaganyani Pans, and Gum//gabi northwest of Nata River |
| | //Kaiye (/l'aye) | Tabatshukudu and area between Ntwetwe and Sua Pans |
| | //Gwaochu | Area northwest of Nata and the Nata River |
| Eastern Sua Area | Tshiti (Chaité, Chiti, Tidikhwe) | Area north of Ntwetwe and Sua Pans and western Zimbabwe |
| | Shua (Shuakhwe, Mashuakwe) | Nata River and area east of Sua Pan |
| | /Taise (/aise, /Xai) | Nata River region and east side of Sua Pan |
| | G//abeke | Area east of Sua including the Lepasha, Semowane and Mosetse Rivers areas |
| | Phaleng | Nata River area, Lepasha area, east side of Sua Pan |
| | /Kaichwa | Makgadikgadi Pans and area to the east of Sua Pan |
| Botletle (Boteti) | Teti | Vicinity of Boteti River and Lake //Gau (Dow) area |

Note: Data obtained from fieldwork; see also Cashdan (1979, 1985, 1986); Hitchcock (1982, 1988, 1995)

Sometimes called River Bushmen, the Tyua are Central Bush or Khoe-speaking peoples (Barnard 1992:117-133). The Tyua number approximately 7,500 and are located in the region that includes the Makgadikgadi Pans and areas to the north (e.g. Bushman Pits, Odiakwe) in the Central and North West (Ngamiland) Districts of Botswana and the Tsholotsho and Bulalima-Mangwe Districts in the Matabeleland North Province of Zimbabwe (Hitchcock and Nangati 1993). These peoples today combine agriculture and livestock production with employment and participation in small-scale rural industries (e.g. basket manufacture and sale) and hunting and gathering (Hitchcock 1999).

It is likely that cattle, goats and sheep were brought into the northern Kalahari region as early as the first half of the first millennium AD. Iron Age archaeological sites abound in the region, including ones at Moseitse and in the area of the Nata, Semowane, and Lepasha Rivers. These Iron Age populations interacted extensively with local Tyua groups. Some Tyua may have been used in mining at what is now known as Bushman Mine to the north-northeast of the village of Moseitse.

By the mid-19th century, when the Ndebele and the Ngwato had established themselves in the northeastern Kalahari region, Tyua and other local people were employed as herders on their cattle posts (*meraka*), as guides for their hunting parties, and as assistants for processing animals once they were killed. Tyua were supposed to provide tribute (*sehuba*) to the Ndebele and the Ngwato, usually in the form of meat, skins, or, in some cases, high value animal parts such as elephant ivory, rhinoceros horn, and ostrich feathers (Chapman 1971). Tyua women worked as domestic servants in the homes of well-to-do agropastoralists, including the chiefly family of the Ngwato Tribe, the Khamas (Hitchcock 1999).

The lower reaches of the Nata River contain brine pools in which blocks of salt form. The salt is of high quality, according to assessments of samples obtained by in the early 1950s (Botswana National Archives S.488/6) This salt was extracted in blocks by local people, who used it themselves or traded it to other groups (Hitchcock 1982). The salt trade was an important source of income for people in the Nata region, especially those who were poor.

In the 19th and 20th centuries, the Tyua engaged in the procurement and exchange of fish, salt, palm fronds, and baskets with the Kalanga and Ndebele, receiving pots, metal tools, and ammunition in return. As one Tyua man put it, "The most important things to a Tyua are meat, salt, water, and palm trees." All of these resources, they maintained, were either directly or indirectly related to the Nata River.

Late 19th and 20th century history of the Nata River region

The Nata River region has witnessed complex interactions among a variety of groups and institutions. In August 1894 there was an incident in which Khama III, chief of the Bamangwato Tribe in eastern Bechuanaland, claimed that some British South Africa (BSA) Company men had taken guns away from Basarwa in the Nata region (Maylam 1980:141). The BSA company, for its part, said it could do this as it owned the territory, something that Khama III and the Ngwato disputed. In 1895 Chief Khama complained of a European man settling on the Nata River (Botswana National Archives (BNA) file HC.182/2). As it turned out, the individual had been sent by the British South Africa Company to obtain salt and had been delayed by the rains. Chief Khama pointed out that in his opinion the salt belonged to the Ngwato, not the Europeans. Basarwa in the Nata region, on the other hand, maintained that the salt was theirs.

Disputes over the resources of the Nata were not uncommon in the period from the 1850s through the 1940s. In 1899, after the rinderpest epidemic had wiped out most of the cattle on the Nata River and in much of the rest of southern Africa, the Ndebele and the Ngwato both sought to re-establish functioning cattle posts in the Nata area. There were occasional cattle raids by Ndebele, Ngwato, Kalanga, and Basarwa, adding to tensions in this frontier zone.

In 1940 Southern Rhodesian police officers complained that a party of armed Basarwa at Gazuma's Vlei near Kazangula were robbing men returning from work in the Wankie (Hwange)

area of what is now Zimbabwe. Khama was requested to look into the matter, but he pointed out that the area north of the Nata River had been ceded to the British as Crown Land as part of the agreement to establish the British Protectorate of Bechuanaland in 1895.

The area north of the Nata River had been designated Crown Land, while the area south of the Nata was considered part of the Ngwato Tribal Territory after 1904. In 1907 a Bechuanaland Protectorate policeman, Arnold Hodson, accompanied Sekgoma Khama, the son of Khama III, and his followers to the Nata River region where they were required to stay after a split between Khama III and Sekgoma (Hodson 1912). Sekgoma and his Ngwato followers stayed in the area from 1907 to 1916, when Sekgoma returned to Serowe. Some of the Ngwato stayed on at Marulamantsi north of what is now Nata Village for some years after that.

In Bechuanaland, the period between 1907 and 1916 saw disputes erupt between Khama and Sekgoma over such issues as Sekgoma's followers crossing the Nata River into the Bamangwato Tribal Reserve and "bothering Khama's Bushmen" (BNA S.34/8). There were also labour disputes between the two segments of the Ngwato. Some of the Tyua herders felt themselves to be caught between the two powerful Ngwato leaders, so they opted to leave the area in search of a less stressful work environment. In 1909 a copper mine now known as Bushman Mine was opened at Mosetse, and a number of the Basarwa on the cattle posts on both sides of the river went to the mine to work. Others crossed the border into what is now Zimbabwe and sought work on the white farms or in the mines at Wankie.

In the period between 1890 and 1923 the Department of Agriculture of Southern Rhodesia oversaw the administration of wildlife and other resources in the Amanzanyama region. The *Game and Fish Preservation Act of 1929* saw the establishment of several game reserves and national parks, including Wankie Game Reserve just to the north of the Amanzanyama River region (as noted before, the Amanzanyama represents the southern boundary of Wankie Game Reserve). With the passage of this legislation local people were required to cease their subsistence hunting activities. Police patrols were mounted by the Southern Rhodesian government into the remote areas of the region to seek 'ivory poachers' (Davison 1977:5-6).

The game ranger who was appointed to oversee the Wankie area in the late 1920s, Ted Davison, undertook trips into the region to assess its status and to tell Bushmen and other residents that they were breaking the law (Davison 1977:17-24). These efforts were not easy, as Davison noted, saying "Bushmen who knew the area kept their secrets, refusing to divulge any information at all – probably because they felt this might lead to the arrest of relatives engaged in poaching" (Davison 1977:16). One of Davison's tasks was to warn people that the area was now a game reserve and that they were not allowed to live there (Davison 1977:20).

Davison, unlike other wildlife personnel, had a certain amount of empathy for the Bushmen, as revealed in a statement he made in his book: "These Bushmen, in fact, evoked a degree of sympathy. They were not really poachers in the worst sense. Just like a pride of lions, they killed only for their own needs, amounting to not much more than an animal a week. However, the law had come to Wankie Game Reserve and it had to be implemented" (Davison 1977:21).

Unfortunately, there were other less positively inclined individuals, some of whom worked for the government, and others who were 'self-appointed conservationists'. One of these men, H G Robins, was a former hunter who resided on a farm to the north of Wankie Game Reserve. According to Davison (1977:23), Robins was obsessed with the idea that the region was "infested with poachers, all of whom were concentrating their efforts on his land." Robins carried out patrols both by vehicle and on foot, looking for the tracks of Bushmen who he believed were responsible for what he believed were declining numbers of large game. Davison, for his part, had concluded after some of his initial surveys of the Wankie region that the poaching problem was not nearly as serious as he had been led to believe (Davison 1977:23-24). He admitted that there were indeed Bushmen families moving around the area, some of them with muzzle loaders (Davison 1977:24). These Bushmen apparently were not using either poisoned arrows or wire snares, items which were considered highly lethal to game populations. In Davison's opinion, the biggest con-

straint affecting wildlife populations in Wankie was not poaching but rather the availability of surface water.

In the late 1920s and early 1930s Bushmen were informed by government officials that they had to move out of the Wankie Game Reserve (Albert Potts, Gary Haynes, personal communications). Some of them did so, but others retreated into the dry interior along the Botswana-Zimbabwe border. Patrols were sent in to arrest people and to remove them from the game reserve. Oral history data indicate that the Tyua who left the reserve shifted into a more mixed economic system in which livestock raising and cattle post labour played a relatively important role at least for some members of the population (Hitchcock 1988).

Relocation and socioeconomic change in the Nata River region

By the early 1940s the numbers of Basarwa in the region north of the Nata River had increased to several hundred or possibly as many as 700-800, according to local informants. In October 1943 two Rhodesian Air Force pilots brought their plane down for a landing in the area of what is now Kuakaka Pan north of the arm of Ntwetwe Pan. They had run out of fuel. They left a note on their plane saying that they were setting off to seek help. They were never seen again. The plane was located after a search by Bechuanaland and Southern Rhodesian authorities on November 8. Later on, when police investigated the disappearance of the two pilots, some of their belongings were found to be in the possession of some Ganade Basarwa who resided in the region. Eventually, eight people were arrested and tried for murder of the two airmen, but they were acquitted because of lack of evidence (BNA file S.198/2).

The Bechuanaland Protectorate government, in conjunction with the Ngwato tribal authorities, decided to disarm and remove the Basarwa from the Northern Crown Lands region (BNA S.303/8/1). This process began in 1944-45 and lasted, according to people who lived in the area, until the early 1950s. Basarwa in the Crown Lands were contacted and requested to relocate to areas south of the Nata River in the Ngwato Tribal Territory. A stated purpose of the relocation of the Basarwa out of the Crown Lands was, according to a Protectorate administrator, A D Forsyth-Thompson, not so much to drive the Basarwa out of the area or to frighten them but rather "gradually to teach them a better way of life" and "to furnish them with a means of subsistence other than those depending on the gun, the bow, and the trap" (BNA S.303/8/1).

One suggestion that was made as a means of providing alternative economic opportunities was to promote livestock production through the establishment of a livestock improvement centre in the area. However, this decision was never implemented by the Protectorate administration, ostensibly because there were so few cattle owned by Basarwa in the region. One estimate given by a veterinary officer, von Backstrom, in July 1946 was that there were only 98 head of cattle owned by Basarwa in the Gweta, Nata, and Mosetse areas combined (BNA S.426/1).

An outgrowth of these events was the decision by the Protectorate administration to establish a police post at Nata Village. On 3 February 1945 a Sergeant Whallen arrived there to take up his duties as the non-commissioned officer in charge of the post (BNA S.218/3). Camel patrols were undertaken in the northern Crown Lands area, and local people were encouraged to relocate to either the Chobe District (the Nunga area) or to the area south of the Nata River in the Ngwato District. According to reports of the police (e.g. those in 1948, see BNA S.218/3), the levels of poaching declined after people in the area were disarmed and relocated.

In the late 1940s and early 1950s, a set of cattle ranches was established by the Colonial Development Corporation (CDC) in the area north and east of the Nata River, along with a large ranch near Pandamatenga in northern Botswana. These ranches were fenced, something that led to disruptions of wildlife movements and the deaths of wildebeest, zebra, and other wild animals. There were other problems on the ranches, including high predation rates by lions and hyenas and deaths of cattle due to consumption of *mogau*, a poisonous plant (*Dichapetalum cymosum*).

The construction of the weir across the Nata River in what is now Nata Village in 1941 was

Figure 3: The main villages in the Nata River region

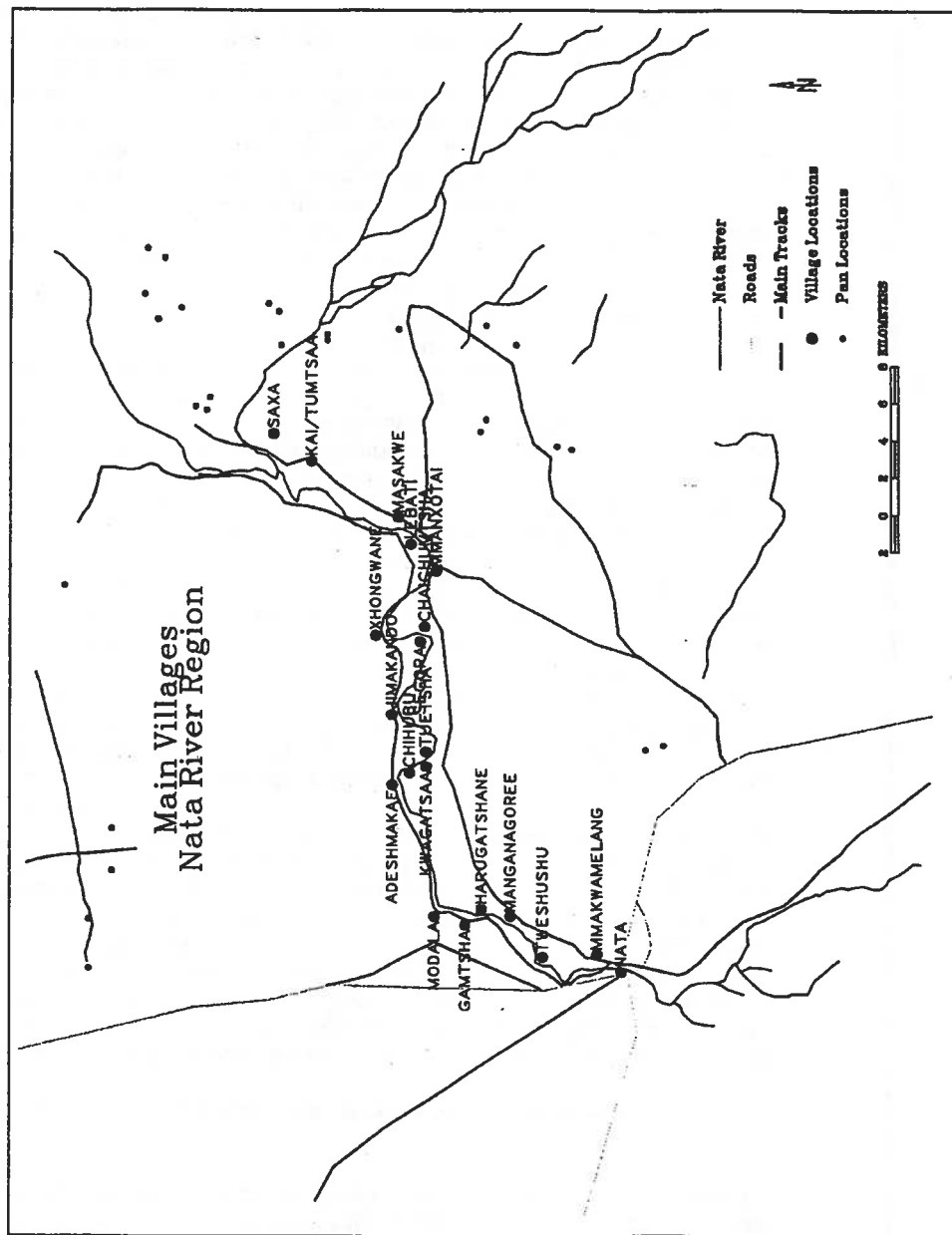
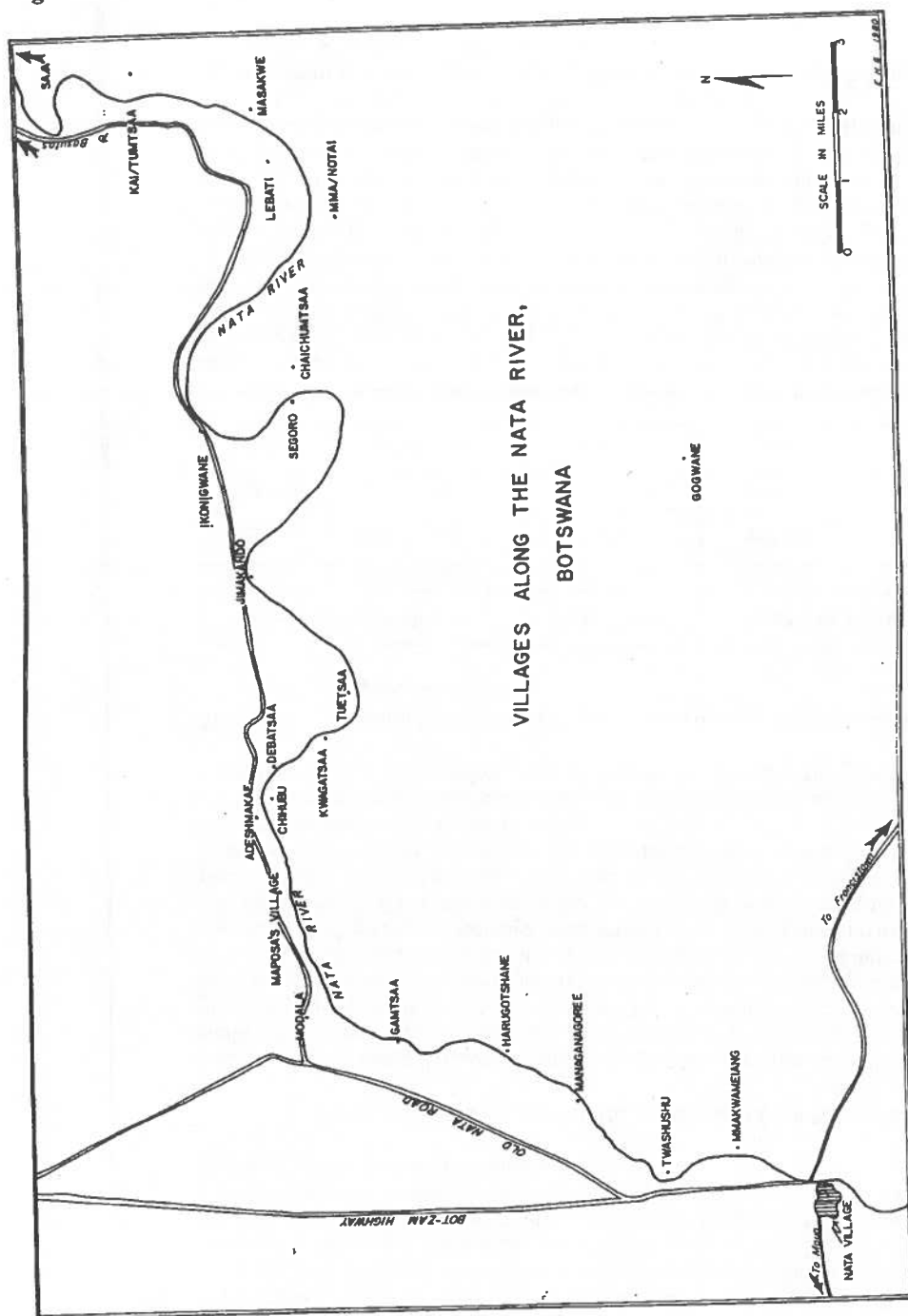


Figure 4: The villages along the Nata River



said by local people to have had negative effects on the resources in the river, especially the fish. At the same time people sometimes sit on the weir and fish, and they have been known to hold nets in the spillway below the weir in an attempt to catch whatever fish that do come down the river.

In the early 1950s the Bechuanaland Protectorate administration established a series of veterinary cordon fences and quarantine camps to prevent the spread of foot-and-mouth disease. One of these was the Dukwe Fence, which bisected the region between the Nata and what is now Bokalaka. The movement of livestock and the carrying of meat across these fences was restricted, something that local people were concerned about.

Competition and change in the economies of the Nata River region

As a result of the rising livestock and human population densities along the Nata, especially on the south side of the river, there was greater competition for resources, including water, fish, veld products (e.g. thatching grass), and wildlife. This competition sometimes led to conflicts between local people. Some of these conflicts were between people who engaged in fishing and those who utilised the river and its pools for other purposes, particularly the grazing of livestock. There were complaints by Ngwato and Kalanga cattle owners about local Tyua who used fish baskets to catch fish in the pools. The cattle owners felt the fishermen were stirring up the mud in the water, making it unfit for cattle to drink. Fishermen, on the other hand, complained about large numbers of cattle using the pools, which they said led to reductions in the numbers of fish due to trampling and diseases transmitted by the livestock.

In the dry winter months the only water resources available generally are in the bed of the Nata River (see Table 4 for a breakdown of the seasons according to the Tyua).

Table 4: Seasonal divisions of the year according to the Tyua of the Nata River region, Botswana

| Season | Months | Tyua Term | Setswana Term | Conditions |
|--------|--------------|-----------|---------------|----------------|
| spring | Sept-October | /e | pulanta | hot, dry |
| summer | Nov-March | baraa | selemo | hot, wet |
| autumn | April-May | sao | letahula | cooler, drying |
| winter | June-August | koo | mariga | cold, dry |

People fish in these pools, sometimes in groups. In some cases, other kinds of species were obtained close to the river, including water turtles, bull frogs, and monitor lizards. A particular favourite of the Nata Tyua was the python (*Python sebae*) which were found relatively frequently under logs not far from pools in the river. But the most important subsistence-related activity in the Nata River itself besides water collection was fishing.

The Tyua took great pride in their fish resources, saying that fish were crucial to their well-being. In fact the degree to which fish were a major component of the diet was highly variable. In the interviews that the University of New Mexico Kalahari Project personnel conducted in the mid-1970s, the numbers of people dependent on fish were quite low (UNM Kalahari Project 1987; Hitchcock 1988). The people who were most dependent on fish for their subsistence tended to be small-scale poverty-stricken households headed by elderly men. The wealthier the household, the less likely it was to utilise fish for subsistence, although there were cases of herdboys (*badisa*) from wealthy families using hooks and lines or spears for fishing in periods when they were not looking after the cattle and goats.

In the 1970s the Tyua in the middle section of the Nata River in Botswana resided in small villages and dispersed extended family compounds ranging in size from 10 to 120 people (see Table 5).

Table 5: Population size, range size and population density of villages along the middle section of the Nata River, Botswana (1975-76)

| Village Name | Compounds | Population Size | Range Size (square km) | Population Density |
|--------------|-----------|-----------------|------------------------|--------------------|
| Manxotae | 21 | 129 | 1,385 | 0,093 |
| !Kongwane | 10 | 92 | 370 | 0,251 |
| Segoro | 4 | 22 | 1,017 | 0,022 |
| Tcaitcumtsaa | 11 | 73 | 50 | 1,46 |
| Lebati | 3 | 15 | 745 | 0,02 |
| Masakwe | 10 | 58 | 1,963 | 0,029 |
| Gogwane | 7 | 68 | 420 | 0,162 |
| Kai/rumtsaa | 5 | 29 | 268 | 0,108 |
| Sa/a | 8 | 68 | 520 | 0,131 |
| Tjamakando | 2 | 23 | 360 | 0.064 |
| Totals | 81 | 577 | 709,8 | 0,139 |

Note: Data obtained during fieldwork along the Nata (August, 1975—November, 1976) (from Hitchcock, 1982, 1988)

Local communities were characterised by a kind of land use pattern in which extended seasonal forays were taken from stationary village sites along the Nata to areas away from the river where there were pools that contained water during the dry season. There they undertook foraging activities, including the collection of wild plants and, in some cases (e.g. at the pool known as Dzivinini or Sebanana), fishing (Hitchcock 1982).

Two major methods of fishing were observed in the Nata region. Conical fish traps known as *dumbu* were used to capture fish, usually by women but sometimes also by men or children. The trap was held with both hands and thrust down vertically into the water of the pool into the mud. Fish caught in the *dumbu* were then taken out of the trap by hand through a hole in the side of the trap. The other method of fishing involved the use of spears. Sometimes two spears were used, one a small spear with a piece of sharpened wire which was thrown down into the water, generally by men and older boys. If it struck a fish, especially a barbel (*Clarias* spp), the spear would quiver, alerting the fisherman to the presence of prey. The fisherman would then use a larger spear to impale the fish and bring it to shore. In some cases people fished by hand. There were also cases in which people used hooks and fishing lines to catch fish. The hook and line method became more important after such items were introduced by traders (e.g. Bobby Wilmott and the Haskins) in the 1950s and 1960s and by people from the Fisheries Unit of the Ministry of Agriculture in the 1970s.

Initially fishing was done as a kind of buffering strategy in the dry season when meat was

unavailable. As hunting laws began to be enforced more stringently and competition for terrestrial resources increased, fishing became increasingly important as a source of food. Among the Tyua, most fishing was done by adult males and older boys. Lines of a dozen or more fishermen would be established in pools to which local groups had rights or had sought permission to use. The lines of fishermen would sweep forward, throwing the small spears down in front of them in search of fish. If they located a fish, one or more fishermen would then spear it with a larger thrusting spear, usually a short, thick-handled spear with a long, flat blade. They would hand the fish they caught to a young boy who would then take it to the bank and place it in a hole dug in the sand. Eventually, there would be a line of such holes along the bank, each of them containing fish belonging to specific fishermen. When the day's fishing was done, the fish would be strung on ropes made of palm leaves or baobab fibre and carried back to the people's homes.

In order to get an estimate of the numbers of fish being caught during communal fishing expeditions, one of us (Hitchcock) recorded all of the fish obtained by approximately 80 people fishing in a pools in the Nata River, Tsaitsumtsaa, on October 17, 1976 (see Hitchcock 1988, 1988:78-79, Table 6).

Two methods were used: spear fishing and fishing with fish traps. Of the 42 people involved in the fishing activity, 32 had spears (76.2%) and 10 used *dumbu* (23.8%). A total of 304 fish weighing 64.5 km were obtained in the two pools. Of the fish that were obtained, 141 were barbel (*Clarias gariepinus*, sharp-toothed catfish) (46.4%), and 162 were bream (*Tilapia* spp) (53.3%). One fish could not be unidentified (0.3%). That this fishing expedition is not unusual in terms of the numbers of people or the amounts of fish obtained was confirmed by local Tyua, who said that fishing activities like these were done on a regular basis during the winter and spring.

There were differences in the ways in which various segments of the Nata population and nearby groups utilised the resources of the river. Those who lived along the river used the river and its resources fairly frequently. Women tended to use the river more than men, except in the case of spear fishing, and herdboys tended to use the river more non-herdboys. Those people who engage in fishing tend to use the river more than those who hunt terrestrial fauna, although hunters told us that they often searched for game close to the river because some of the species that they especially liked tended to feed and hide in areas along the river (e.g. kudu).

The Nata River was not considered an open-access area; rather, it was divided among groups that were arrayed in villages along its banks, or who lived some distance away but who had long-standing ties to sections of the river. The river itself was divided into a whole series of territories, most of which stretched away from the river on one side or the other but usually not both sides. People had to seek permission to use the resources in the river. From the local perspective, the Nata was segmented into a series of territories (called *no* in Sesarwa). Some riverine resources were considered open to anyone, notably water for drinking. But other riparian resources were restricted, notably certain kinds of trees along the river, firewood, medicinal herbs, thatching grass and some species of veld foods (e.g. *mmilo*, *Vangueria infausta*).

Aquatic resource conservation strategies included having certain areas along the river off limits during specific periods of the year (e.g. in the rainy season) and having some riparian species off limits, two examples being monitor lizards and bull frogs. When local people who had rights to specific sections of the river felt that the resources in their localities were under threat, they imposed restrictions on access to them, and they refused to give outsiders permission to come in to the area or to use its resources. As several people put it, the socioeconomic values of riverine resources are determined by local people, and it is those people who have the right to utilise them, give them away, barter them or sell them. There were cases of conflict over access to areas of the river. People who entered other peoples' territories along the river without permission were sometimes forced to leave, occasionally after rather tense confrontations.

In the recent past there were rumours to the effect that people who had inherited rights to sections of the river had agreed to transfer those rights to non-local people, including large-scale cattle owners, in exchange for cash. There is no question that the number of large cattle owners

had increased over the past twenty years. In some cases this was because individuals were able to convince the government to make allocations of fairly sizable blocks of land even close to the river (allocations which did not fit with the Central District Council's zoning of the Nata as a communal area). Some people, including Botswana government officials (e.g. those from the Ministry of Local Government, Lands and Housing), have suggested that the allocations of land along the Nata are linked to environmental degradation and conflicts over land use in the region.

Land use in Zimbabwe

On the Zimbabwe side of the border fishing in the Amanzanyama increased in the 1950s and 1960s, in part as a strategic response to rising competition for natural resources as a result of greater population densities and, in the 1970s, as a result of the liberation struggle, when people could not go to town for fear of being arrested and jailed. Population size in the Tsholotsho and Bulalima-Mangwe Districts had expanded in the 1950s as a result of immigration of people who were evicted from the overcrowded districts in Matabeleland South such as Filabusi, Matobo, Fort Rixon and West Nicholson. Ndebele, Kalanga and Tyua utilised timber for fish spears, other kinds of tools, construction and fuel wood. Resource depletion and land degradation generally was not pronounced in the western Zimbabwe region except for areas immediately adjacent to the Nata River and its tributaries and along cattle tracks.

In the early 1990s one village in the Tsholotsho area was estimated to use 755 cubic metres of wood per annum. Wood consumption for beer brewing, a major economic activity in the region, was estimated at around 6,200 cubic metres per year over the area (Nangati and COWIconsult 1992). Commercial logging went on in the area for years, although much of it ceased in 1991 due to the depletion of hardwood timber species. In the Tsholotsho District there were 724 water points in 1992, 523 (72%) of which were boreholes. Most households in the region did not have toilet facilities. Standpipes existed in some of the larger villages, and people dug wells in pans for water to meet their daily needs.

The major source of income for many of the households in western Tsholotsho District in the early 1990s was livestock production. According to figures obtained by Nangati and COWIconsult (1992), the cattle population of the North Nata region of Tsholotsho District was 21,648 cattle, 22,611 donkeys, 27,491 goats and 2,810 sheep. People sold their animals both locally and externally. The external sales of cattle were done to the Cold Storage Commission, with peak commercial sales in May-June of each year. The average price of a beast in 1992 was between Z\$500 and Z\$700. Thirty percent of the population of the district did not own cattle. For those that did own cattle, the average number per household was 10. Household members told us in 1992 that they supplemented their income by exploiting reeds and sand from the Nata River which they sold to buyers from Bulawayo. There were also people who worked as commercial hunting guides. Some of the poorer households utilised resources from the river and nearby pools such as bullfrogs and fish.

Communities in western Tsholotsho were involved in natural resource management and utilisation projects under CAMPFIRE, the Communal Areas Management Program for Indigenous Resources. In 1990, for example, two safari companies, Ngamo Safaris and Matabeleland Group, paid a total of Z\$320,322 to the Tsholotsho District Council (Nangati and COWIconsult 1992). Most people in the district were happy with the CAMPFIRE scheme, although some people expressed concern that they were not getting household-level economic benefits, unlike some other districts in Zimbabwe such as Beitbridge and Nyaminyami. It should be noted, however, that not all of the households in the district benefited from CAMPFIRE-related programmes.

Some Tyua households were relocated out of grazing areas on the Botswana-Zimbabwe border as a result of the implementation of the Zimbabwe Natural Resources Management Project (ZNRMP) in the early 1990s (Hawkes and Madzudzo 1991). Women's access to thatching grass and other wild resources was also reduced because they had less land on which to forage and they

had to compete with people engaged in commercial exploitation of the grass.

On the Zimbabwe side of the Botswana-Zimbabwe border there is a small dam on the Amanzanyama, the waters of which are used for watering livestock and for domestic purposes (Nangati and COWIconsult 1992). There was concern expressed by local people about the possibility of additional dams being built along the Amanzanyama in Zimbabwe, since they felt that the flow of the river had been reduced already. There were also concerns expressed about the construction of additional veterinary cordon fencing along the border, since some people believed that the cordon fencing was linked to deaths of wildlife and restrictions on their movements which, they suggested, led to lower reproduction rates.

The Nata Sanctuary

The Tyua and other Nata River residents in Botswana have been affected by the establishment of a conservation area, the Nata Sanctuary, which incorporates the Nata Delta where it flows into Sua Pan (Liversedge, Ross Greer and Lethare 1989; Venn 1996). Located on the northern tip of Sua Pan in the Makgadikgadi Pans region of northern Botswana, the Nata Sanctuary is 230 square kilometres in size. The sanctuary contains pans consisting of clays and salts covering some 45 % of its surface area, rolling plains savannas, and strip gallery forest along the Nata River itself. It is known for its large numbers of migratory birds, especially flamingos and pelicans which use the area as a feeding ground and breeding area. The area also supports a variety of antelopes, including springbok, impala, and kudu.

From the time the Sanctuary idea was conceived in the mid-1980s, it was visualised as a biological reserve area where people other than tourists and staff members would be excluded. The planning of the Sanctuary included discussions with people in the immediate area, including Nata Village, which is 18 kilometers to the northwest (Liversedge, Ross Greer and Lethare 1989). Discussions about the founding and management of the Nata Sanctuary included some of the people from villages along the lower and middle stretches of the Nata River (see Table 6).

Table 6: Communities involved in the Nata Sanctuary, Botswana

| Community Name | Population Size | Percentage of Basarwa | <i>Tirelo Sechaba</i> Participants ¹ | Distance to Nata Sanctuary (km) |
|----------------|-----------------|-----------------------|---|---------------------------------|
| Nata | 3,000 | 50% | 12 | 18 |
| Maposa | 400 | 80% | 4 | 38 |
| Manxotae | 600 | 80% | 4 | 58 |
| Sepako | 800 | 80% | 6 | 78 |
| Total | 4,800 | 61% | 26 | |

¹ *Tirelo Sechaba* (National Service) is a nation-wide service programme for young Batswana that was started in 1981. It gives former students the opportunity to work in rural areas of Botswana

The local people wanted very much to be a part of the discussions about the establishment of the Sanctuary because it is situated in an area that has long been used for a variety of purposes by Tyua foragers and Bamangwato and Kalanga agropastoralists, including grazing, firewood and wild plant collecting, fishing and hunting. An important salt collecting area is now within the boundaries of the Nata Sanctuary, something that has caused consternation among people further

up the river who in the past depended on salt collection as a means of generating income and providing materials for trade with groups to the east.

An increase in the number of community-based natural resource management projects, including one in the Gweta area to the west of Nata, resulted in an expansion in the exploitation and sale of various wild plant products, one example being *marula* (*Sclerocarya caffra*). Local Tyua and other groups have argued that the commercialisation of these items has led to a reduction in the availability of these resources for use by the poor.

Similar kinds of impacts were seen with the establishment of commercial tourism operations in the Nata area. The founding of Nata Lodge in the 1980s provided some local people with employment and income generating opportunities. At the same time the increased numbers of tourists in the area, including some who liked to fish, led to greater competition with local people over natural resources. Some of the Tyua who used to live in the area south of Nata Village moved into the village, where they established new homes. They did this in part, they said, because they could no longer make a living from the area along the lower stretch of the Nata. Some of the land had been set aside for the Nata Sanctuary. The pools were being fished by tourists, and the wildlife numbers had declined because, they said, of fences and expanded numbers of livestock.

Conclusions

As the Nata River case demonstrates, riparian ecosystems in southern Africa have long been an integral part of the livelihoods and life ways of local communities. Rivers are complex ecosystems, and they provide a wide variety of ecological services and resources that help sustain plant, animal, and human populations. Local people say that the flow of the Nata River replenishes the aquifer in the riverbed itself, ensuring that relatively clean water is available to them and their animals. People who use the river frequently note that many things are dependent on a regular flow of water in the Nata-Amanzamyama catchment, including fish, invertebrates, riverine-adapted plants, birds, and both small and large mammals.

Having the ability to graze livestock along rivers is crucial to the well-being of agropastoral populations, and the pools in the river serve as a crucial fall-back resource during winter and during drought periods. At the same time, there are conflicts between livestock users and those exploiting fish and other resources in the river. Tyua remarked to the effect that the cattle stirred up the mud in the pools of the river, causing problems for the fish as well as the fishermen (University of New Mexico Kalahari Project 1987). There were also concerns expressed about potential conflicts that might arise with the establishment of the Soda Ash Botswana project in the northern Sua Pan area, the only mining project affecting a wetland in northeastern Botswana. Some of these concerns, which were anticipated in the Environmental Impact Assessment (EIA), turned out to be well-founded (Ndaba 1995:84-85).

Men, women and children utilised the Nata River extensively, not only through collecting water but also for carrying out such activities as washing clothes and dishes, collecting reeds and firewood along its banks, and sometimes engaging in fishing and collection of bullfrogs and other resources. Women and children tended to use the river more intensively than men, who confined most of their river-oriented activities to fishing, washing, grazing of livestock and digging of sand. Women noted that the level of the river is of crucial concern to them. They usually do not like to cross the river if it is above their knees. They also do not venture close to the river when it is at peak flood. There were a number of cases of drowning of people in the Nata, something that led them to request the Central District Council in 1976 to build a bridge at Manxotae (Man/otai) so that they could cross the river more easily and with less risk.

The early floods of the river at the beginning of the rainy season bring health problems, including stomach disorders that come from drinking the water even if it is boiled. The pools in the river allow mosquitos to multiply, and malaria is a major health problem in the Nata region. Efforts were made by the Botswana government to spray people's homes to alleviate the problems brought

by mosquitos, something that was much appreciated by local people.

The river had both material and symbolic value to the people who lived in the northeastern Kalahari. On the one hand they depended on it for its resources, while on the other they saw it as a life-giving force, one that was associated with Molimo (God). Often people would simply sit along the banks of the Nata, gazing out over it and enjoying the view. There were numerous stories about the Nata in the folklore of the Tyua. There were beliefs about river snakes that would appear in people's compounds on occasion, especially if they had committed some social transgression. There were also beliefs that the river would stop flowing if people committed a socially or environmentally irresponsible act, such as destroying an entire herd of antelopes during a hunt or eating a totem animal (known in Setswana as *sereto*).

Overall, the Nata, like other southern African rivers, represents a resource with both costs and benefits. Floods are seen as problematic to some, but others feel that the floods purify the area and help replenish the riparian resources that they need. The dry periods, too, have their utility, bringing people closer together in their efforts to survive.

The Nata River is a crucial buffering resource in the semiarid northern Kalahari ecosystem. It served as a kind of emergency area to which people could repair during periods when there were serious resource shortages in other areas. It was noted by local people that the *//kaiha*, the traditional leaders of the Tyua and the chiefs and headmen of the Ndebele, Ngwato and Kalanga tended to allow local people to enter areas when the droughts or other problems were so serious that the people asking permission to use their resources were at the risk of dying if they did not get access to water and food.

Knowledge of rights concerning riverine land and resources is maintained assiduously by those individuals who deal with land and resource management. This knowledge, which some people identified as being in essence 'indigenous knowledge', was passed down from one generation to the next. In some cases, the information was provided to young people during initiation ceremonies. Eventually people were able to build up what they considered to be a kind of 'mental map' of the Nata River region. This cognitive map included not only resource areas and places of historical importance but also areas which were significant ideologically and ritually, such as the burial places of their ancestors. People along the Nata managed the river and its diverse resources in innovative ways, attempting to ensure the availability of crucial goods and services of the river over the long term. "Without the Nata," one woman said, "we would be lost."

Figure 5: Tyua woman collecting water in the sandy bed of the Nata River



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