

# Ngorongoro: A Challenge

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*The Ngorongoro Conservation Area of Tanzania, covering 3292 km<sup>2</sup> of one of the most diverse and spectacular natural environments in the world, is a unique balancing act between conservation and development. Some 18 000 Maasai pastoralists share the Ngorongoro with vast numbers of wildlife and manage to do so in harmony with their environment. But competing land use interests, especially agriculture, will continue to put further development pressures on this fragile area.*

Human interest in the Ngorongoro goes back beyond the dawn of history as is evidenced by the numerous remains of hominids, mankind's earliest recognizable ancestors. At present, however, there are nearly 18 000 people who live in the Ngorongoro Conservation Area (NCA) and the majority of these people do not know any other home. In addition, the area is covered with thousands of domesticated animals and literally millions of wild creatures. Ngorongoro's outstanding natural features readily qualified its inscription on the World Heritage List in 1979. However, it is the perception of its potential value by different interest groups, both within and outside Tanzania, which makes

Ngorongoro a case study in the classic clash between conservation and development.

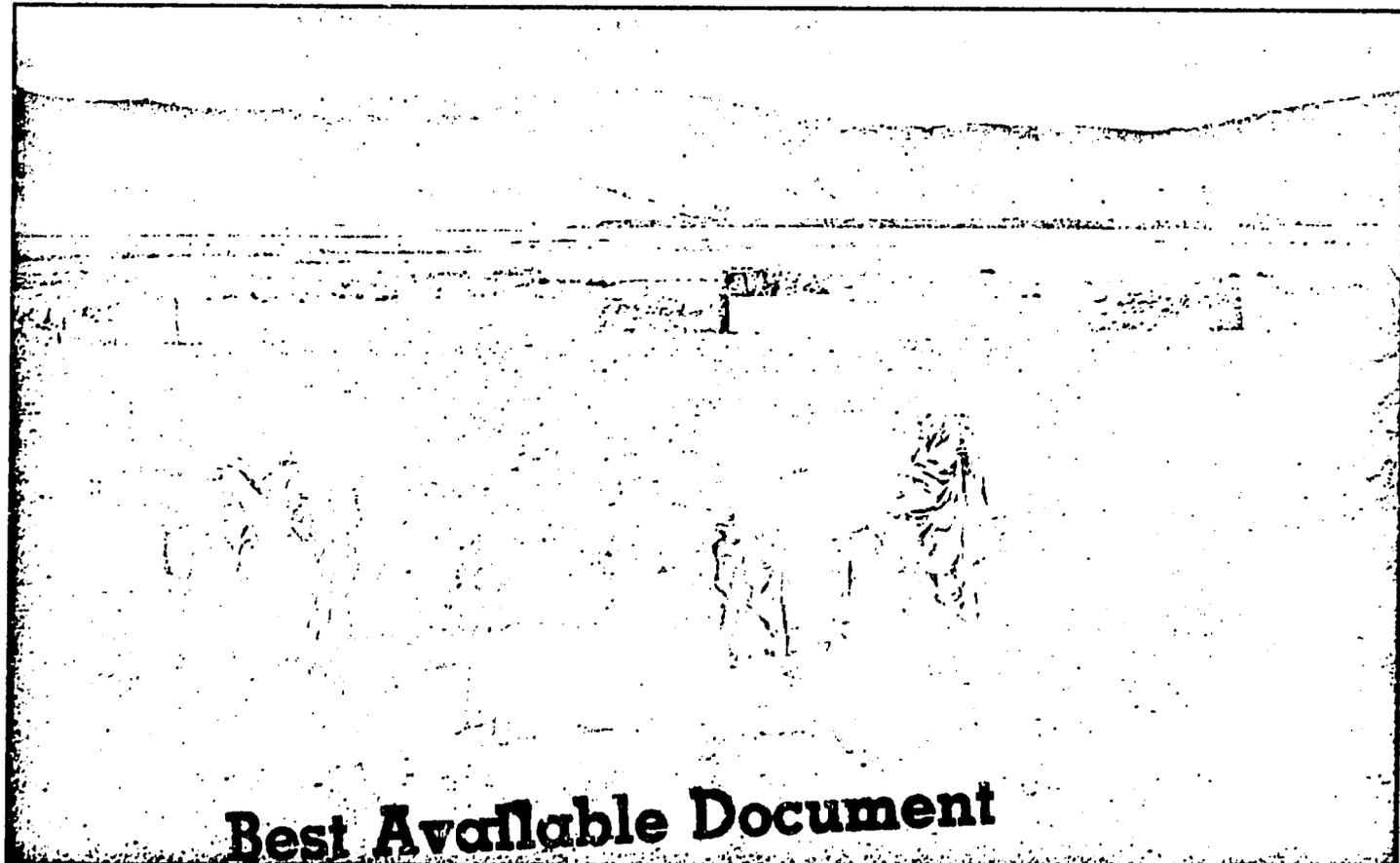
H A Fosbrooke, who started his career in East Africa about 50 years ago and became the first conservator of Ngorongoro, aptly introduced the many alternative types of land use for the area, some complementary and some conflicting, when he wrote:

"To the visitor, Ngorongoro suggests teeming African wildlife in an idyllic setting of scenic grandeur: to the archaeologically minded it is the gateway to Olduvai, home of man for 1 750 000 years: to the conservationist it presents an acutely controversial issue:

to the financier a source of foreign exchange: to the student of nature a paradise for research: to the land-hungry, an untapped expansion area: and to the Maasai, a home" (1).

Therefore, the NCA is an attempt to harmonize conservation and "development", two activities which conventionally are diametrically opposed to each other. The simplest solution would have been to lock the area away as a national park: there are many precedents in Tanzania to do so. Equally, the government could have given in to development pressures and allowed farmers or pastoralists to use the area for a few years before it was made worthless. Instead the government of Tan-

This unfenced Maasai boma or village is situated on the floor of the Ngorongoro Crater. Currently, some 18 000 Maasai pastoralists share the Conservation Area with vast numbers of wildlife. Photo: H Fosbrooke.



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# to Conservation and Development

BY ADOLFO MASCARENHAS

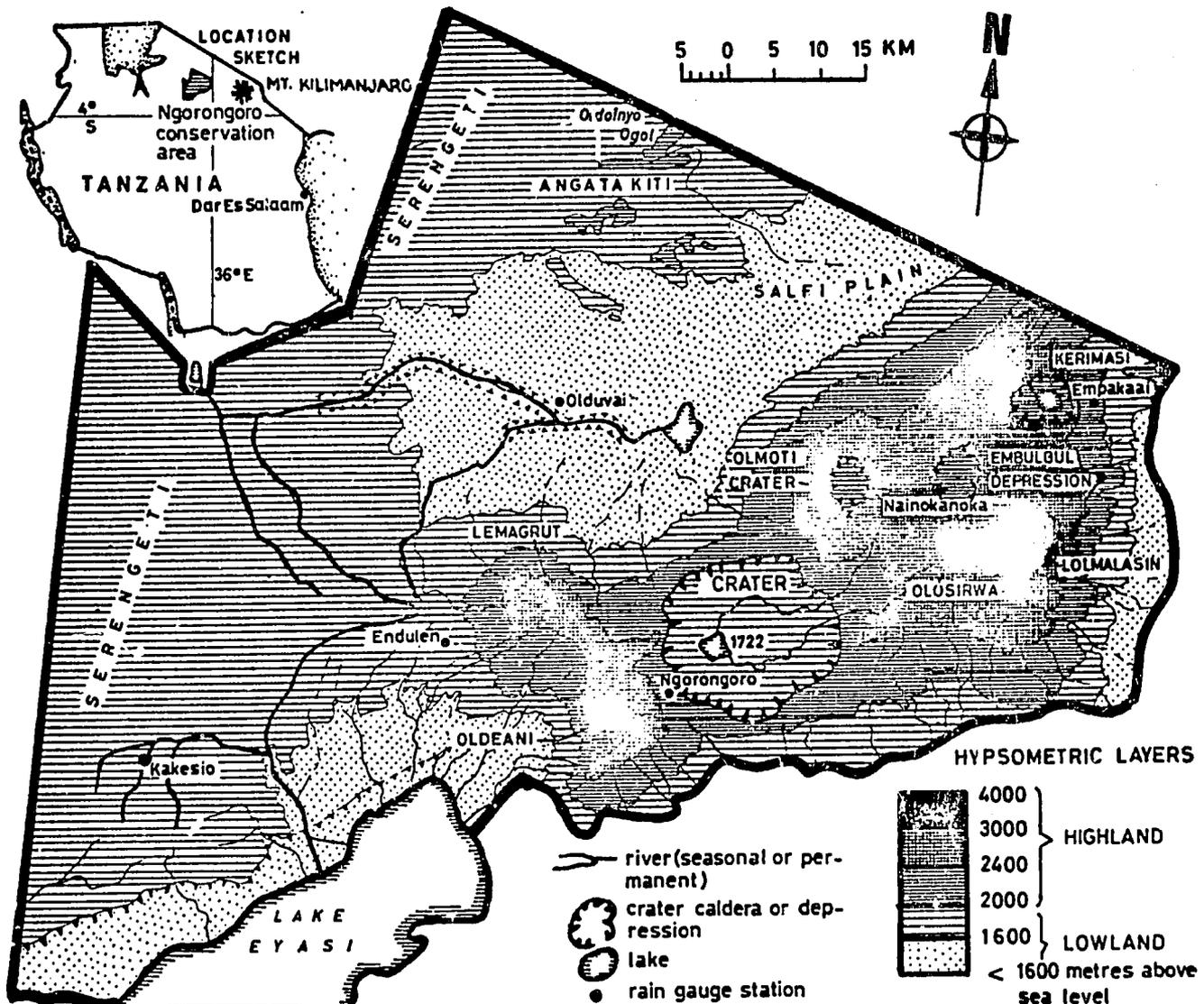


Figure 1. The Ngorongoro Conservation Area.

zania took the decision to protect the interests of both man and nature. This is what makes Ngorongoro so unique. In addition, the dilemma in decision making is intensified because the resources of the area are staggering to the imagination, yet the environment is a fragile one. What are these resources?

## NGORONGORO'S NATURAL RESOURCES

### The Landscape

What is known as the NCA is located in Northern Tanzania which is reputed to have one of the most diverse and spectacular natural environments to be found any-

where in the world (Figure 1). It stretches from the perennially snowcapped Mount Kilimanjaro and ends in the salt flats of the vast sun-parched plains. Part of this complex is the NCA, an area of some 8292 km<sup>2</sup>. Access to the area is from the nearest large town, Arusha, which is 175 km to the southeast. The route bumps through some very desolate country into the Manyara National Park, up the side of the Gregory Rift and finally into the Northern Highland Forest Reserve.

The formation of the Ngorongoro Crater and the other highlands are associated with the massive rifting which occurred to the west of the Gregory Rift Valley (2). Volcanic vents ripped apart this weakened crust which is marked today by six giant

towering dome-shaped plateaus over 3300 meters high. One of them, the Ngorongoro Crater, has an area of 307 km<sup>2</sup>, making it one of the world's largest inactive, unbroken, unflooded calderas. From the rim of the Ngorongoro Crater there is a spectacular view of the floor 650 meters below, while the Embakaai Peak rises in the distance along with cone-shaped Lengai, which is an active volcano, and its neighbor, the Kerimasi, which is extinct. The highest point in the whole system is the Sirua-Lolmalasin block. Volcanism has left its indelible imprint on the landscape, contributing to the preservation of many prehistoric "events".

The northern and western boundaries, formed by Maswa District and the Seren-

2



This consort pair of lions were photographed on the floor of the Ngorongoro Crater. There is nearly one lion for every 2.5 km<sup>2</sup> of the crater floor, giving the area one of the most dense lion populations known in Africa. Photo: A Mascarenhas.

geti National Park, are part of a vast plain which defies human boundaries. Even in the plains there is much to learn and observe, for geology and history have conspired to retain one of the earliest records of our hominid ancestors at the Olduvai Gorge.

#### **Climate**

Because of the great amplitude in relief and the dynamics of air masses, there is a great variation in the climate of the area. In the highlands it is generally moist and misty and temperatures can be as low as 2°C. At the other extreme, in the semi-arid plains, temperatures can often go up to 35°C. Rainfall is seasonal and follows the altitudinal gradient. The highlands in the east may get as much as 1100 mm of rainfall while in the semi-arid plains in the west the rains are erratic, sparse and in some years even totally absent. In the highlands, rains are further arrested by the forests. Elsewhere some of the water quickly sinks into porous ground.

A considerable amount flows into streams which end in the plains as marshes, or into closed drainage basins with their alkaline lakes, or flows out seasonally into Lakes Man'ara and Natron or the more distant Lake Victoria.

#### **The Vegetation**

The variable climate and diverse land forms have resulted in several distinct habitats. The vegetation varies from open grasslands to montane forests and from scrub to heath in the higher altitudes. The

Northern Highland Forest Reserve and other related forests are fundamental to the management of the hydrology, not only of the NCA but also of the rich agricultural lands outside the conservation area. Destruction of the forests would alter the flow of the streams and springs and threaten many life forms including those of the pastoralists.

Over half of the NCA consists of grassland and the proportion is even larger if the shrublands are included. These grass and shrublands are rich and support very large animal populations. Their richness can be appreciated if one considers the vast number of animals which feed on them at the same time and the variety which exists. Rhinos, for instance, dine on over 160 species of plants in the Crater alone (3).

The full potential of the land and its vegetation have yet to be fully appreciated and will offer a challenge to scientists for a long time. Meanwhile, most of the attention is focused on the other major resource—wildlife.

#### **Wildlife Resources**

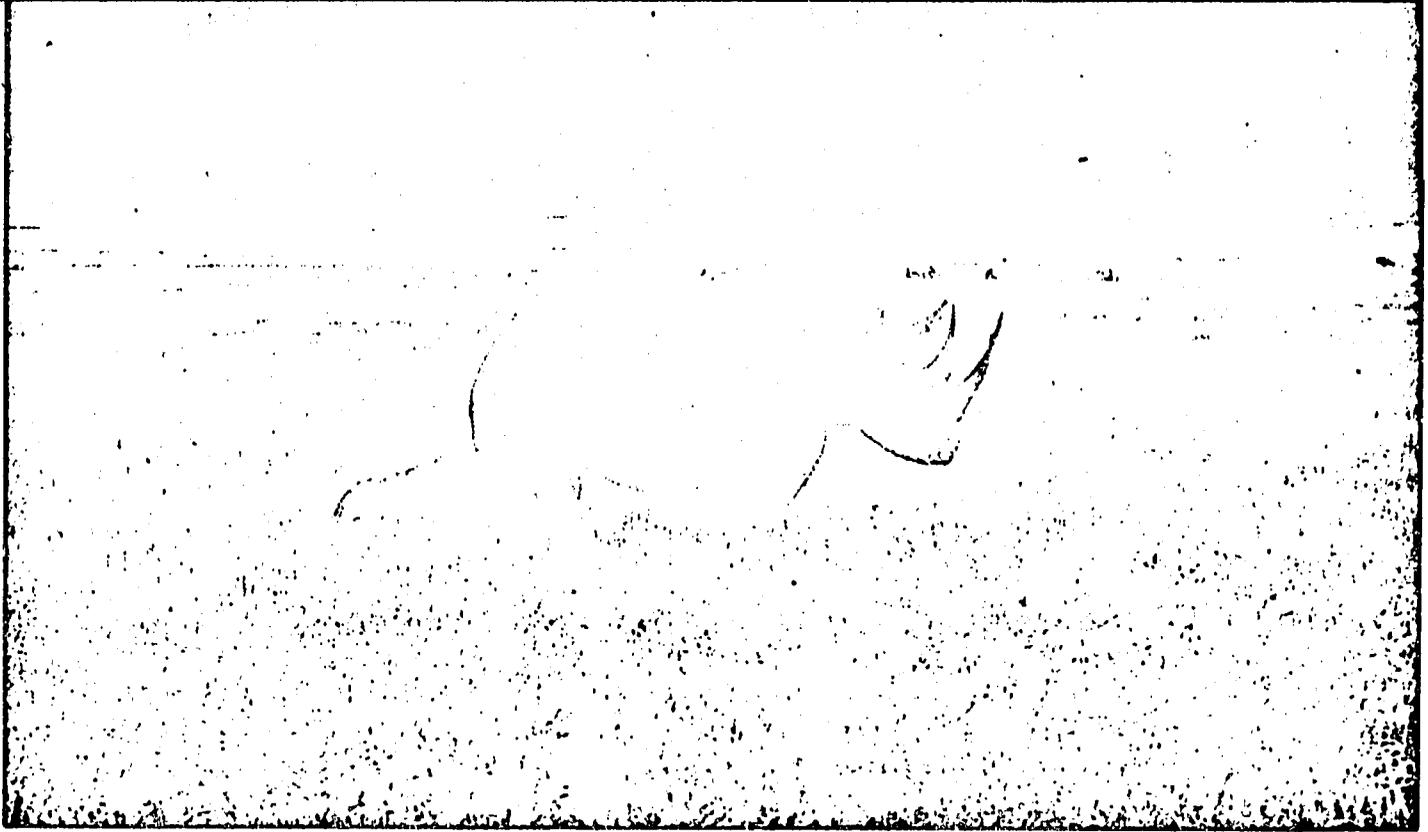
The wildlife resources of Ngorongoro fall into at least six distinct populations. First, the wildlife populations found in the montane forests of the wetter eastern slopes of the Ngorongoro Crater and Oldeani consist of such animals as buffalo, rhino, elephant and bushbuck. No detailed studies have been undertaken of this habitat here or in any similar forests in East Africa. Second, in the arid lowlands around Lake

Natron there are oryx, lesser kudu, zebras and wildebeest but the rhino and elephant have been eliminated.

Third, in the Ngorongoro Crater itself there is a resident population of rhino, buffalo and elephant. The former have been a source of great concern because of the pressure exerted on them elsewhere. For instance, in the Olduvai in 1965 there were about 80 rhinos but today not one remains. In the Crater the numbers are down from 100 in the mid-1970's to 20 at last count. Small as this number is, it represents the only visible breeding population of rhinos left in northern Tanzania (4).

The fourth category consists of animals permanently resident in Empakaai and Olmoti craters. Here zebra dominate numerically but there are also large herds of eland and reedbuck. In sharp contrast the fifth is found in swamps and water bodies, both in the Crater and outside it, with vast numbers of breeding water birds, especially flamingoes. Finally, the plains of Ngorongoro, which merge in the west with the vast Serengeti National Park, boast breath-taking numbers of migratory animals. In January 1980 Ecosystem Limited counted the following animals in the NCA: 1 060 200 wildebeest, 72 200 zebra, 373 800 Thomson gazelle, 10 000 Grant's gazelle, 1100 hartebeest, and 4700 elands. The migration pattern and changes in the populations of the plains animals are a fascinating and unique phenomenon.

The NCA is of great value for ecological and management studies of the flora and fauna. The high population density and



Rhinos face an uncertain future. Over the last 15 years, poaching has reduced the Ngorongoro rhino population by some 80 percent.  
Photo: A Mascarenhas.

variety of animals in a natural habitat which is used by man, but not disturbed by this use, yields valuable ecological insights into the inter-relationships between the animals and their selective use of the same habitat. The presence of permanent resident animal populations facilitates the study of animal behavior including reproduction, while the opportunities to study and observe predator-prey relationships are unrivalled anywhere else in the world. The role of animals on the composition and yield of grasslands, the impact of fire on the various habitats and the efficiency of various types of vegetation are yet another field of pure research which can be conducted in Ngorongoro (5).

Already some impressive scientific studies have been completed which demanded new methodologies and techniques. For instance, how could the thousands of wildebeest be studied if they could not be identified? Immobilization and marking techniques of the species assisted Estes in his study on the behavior, mobility and reproduction of the wildebeest (6). Photographic techniques have been used to study rhinos. Some field work has even succeeded in dispelling popular myths. An investigation of over 350 spotted hyenas in the crater have shown that the much maligned creatures are not only scavengers but the main predators of ungulates, such as zebras and wildebeest (7). Thus, they compete with the majestic lions as predators. Despite the many field studies which have already been carried out, a great deal still remains to be done before

the secrets of Ngorongoro's animal resources unfold (8).

#### THE ARCHAEOLOGICAL SIGNIFICANCE

The NCA has several palaeontological and archaeological sites dating from the Miocene to the recent past. The variety and richness of the fossil remains, including those of early hominids, has made Ngorongoro one of the major areas in the world for research and study on the origin and evolution of the human species. The various archaeological and palaeontological findings make the area a repository of sequential data for the last 15 000 years, extending back about four million years. This combination makes the area globally unique. It is a museum and a laboratory of the cultural and technological development of man through time and space.

In brief the major archaeological features of the NCA fall under four major headings. First is the Olduvai gorge, which was given a major place in history in 1959 when Dr Mary Leakey found the *Zinjanthropus* skull (9). Potassium argon dating dramatically backdated the Australopithecine generic group from about 500 000 years to about 1.75 million years. Remains of another generic group called *Homo habilis* were discovered a year later.

Stone tools litter the area, contributing greatly to our understanding of the evolution of human technology. The archaeological significance of the Olduvai was first recognized by a German scientist in 1911.

But it was not worked extensively until the 1930s when the late Dr LSB Leakey scoured the area. From the 1950s to the present it has been investigated by the Leakeys and many other scientists.

The dividends have been rich not only for studies in human evolution but also for investigations of palaeoecology, subsistence, camping and living sites of hominids, past climates, and the evolution of various vertebrate and invertebrate life. Despite the advances made in the Olduvai Gorge, the area is so vast and diversified that it should attract a further generation of scientists and scholars.

In 1978, Dr Mary Leakey made a sensational and unique discovery of hominid footprints preserved in volcanic deposits at the Laetoli site. A total of 31 dual tracks made by two individuals walking in tandem and several prints of a smaller individual have been exposed, mapped, preserved, photographed and studied. These prints were made by hominids and potassium argon dating provides evidence that bipedal gait evolved between 2.8-3.6 million years ago. Although there were no stone tools, the area is rich in fossils of extinct and surviving animals, birds and reptiles.

In addition there are various sites at Lake Ndutu which are rich in faunal material and stone artifacts belonging to the Acheulean Industrial Complex dating back 200 000 to 500 000 years BP (Before Present). To the north of Olduvai is the Nasera Rock Shelter containing Early to Middle Stone Age remains.

crater itself rest numerous burial mounds. Excavations have yielded stone bowls, grinding stones, pottery, and beads of semi-precious stones. Both stone and iron objects have been found. These findings have raised new provocative questions concerning the cultural levels of the Terminal Stone Age and Iron Age people (10). Fascinating as these discoveries are, the real human drama centers on the future development options of the pastoralists and other people who presently occupy the area.

### THE PASTORAL MAASAI

Wandering around in the midst of all this wealth—archaeological, ecological and scenic—are Ngorongoro's present tribal inhabitants: the Maasai. These people have carved out a place in history for themselves far out of proportion to their numbers. The Maasai are pastoralists whose territory at the height of their power—in the latter half of the last century—covered thousands of square kilometers, extending all the way from the shores of Lake Victoria to the Indian Ocean. European colonization artificially split the Maasai between Kenya and Tanzania.

The Maasai in Tanzania numbered 79 649 individuals in 1967, the last year for which figures are available. On the basis of their past low growth rates, they now probably do not number much more than 90 000. Like pastoralists all over the world, they have come under great pressures from population increases and the loss of their traditional grazing lands as more new land is put to the plough. Some of the Maasai have actually succumbed to the "evils" of cultivation but basically they are still pastoralists and merit attention for several reasons.

The Maasai, more than any other group, have attempted to be a self-providing society in an environment of great risks. They suffer from marked changes in seasonal rainfall and high local variability. This means that their food supply system, which is dependent on livestock, is so subtly balanced that they have to move frequently in order to take advantage of annual and seasonal variations. The Maasai grazing grounds are frequently areas of large and diverse wildlife populations and the pastoralists have coexisted with wildlife for centuries. This semi-arid, environmentally fragile belt which is home to the Maasai and countless wildlife covers a large part of East Africa and has potential, however risky, as a base for livestock development. Yet so far there is no range management practice that can compete economically or ecologically with that practiced by the Maasai. Despite this, traditional pastoral lands have become the focus of high risk commercial agriculture. These pressures seem to be increasing. In this general context the Maasai have to walk a tight-rope



Aerial view of Maasai bomas in semi-arid country. Photo: H Fosbrooke.

which could lead them through a course of confrontation with other groups whose interests are not necessarily the same.

#### The Maasai in Ngorongoro

About 20 percent of the total number of Maasai in Tanzania live in the NCA. Many came there because they were ordered to leave the Serengeti and Tarangire areas when these were declared national parks. The Ngorongoro area with its lush mountain pastures was offered as an inducement. The highlands are seen by the pastoralists as the key to the continued occupancy of the surrounding dry plains. In exceptionally dry years even non-resident Maasai might seek refuge there, thus swelling the numbers of domestic animals and people. Since the survival of the Maasai is based mainly on pastoralism, there is reason to examine how their distinctive social and ecological adaptation to the environment actually works in practice.

The Maasai have a highly complex tri-structural organization based on a territorial identity, clan affinity and an age-set system. Each male individual belongs to a particular territory, a specific clan and a named age set. The life of a Maasai male is divided into several stages which define his rights and obligations to his society (11).

The *boma* is a basic settlement unit. It is a circular arrangement with a thorn bush stockade and small huts. The walls and roofs of the huts are covered with dung and mud. The number of huts depends on the number of wives and the size of the family. At night the livestock are kept within the *boma*. The settlements are concentrated around the permanent water sources which survive the dry season. Several *bomas* make a locality and these in turn make a section (*oloshi*) which is the largest social and territorial unit.

Cattle are a fundamental economic and social property, forming the basic mode of

exchange and providing food. In the Ngorongoro, small stock such as goats and sheep are rapidly increasing in number because they are easier to manage, to dispose of and to consume. Cattle are used mainly for milk and blood, not meat. The family herd is divided into three groups: mature cattle are grazed furthest away while their offspring may be kept within the *boma* and the smallest stock and calves graze close to the *boma*. Pasture during the dry season must be available within a radius of about 8 km.

The high potential pastures found in the moist highland glades and forests are allowed to rest during the wet season, when young men and warriors move into the plains and establish temporary camps. As they move they set fire to the dry grass. This management practice kills off ticks and parasites, checks bush encroachment and helps make the new growth lush and palatable. In the wet season the livestock share the pasture with the plains animals. Women, elders and children remain with a few milk cows and their young in the permanent settlements. Essentially, the Maasai in the NCA are transhumant not pure nomads, but because the resources vary from locality to locality, there are several variants of transhumance (see Figure 2).

There is considerable controversy about the exact number of people in the NCA partly because pastoral people are difficult to enumerate and they are mobile. There have been significant fluctuations in the number of people residing in the NCA. In 1957 there were about 10 633 of them but by 1970 the figure was down to 5435, rising to about 17 982 during the 1978 census (Figure 3). Arhem has tried to explain these variations: there is movement in and out of the NCA (during severe drought periods such as 1960-61, 1973-74 many more came in), the month during which the census counts were made and the methodology and personnel involved could all affect the accuracy of the numbers. Whatever the facts, the Maasai population in the NCA has undergone changes in its composition, in the size of settlements and in the number of individuals within each settlement (12). What is the significance of these fluctuations and changes? Do they represent optimal carrying capacities? What is the implication of these changes to the future Maasai way of life? Perhaps the way in which NCA has been managed in the past will give a clue to the apparent management conflicts of the future and the likely options.

## MANAGING CONFLICTING INTERESTS

### Historical Background

Balancing the various competing interests in the NCA clearly made it necessary to have a management authority and definite

Figure 2. Wildlife and domestic animal densities in the Ngorongoro Conservation Area.

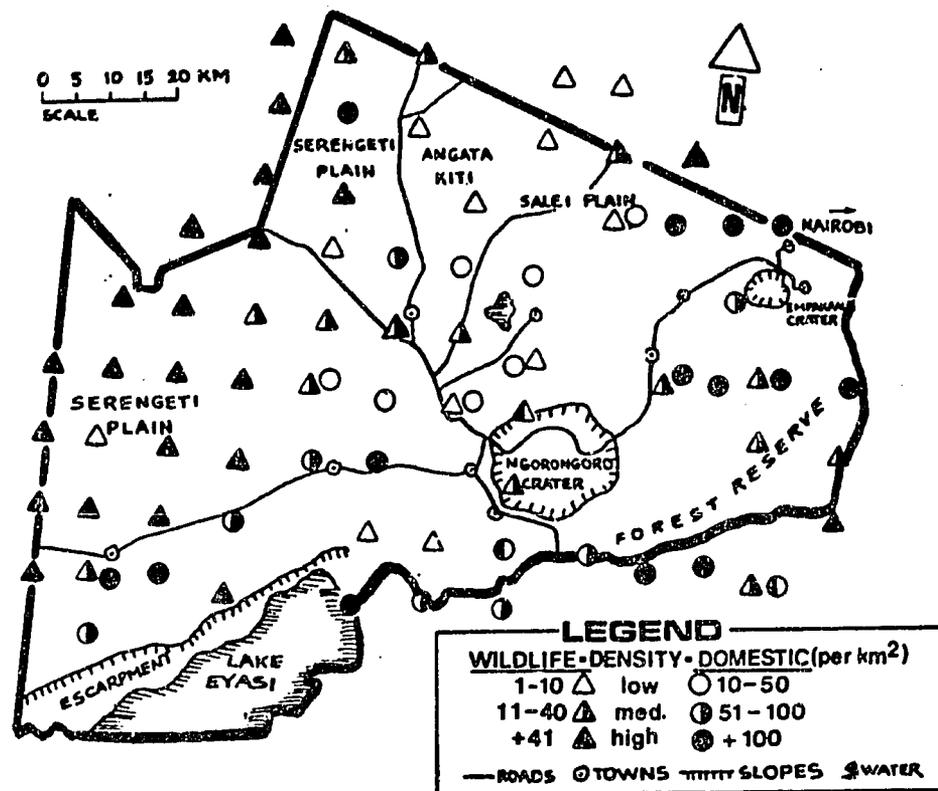
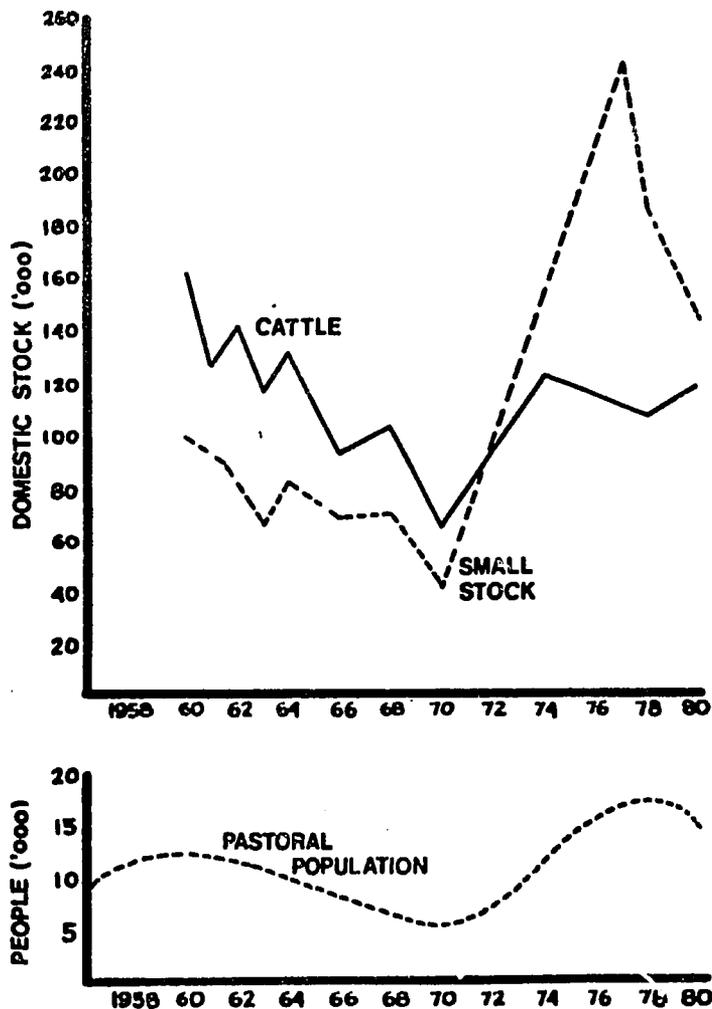


Figure 3. Population trends in the Ngorongoro Conservation Area, 1957-80. Source: Arhem (1980).



tions and making them work takes time. Plans would be easy to draw up if everything remained static but this is seldom the case, even less so in the NCA.

Under the provisions of the Game Ordinance the whole of the Serengeti Reserves and the Ngorongoro were combined to form the Serengeti National Park (SNP)—a process which was initiated in the 1940s—but nothing was done to secure the rights of any person whose land was included in the Park. It soon became apparent that the single-use concept of a national park made it incompatible to have the Maasai and their livestock as well as game in the SNP. A proposal to whittle down the SNP was seriously considered by the former government of Tanganyika. The publication of a government paper to this effect caused so much concern among conservationists, including those in Europe and North America, that a Committee of Enquiry was appointed to look into the issue. The outcome was the Ngorongoro Conservation Area Ordinance of 1959 which excised the eastern part of the former SNP and created the Ngorongoro Conservation Area Authority (NCAA). It was charged with ensuring the multiple land use of the area so as to assist in "conserving and developing the natural resources of the Area." The Authority was composed of government officials representing interests in veterinary medicine, water supply, forestry, and game management, along with four Maasai elders. But ultimately the Authority failed to function because of the lack of rapport between the government officials and the Maasai (13). However, by 1960, the administration prepared a draft management plan for the NCA. The plan was reviewed by Mr H A Fosbrooke and revised (from a sociological point of view) in 1962. In addition, an advisory body consisting of prominent conservationists and senior government officials was also established. Mr Fosbrooke was appointed conservator in 1962 and the Authority was strengthened by additional officers. The 1962 Management Plan was reviewed by Dr W J Eggeling from the United Kingdom Nature Conservancy, a former Chief Conservator of Forests. His report drew attention to the "unending spate of advice—which has impeded, confused and bedevilled not only the rational development of the area but also the official relationship with the resident Maasai. The time has come to concentrate on acquiring the basic data without which no new land use methods can be introduced safely" (14).

This was a period of great pessimism and uncertainty about the future priorities of a country that would soon become an independent sovereign state. The turning point came in 1961 when Prime Minister Julius Nyerere issued the "Arusha Manifesto" to conservationists attending an IUCN meeting in Arusha.

issues, the contradiction between local versus international interests; the rights of communities versus the opinions of scientists; community participation versus bureaucratic decision making; and planning and the consequences of the lack of it. The Ngorongoro case study amply demonstrates the dangers in blanket prescriptions. While there are no universal answers, there are options, but each one has a price. Obviously there is no such thing as neutrality when it comes to development.

In the two decades that have passed since the NCA was created, considerable effort has been expended to reconcile the various conflicting interests. Contrary to the most pessimistic scenarios neither the wildlife nor the Maasai have disappeared. Wildlife is abundant and the Maasai have increased manyfold. Pastoralism is definitely compatible with the management of wildlife. However, the question of poaching should be raised here. There is no conclusive evidence to indicate that the pastoralists alone are responsible for this threat. One school of thought suggests that so far the pastoralists and animals have kept most people who would have moved into the area, out of it and so minimized poaching. But as long as the demand for rhino horn remains, the threat from internal and external sources will continue. On the whole, the efforts of the NCA have kept poaching of other animals to a minimum.

#### Anticipating future priorities

The new management plan presently under consideration highlights the need to focus on the pastoralists. As noted, the level of research into human and range ecology is extraordinarily low. This is especially true in comparison with the level of wildlife and early hominid research. There is also some urgency to deal with the deteriorating food situation among the Maasai (15).

The "villagization" programs of Tanzania have helped to improve the level of social services but these programs were based on sedentary communities, with very little understanding of the special problems of the pastoralist. And little work has been done on herd composition, so there is a danger that some families cannot subsist (16).

The Arusha Manifesto, reassuring as it was in the 1960s, raises two very relevant questions for the future. First, if the wildlife heritage is to be conserved for future generations, the question of costs and priorities is becoming more and more pressing. Second, conservation calls for specialist knowledge, capital and manpower. These are scarce locally and difficult to obtain from abroad. Can a poor country like Tanzania afford to subsidize the world's heritage? Clearly there is need for a

for addition: international cooperation to assist national efforts.

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